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FOOD TERRITORIES.
The Political Economy of Food Systems
and its Effects on the Built Environment.
Case Study Egypt.

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Man's ability to participate intelligently in the evolution of his own system is dependent on his ability to perceive the whole.

Immanuel Wallerstein, *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteen-Century*, vol. 1 (University of California Press, 2011), 10.

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Abstract

(English)

This dissertation investigates the relationships between food systems and the built environment through the lens of political economy, focusing on the case of Egypt. It argues that food systems as well as the factors that influence them at social, economic, and political levels also affect architecture, urban form, and territorial organization. In order to assess specifically how food systems contribute to the architecture of territory, the study identifies, describes, and explicates material interrelations between grain commodity trade and the development of the built environment in Egypt.

First by examining a host of operations of the global commodity chain, political and economic machinations of the international food order are precisely articulated, and interconnections between food systems, the grain chain, and spatial organization at the geographical scale of the world are identified. Consequently, the specific treatment of the three case studies deals with examples of acute conditions of spatial transformation in correlation with segments of the food system: 1) food subsidies and urban space in Alexandria, 2) food production and informal urbanization in Cairo, and 3) food security and infrastructure with the Toshka Project in Upper Egypt. Egypt is thus examined as to how food systems operating a various scales—trans-national, national, and local—transform socio-spatial territories and how those systems are reciprocally transformed by ongoing changes in territorial relations.

By investigating the spatializing dynamics of food systems, the work seeks to better comprehend how political, economic, and spatial practices interact to produce specific territorial conditions of our world. The hypothesis foregrounded is that the vital resource of food is determinate of territorial organization. Yet, this work argues that it is not only possible to address political economy through architecture and urban forms, but also that commodity protocols directed by political and economic policy-making in fact determine the production of space. The co-constitutive relationships between political economy of space and the territorial relations is addressed with the notion of *territorial reciprocity*, and by placing the study of the built environment in conversation with Michel Foucault's biopolitical concepts. Ultimately, through spatial analyses of architectural form, urbanization processes, and the political economy of food, this work attempts to extend discourse on the formation of territory by linking distinct spatial outcomes to systems typically considered to operate beyond the purview of design disciplines and spatial practices.

Abstract

(French)

Cette thèse étudie les relations entre le système alimentaire mondial et l'environnement construit au travers du prisme de l'économie politique, en se concentrant sur le cas de l'Égypte. Il est argumenté que les facteurs qui régissent le système alimentaire aujourd'hui au niveau social, économique et politique, affectent également l'environnement construit, les formes urbaines et l'organisation du territoire. Afin d'évaluer précisément comment le système alimentaire contribue à cette architecture du territoire, l'étude distingue, retrace et explique les interrelations matérielles entre le commerce du blé et le développement de l'environnement construit en Égypte.

D'abord en reconstruisant l'enchaînement d'opérations garantissant la circulation mercantile du blé au niveau international, les machinations politiques et économiques qui régissent l'ordre alimentaire mondial sont précisément reconnues et énoncées, et les interconnexions entre le système alimentaire, la chaîne commerciale céréalière et l'organisation spatiale sont identifiées à l'échelle géographique. En suivant cette logique, l'analyse de trois études de cas spécifiques porte sur des exemples manifestes de transformations spatiales en corrélation avec des portions précises au sein du système alimentaire: 1) subventions de pain et espace urbain à Alexandrie, 2) production agricole et urbanisation informelle au Caire, et 3) sécurité alimentaire et infrastructure avec le projet Toshka en Haute-Égypte. Le cas égyptien aide ainsi à percevoir comment les mécanismes du système alimentaire fonctionnant à différentes échelles transnationales, nationales et locales transforment les territoires de manière socio-spatiale, ainsi que de quelle façon ce système est à son tour modifié par les changements survenus au sein de l'organisation territoriale.

En étudiant ces dynamiques de spatialisation du système alimentaire, le travail cherche à mieux comprendre comment les pratiques politiques, économiques et spatiales interagissent pour produire les conditions territoriales du monde actuel. L'hypothèse mise en avant est que l'alimentation est un facteur déterminant de l'organisation territoriale. Cependant, ce travail suggère qu'au delà d'une lecture de l'économie politique à travers l'architecture et les formes urbaines, les protocoles de politique économique peuvent aussi être déterminées par la production de l'espace, ainsi redéfinissant sa qualité d'agent actif. Ces relations co-constitutives entre l'économie politique de l'espace et les relations territoriales sont abordées au travers de la notion proposée de *réciprocité territoriale*, engageant ainsi un dialogue entre l'étude de l'environnement construit et le concept de biopolitique élaboré par Michel Foucault.

Enfin, à travers ces analyses croisées de la forme architecturale, des processus d'urbanisation et de l'économie politique de l'alimentation, et en unissant l'étude de réalités spatiales spécifiques et l'observation de systèmes considérés habituellement comme étrangers aux disciplines de l'architecture et de l'urbanisme, le but de ce travail est d'élargir le discours sur la formation du territoire, et de redéfinir une certaine conception de l'analyse spatiale.

INTRODUCTION

Food, Political Economy, and Territory

Objectives

Literature Review and Methods

Structure

Sources

Food, Political Economy, and Territory

This research investigates the relationships between food systems and the built environment through the lens of political economy, focusing on the case of Egypt. It is argued that food systems as well as the factors that influence them at social, economic, and political levels also affect architecture, urban form, and territorial organization. To evaluate this working premise, Egypt is examined as to how food systems operating at various scales—trans-national, national, and local—transform socio-spatial territories and how those systems are reciprocally transformed by ongoing changes in territorial relations.

Food

In January 2011 as a response to rising commodity prices and food riots underway elsewhere in the Southern Hemisphere, Egyptians took to the streets in mass demonstrations that eventually ended the three-decade-long rule of President Hosni Mubarak. Those events brought to the fore complex correlations between global food markets, local forms of urbanization, and situated political dissent, prompting a series of interrelated questions that are addressed in this work. The research is situated at the nexus of two issues of paramount importance for humanity: food and shelter. Almost any number cited speaks for itself with respect to an ever-growing world dilemma. Every ninth person on earth is undernourished, while urbanization processes have engulfed the globe.¹ Cities absorb the greater part of population growth and rural migration. In addition, the territories shaped by these particular dynamics of accelerated urbanization tend to be located in less developed and more vulnerable world regions. The resulting transfer of poverty from rural to urban areas is occurring at an unprecedented pace, and poor city dwellers remain exceptionally exposed to the dire effects of food price shocks. With the program ‘Food for Cities’, the Food and Agriculture Organization investigates links between urbanization and food security. The published report *Food, Agriculture and Cities: Challenges of Food and Nutrition Security, Agriculture and Ecosystem Management in an Urbanizing World* underscores the timeliness of studying food systems and their impact on both urban and rural contexts.² This topic became

¹ FAO, IFAD, UNICEF, WFP and WHO, The State of Food Security and Nutrition in the World 2017. Building Resilience for Peace and Food Security (Rome: Food and Agricultural Organization, 2017).

² Food and Agriculture Organisation, Food, Agriculture and Cities. Challenges of Food and Nutrition Security, Agriculture and Ecosystem Management in an Urbanizing World (Rome: FAO Food for the Cities multi-disciplinary initiative position paper, 2011), 1-45.

even more relevant in light of the crises of 2008 and 2011, when high food prices combined with questionable modes of governance triggered widespread social unrest that was most acute in urban centers.³ Moreover, those crises reflect the significant influence that economic and political institutions of the industrialized nations wield over the world food system. Despite the declared goals of prevailing millennial discourses, the influence of development agendas premised on neoliberal, market-oriented policies have exacerbated the range of hardships faced by rural populations and low-income groups in urban areas of poorer countries.⁴ The resulting food crises have metastasized in dispersed social and spatial tensions, the magnitude of which is worsened by inequities accompanying a “new food equation, with growing conflict over natural resources including land, water, forests, etc.”⁵ Using the context of Egypt as a case study, the principal aim of the dissertation is to explore the socio-spatial dimensions of these crises with respect to conflicts and correlations between the global food system and local built environments.

Political Economy and Territory

It is necessary to clarify the characteristics and contextual use of the main concepts that determine the approach for examining the research material. The commonly agreed upon definition of *political economy* is the juncture of politics and economics.⁶ The concept initially appears in works, for instance, from Adam Smith, David Ricardo, Thomas Malthus, and Karl Marx to Friedrich Hegel, Rosa Luxembourgh, as well as from more recent scholars like Karl Polanyi and Susan Strange.⁷ Such literature provides the foundational understanding of political economy as used in this work. Relevant to this research is the changing significance of this concept, specifically with respect to a Marxist focus on how political practices determine economic conduct within a broader sphere of social and spatial relations. This conceptual shift brings to the fore the role of cultural factors as well as that of the state and institutional agents in

³ Marco Lagi, Karla Bertrand, and Yaneer Bar-Yam, "The Food Crises and Political Instability in North Africa and the Middle East," ed. New England Complex Systems Institute (September 2011): 1-15.

⁴ United Nations, "Transforming Our World: The 2030 Agenda for Sustainable Development" in *A/RES/70/1* ed. General Assembly of the United Nations (New York: United Nations, 2015).

⁵ Kevin Morgan and Roberta Sonnino, "The Urban Foodscape: World Cities and the New Food Equation," *Cambridge Journal of Regions, Economy and Society*, Volume 3, no.2, (July 2010): 209–224.

⁶ See Barry Stewart Clark, *Political Economy: A Comparative Approach*, 2 ed. (Westport, CT: Praeger, 1998).

⁷ Gregory Hooks and Andrew Crookston, "Political Economy," *Sociology*, no.2, 2013.

regulating capitalist accumulation and circulation. Further questions concerning space in relation to abusive practices of power, especially with regard to the contested realms of urban and rural territories, are raised in the works of Henri Lefebvre, David Harvey, and Edward Soja, to mention just a few.⁸ The “spatialization of Marxian theory,” to use Soja’s phrase, that foregrounds the roles of space in processes of exploitation frames the operative understanding of political economy in this investigation.⁹ Additionally, Neil Smith’s contemporary approach to examining practices that bear on socio-spatial organization augments this spatialized conception of political economy.¹⁰ Smith, for example, examines how the production of space under capitalism necessitates unequal growth, leading to “industrial urbanization and agricultural diminishment.”¹¹ From this perspective, the concept of political economy provides a relevant lens for analyzing modes of *territorial organization* relative to the operations of food systems, the objective being to identify attendant forces, actors, and mechanisms of those operations that in turn affect how space is produced and inhabited. The understanding of processes integral to a prevailing political economy is key to investigating socio-material consequences of the food system–spatial organization interplay. By focusing on specific historical, structural, and economic forces of this interplay in the context of Egypt, core imbalances in local socio-economic development are shown to be directly correlated to national and international policy-making as well as to global market trade. Acknowledging that the global food system is firmly coordinated with market economy activity in principle and in practice, such an investigation cannot avoid critical engagement with the prevalent neoliberal narrative concerning the course of world growth through capital-led development. Indeed, this narrative constitutes the mainstay of those political and economic directives that ultimately determine the production of territory.

The thematic issues of political economy and territorial organization are situated at the nexus of governance, monetary policy, and space, constituting what geographer Jean Gottmann terms the “spatial arena of the political system” to highlight the entanglement of power in

⁸ See Ira Katznelson, *Marxism and the City* (Oxford; New York: Clarendon Press; Oxford University Press, 1993).

⁹ Edward Soja, "In Different Spaces: The Cultural Turn in Urban and Regional Political Economy," *European Planning Studies* 7, no. 1 (1999).

¹⁰ See Neil Smith, *Uneven Development. Nature, Capital, and the Production of Space* 3ed. (Athens, Georgia: The University of Georgia Press, 2008).

¹¹ Edward Said quoted by David Harvey, "Foreword to *Uneven Development* by Neil Smith," in *Uneven Development. Nature, Capital, and the Production of Space* (Athens, Georgia: The University of Georgia Press, 2008), viii.

economics and spatial disciplines.¹² The present work builds upon this idea of entanglement, attempting to reframe territory as agent in processes that shape the built environment. Of significance are definitions of what could be considered an “architecture of territory,” a concept addressed by such as Vittorio Gregotti, Franz Oswald, and Milica Topalovic, addressing the organization of space driven by structural forces—socio-political, environmental and economic.¹³ What this suggests is that territory is not merely a passive product of spatial policies and practices, but an active player in organizational processes as well.¹⁴ In the words of urban historian André Corboz, “territory is not given: it results from various processes (...) and changes spontaneously” as well as being an “ever-reshaped space.”¹⁵ With such points of view in mind, it is argued herein that not only do global and local forces act upon space, but also the resulting socio-material relations that make up a territorial arrangement act back upon the operative powers to inflect the course of development, for better or worse. In brief, a political economy of space and the territorial relations engendered are co-constitutive. The idea of “space as a container” is thereby called into question, with territory understood here less as an invariable frame of spatial reference and more as a varying conceptual structure for addressing how the built environment takes form.¹⁶ Whereas policy- and crisis-oriented investigations most often inform the workings of food systems, it might be more useful to engage territory as an exploratory lens for examining mutually-reinforcing correlations between the political economy of the food system and the territorializing processes of urbanization that give rise to *Food Territories*.

Objectives

By investigating the spatializing dynamics of food systems, the research seeks to better comprehend how political, economic, and spatial practices interact to produce specific territorial conditions of our world. In order to examine specifically how food systems contribute to “the

¹² Jean Gottmann, “The Evolution of the Concept of Territory,” in *IPSA Round Table* (Institut d’études politiques, Paris: Interdisciplinary Research, 1975): 29.

¹³ See Franz Oswald, Mark Michaeli, and Peter Baccini, *Netzstadt: Designing the Urban* (Basel: Birkhauser, 2003); Vittorio Gregotti, “The Form of the Territory,” *Editorial* 80, no.7(2009); Milica Topalovic, “The Architecture of the Territory?” *CARTHA* II, no. 3 (2016).

¹⁴ Milica Topalovic and Bas Princen, “The Visible and the Invisible World. Egypt, Landscapes and Territories,” eds. Charlotte Malterre-Barthes and Harald Stühlinger (Vienna: PhotoResearcher- European Society for the History of Photography, 2017).

¹⁵ André Corboz, “Le Territoire Comme Palimpseste” *Diogène* 121, (1983), 16.

¹⁶ Smith, *Uneven Development*, 116.

architecture of territory,” the study identifies, describes, and explicates material interrelations between grain commodity trade and the development of the built environment in Egypt.¹⁷ The working hypothesis is that the vital resource of food is determinate of territorial organization. To substantiate this premise, the work illuminates complex linkages between food subsidies, food production, and food security in conjunction with the investigation of political, economic, and social agents involved in building the human habitat. As phrased by Neil Smith in *Uneven Development*, “it is spatial relations (...) that lie at the basis of our analysis.”¹⁸ Through spatial analyses of architectural form, urbanization processes, and the political economy of food, the ultimate goal of the research is to extend discourse on the formation of territory by linking distinct spatial outcomes to systems typically considered to operate beyond the purview of design disciplines and spatial practices.

Literature Reviews and Methods

The complexities surrounding the investigation of spatial conditions and the political economy of food require a mixed methodology. In addition to fundamental texts from relevant urban studies and spatial disciplines, the dissertation aims to widen the analytical scope of the research with literature from the fields of development studies, environmental science, and political geography, as well as philosophy. This interdisciplinary approach informs the theoretical framework as well as the research methodology of the dissertation.

Beyond the canons of traditional architecture and urban studies, a few works are worth noting with respect to their critical investigation of space-making practices and the global trade of food commodities. Surprisingly, apart from a fragment of David Harvey’s investigation in *Between Space and Time: Reflections on the Geographical Imagination*, the work of geographers or urban researchers does not directly address the spatial ramifications of food systems.¹⁹ That said, Henri Lefebvre, for example, does engage this very issue in *The Urban Revolution* by acknowledging the disappearance of the rural world and of agricultural production due to increased urbanization and the thorough re-organization of territory—a discerning observation important to the present

¹⁷ Oswald, Michaeli, and Baccini, *Netzstadt*, 80.

¹⁸ Smith, *Uneven Development*, 114.

¹⁹ See David Harvey, "Between Space and Time: Reflections on the Geographical Imagination," *Annals of the Association of American Geographers* 80, no. 3 (1990).

work.²⁰ Food is also addressed obliquely in Lefebvre's *The Production of Space*, insofar as he treats “the ‘world of commodities’, its ‘logic’ and its worldwide strategies, as well as the power of money and that of the political state” as space-defining forces.²¹

There are also three notable works that address the impact of food commodities on the built environment. First, Carolyn Steel's *Hungry City* is one of a few urban and architectural studies on the relation between food and the city. Steel addresses the role of feeding urban populations—food production, procurement, and processing—in shaping urban and rural landscapes.²² Taking London as a case study, Steel draws attention to fundamental correlations between urban forms and food systems as well as between cities and their productive hinterland, thereby underscoring complex interactions of food production processes with governing policies that bear on territorial organization in a specific context.

Another pertinent work concerning this theme is *Nature's Metropolis* by environmental historian William Cronon, who examines the role of commodity flows in the making of modern Chicago.²³ The book discloses how emerging market systems connected rural and urban realms through the confluence of nascent food distribution protocols and new means of transportation that create unforeseen, far-reaching dependencies. Cronon exposes how the production of the city went hand and hand with the capitalist-driven transformation of grain into a commodity through the ascendance of commercial and urban environments, the invention of telegraphy, as well as the standardization of wheat and corn production, all of which culminated in the founding of the Chicago Board of Trade—the world's most important grain commodities trading center today.

Keller Easterling's book *Enduring Innocence* and especially her analysis of El Ejido—an agricultural area of Spain dedicated to growing indoors vegetables for global markets—offer another theoretical and methodological reference for the present research.²⁴ In this particular case study, Easterling uncovers networks and power relations from the perspective of food production, inspecting the geography of hybrid zones and the architecture of legal enclaves in various locations

²⁰ See Henri Lefebvre, *The Urban Revolution* (Minneapolis: University of Minnesota Press, 2014).

²¹ Henri Lefebvre, *The Production of Space*, trans. Donald Nicholson-Smith (Oxford: Blackwell, 1991/1974), 53.

²² See Carolyn Steel, *Hungry City: How Food Shapes Our Lives* (London: Vintage, 2009).

²³ See William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton, 1991).

²⁴ Keller Easterling, "El Ejido," in *Enduring Innocence: Global Architecture and Its Political Masquerades* (Cambridge, Mass.; London: MIT, 2008), 31-63.

that are interconnected by complex settings of unseen flows. The connections examined between specific spatial forms and the circulation of global food commodities make Easterling's spatial investigation at once a critical foray into the workings of the contemporary world economy. By linking commodity analysis, the built environment, and architecture to global networks, her work establishes a useful precedent upon which this research builds in the effort to identify, in the context of Egypt, linkages between architecture, infrastructure, and an array of national and global networks and organizations.

Still another informative concept for the present research, taken from the field of development studies, is the concept of *world system* coined by Immanuel Wallerstein in *The Modern World System: Capitalist Agriculture and the Origins of the European World Economy in the Sixteenth Century*, which manifests a critical attempt to comprehend the notion of world space relative to processes of globalization.²⁵ Drawing on Marxist approaches to studying labor and social conflicts arising from processes of capital accumulation, Wallerstein categorizes the world system relative to a ranking order of power and dominance: core, periphery, semi-periphery, and external areas. According to Wallerstein, rich "core" countries tend to exploit poor "peripheral" ones, with technology playing an instrumental role in this decisive disparity of world regions.²⁶

Essentially, the concept of a Global Commodity Chain (GCC) is derived from Wallerstein's notion of world system, as is the food system model. Wallerstein, along with Terrance Hopkins, aims to grasp "the totality of the flows (...) in complex production processes that result in a finished commodity," speculating on the extent to which capitalist forces actually structure and organize these movements.²⁷ Commodity chain analysis seeks to illuminate the underlying dynamics of unequal wealth distribution and capital accumulation in relation to territorial configurations of core and periphery sites "across geographical and political space."²⁸ Based on the work of Wallerstein and Hopkins, Gary Gereffi and Richard Appelbaum define GCC analysis as the study of operations in the commodities production processes.²⁹ Furthermore,

²⁵ See Immanuel Wallerstein, *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*, with a New Prologue, vol. 1 (Berkeley: University of California Press, 2011).

²⁶ See Braudel, *Civilization and Capitalism- 15th-18th Century* vol. II : *The Wheels of Commerce*.

²⁷ Terence Hopkins and Immanuel Wallerstein, "Commodity Chains in the World-Economy Prior to 1800," *Review (Fernand Braudel Center)* 10, no. 1 (1986): 159.

²⁸ *Ibid.*, 166.

²⁹ See Jennifer Bair, *Frontiers of Commodity Chain Research* (Stanford, Calif.: Stanford University Press, 2009).

they contend that GCC analysis can be investigated with respect to four distinct references: input-output (i.e., the transformation of raw goods into final products), territorial arrangements, modes of governance, and institutional frameworks.³⁰ Utilizing this tool of inquiry, the present work connects GCC analysis to the food system approach to explore the political economy of the global grain trade. Understood as the bundle of agents and agencies involved in commodity flows from producer to consumer, the notion of food system transverses biological and environmental, economic and political, as well as social and cultural dimensions of interaction.

It is important to note in this respect that cereals are the main source of human nutrition, and that wheat is the most cultivated crop on Earth. The commodity selected for further study herein is one of the three most essential staple foods globally, after rice and before maize.³¹ There is a considerable amount of literature on wheat, with every aspect analyzed as to the cereal's historical, cultural, economic, and political significance, not to mention its nutritious importance. For the interdisciplinary study of grain necessary to Global Commodity Chain analysis, the research draws from nutrition history, biology, the expanded field of environmental studies (i.e., agrarian and agricultural economics), as well as from geography. In *A History of Food*, historian Maguelonne Toussaint-Samat contextualizes wheat and flour with a chronicle of human dietary habits, underlying the importance of bread as processed form of wheat.³² Historian Fernand Braudel not only addresses the importance of food in the interconnections between urban and rural geographies in his broad economic history of pre-industrial Europe, *Civilization and Capitalism -15th-18th Century*, but also provides the historical and geographical background of grain trade, in particular, the impact of shipping routes across the Mediterranean Sea.³³ Both Braudel and Toussaint-Samat address wheat as an agent of civilization. From the discipline of food and agrarian studies, Walter Bushuk and Vladimir Rapser's report *Wheat: Production, Properties, and Qualities* presents an overview of the cultivation of wheat and offers a relevant summary ranging from botanical origins to physical characteristics (e.g. climate, irrigation

³⁰ Richard Appelbaum and Gary Gereffi, "Power and Profits in the Apparel Commodity Chain," in *Global Production: The Apparel Industry in the Pacific Rim* (Philadelphia: Temple University Press; 1994).

³¹ Food and Agriculture Organization, *FAO Statistical Yearbook 2015* (Rome: FAO, 2015).

³² See Maguelonne Toussaint-Samat, *A History of Food* (Malden: Wiley-Blackwell, 2009).

³³ See Fernand Braudel, *Civilization and Capitalism- 15th-18th Century vol. II : The Wheels of Commerce*, trans., Sian Reynolds, III vols.(London: Book Club Associates, 1983).

requirements, cultivation areas), affirming the centrality of wheat to the world's food supply.³⁴ Together, these works also allow for an understanding of wheat as an essential support to human life, from a vital element with a rich cultural history of nourishment, cultivation, and trade to a widely cultivated, processed, and circulated commodity that is at the heart of political disputes and global financial transactions alike. But, while Braudel and Toussaint-Samat's historical accounts critically address the agencies of wheat beyond its basic nutritious functions, including its spatial and geographic bearings, contemporary scientific reports like that from Bushuk and Rasper rarely touch upon such issues. Much of the research produced in the fields of environmental sciences (i.e. biology, food and crop sciences) seldom addresses matters such as questionable biogenetical technologies, problematic usage of pesticides and fertilizers, or unjust food trade regulations. Then again, to delineate a spatial understanding of the political economy of food systems demands an analysis of the current state—and roles—of wheat in analytical terms as a driver of territorial transformations. This is to say that the position taken in the present research recognizes food as a powerful force related to mechanisms of capital accumulation and constellations of politico-economic powers that have very real spatial consequences. In this regard, the work of food system analyst Harriet Friedmann on the political economy of food is essential, who, with development sociologist Philip McMichael, coined the concept of “food regimes” in “Agriculture and the State System,” which presents a geo-political assessment of the roles of agriculture and food in globalization processes.³⁵ In “The Political Economy of Food,” Friedmann also reconstructs the rise and fall of successive international food regimes and the emergence of contradictory and conflicting relations within these systems.³⁶ From her perspective, rich industrialized countries that thrust poorer nations into chronic dependency and debt have amassed the power to rule the present world food system. In line with geographer Anthony Weiss, Friedmann argues that decades of heavy debt service, structural adjustment programs, global market integration, and the increasing influence of the World Bank, International Monetary Fund, and other like institutions have intensified the current reliance of

³⁴ See Walter Bushuk and Vladimir Rasper, *Wheat: Production, Properties and Quality* (Glasgow: Blackie Academic and Professional, 1994).

³⁵ Harriet Friedmann and Philip McMichael, "Agriculture and the State System: The Rise and Decline of National Agricultures, 1870 to the Present," *Sociologia Ruralis* 29, no. 2 (1989).

³⁶ Harriet Friedmann, "The Political Economy of Food: The Rise and Fall of the Postwar International Food Order," *The American Journal of Sociology* 88, no.1 (1982).

developing countries on cheap food imports.³⁷ As defined by Friedmann, McMichael, and Weis, the ‘politics of food’ are “basic to reproduction of human bodies, minds and spirits across modes of production, and to human shaping of land and landscapes.”³⁸ Recalling David Harvey’s attempts to understand “how capitalism shapes spatial organization, how it produces and continuously revolutionizes its geographical landscape of production, exchange, and consumption,” the notion of a political economy of food is meant to illuminate and question spatial correlations between the global grain trade and local territorial organization.³⁹

To conclude this review of research methodology and source literature, one notable approach from the fields of social theory and philosophy is particularly beneficial to the topic of study: Michel Foucault’s concept of *biopower*. His attention to food surfaces in the lectures gathered in *Security, Territory, Population*.⁴⁰ Grain, he argues, is at the center of matters of security, state governance, and free trade. Prior to the seventeenth century, the disastrous effects of grain scarcity prompted the state to set controls on prices, cultivation, and trade, with the linking of nutrition to governance constituting an early form of biopower. As state policy changed to allow the free circulation of grain, reliance on market mechanisms to self-regulate grain supply created the base of what was to become economic liberalism. Thus, Foucault utilizes the history of grain supply and its scarcity for developing his concept of biopolitics that materialized with the problematic of governing the provision of food to populations. The idea of biopolitics has its roots in Thomas Malthus’s *An Essay on the Principle of Population* that addressed how populations can be regulated through food supply.⁴¹ Foucault, however, articulates the array of techniques devised by states to govern populations within a given territory, suggesting that food, as indispensable biological element, is also implicitly a mechanism of what he termed

³⁷ Anthony Weis, "The Perilous Dependence on Cheap Food Imports - Food and Market Approaches," ed. Transnational Institute (The Transnational Institute, 2012), 1-7.

³⁸ Harriet Friedmann, Benoît Daviron, and Gilles Allaire, "Political Economists Have Been Blinded by the Apparent Marginalization of Land and Food," *Revue de la régulation* 20, 2e semestre (Autumn 2016).

³⁹ See David Harvey, *The Urbanization of Capital* (Oxford: Blackwell, 1985), 33.

⁴⁰ See Michel Foucault, *Security, Territory, Population: Lectures at the Collège De France. 1977-1978*, eds. Michel Senellart, Francois Ewald, and Alessandro Fontana (New York: Picador, 2009).

⁴¹ See Luca Paltrinieri, "Biopolitics in the Twenty-First Century: The Malthus–Marx Debate and the Human Capital Issue," in *Foucault and the Modern International: Silences and Legacies for the Study of World Politics*, ed. Philippe Bonditti, Didier Bigo, and Frédéric Gros (New York: Palgrave Macmillan US, 2017).

‘governmentality.’⁴² ⁴³ In his words, governmentality is “the way in which the *conduct* of individuals or of groups might be directed (...) to control the possible field of action of others.”⁴⁴ On this basis, it can be argued that the control of food systems belongs to the ensemble of apparatuses of control developed by administrations to control populations (i.e., statistics, hygiene, and public health policies) through technocratic methods (i.e., classification, qualification, categorization, and cartography).⁴⁵ ⁴⁶ Moreover, Foucault’s line of thought suggests that food systems are forms of biopower that control the body, while being deeply entrenched in processes of market liberalization. In effect, biopolitics, liberalism, and governmentality reframe food as vital physiological matter that also serves as a control mechanism of economic and political agendas that works at the scale of multiple bodies. This hypothesis informs the principal thesis of the dissertation that the global food order of today has spatial ramifications for lived and built territories.

In addition to these theoretical foundations, the methodology is further informed by the work of geographer Neil Smith. In *Uneven Development*, Smith argues that the spatial disjunctions emerging from the geographical dispersion of capital take place at various scales, which he calls “spatial scales of capital” in reference to the global scale, the national scale, and the urban scale.⁴⁷ With this in mind, a working premise is that the political economy of food systems affects territorial organization at the level of the world’s geography, impacting broad social spaces of culture and their organization, while also affecting urban and rural forms as well as the architecture of the built environment. These scales range from (1) the geographical scale of the entire surface of the earth (global), to (2) the territorial scale (transnational, organizational), to (3) the urban and rural form (regional), and finally down to (4) the architectural scale (local), all

⁴² See Thomas R. Malthus, *An Essay on the Principle of Population*, vol. 1 (London: John Murray, 1826).

⁴³ See Michel Foucault, *The History of Sexuality*, trans. Robert Hurley (New York: Vintage Books, 1976/1988).

⁴⁴ Michel Foucault, “The Subject and Power” in *Power: Volume 3: Essential Works of Foucault 1954-1984*, ed. J Faubion (London: Penguin, 2002), 326, 341.

⁴⁵ See Michel Foucault, *Society Must Be Defended: Lectures at the Collège De France. 1975-1976*, eds. Michel Senellart, Francois Ewald, and Alessandro Fontana (New York: Picador, 2003).

⁴⁶ David Nally, “The Biopolitics of Food Provisioning,” *Transactions of the Institute of British Geographers* 36, no. 1 (2010): 37-53.

⁴⁷ Neil Smith, *Uneven Development: Nature, Capital, and the Production of Space* (New York: Blackwell, 1984), 135.

corresponding to political and economic realms that continuously overlap. This spatial order of the research is reflected in the overall structure of the dissertation, which considers information ranging from the global-scale of world food systems (the political economy of grain) to specific case studies of the built environment at territorial, urban-rural, and architectural scales (Egyptian territories). Within the case study investigations, the analytical scales proceed from the architectural scale to the transnational scale, with buildings constituting the initial part of the examination that continues to include the urban, territorial, and global dimensions. This method is consistent with the world systems model, sometimes referred to metaphorically as “Russian dolls” geography.⁴⁸ Each scale of study is distinct and can be considered on its own, yet the investigation as a whole takes into consideration all constituent scales in their interrelations.

Structure

The research is organized in three parts.

The Political Economy of Food Systems:

The 2011 food crisis and ensuing urban unrest demonstrate the contemporary relevance of food to socio-spatial relations. Such unrest provides the incentive for research into the effects of the global food system on the built environment that examines interactions between food, poverty, urbanization, governance, and the global economy. To this end, the research is informed by the concepts of world systems and Global Commodity Chain analysis, along with other concepts relevant to spatial questions such as urban food systems and urban metabolism. Pertinent historical evidence concerning the cultivation, trade, and consumption of wheat is used to contextualize its current processing from production to consumption. The section on the political economy of grain opens with an overview of present-day flows of wheat. Key agents of the grain chain operating at the global level are presented in a detailed outline (i.e., input, production, trading, transportation, processing, distribution, and consumption of wheat). By examining a host of operations of the global grain trade in this manner, political and economic machinations of the international food order can be more precisely articulated. This section concludes with an attempt to identify interconnections between food systems, the grain chain, and spatial organization at the geographical scale of the world. This geography of the grain chain offers a global synopsis that is given more specific treatment in the following case studies.

⁴⁸ See Andrew Herod and Melissa W. Wright, *Geographies of Power: Placing Scale* (Malden: Blackwell Pub., 2002).

Egyptian Territories:

Focused on Egypt, the second part of the dissertation provides a survey of concrete contemporary spatial transformations by way of three case studies. First, a contextual outline positions the relationships between food, power, and space in Egypt. Then, three scales of spatial transformations (architectural, urban, territorial) are investigated in relation to three sub-structures of food supply in Egypt (food policies, food production, food security) in Alexandria, Cairo, and Toshka to form a multi-scalar array of topical studies: 1) state-run bakeries in a neighborhood of central Alexandria, 2) informal urban development on agricultural plots in Greater Cairo, and 3) the large-scale infrastructure project Toshka in Upper Egypt. Each case study adheres to this investigative framework, the objective being to formulate how food system processes impact built form in particular territories. A historical outline of modern Egypt is used to frame each segment of the food system under investigation. The study pertains to food distribution, production, and security in relation to urban, peri-urban and rural territories on hand from material production (i.e., buildings, urban fabric, and infrastructure). Informed by direct fieldwork observations as well as by primary and secondary literature, diagrams and mapping are also used to analyze the chosen sites in Egypt in terms of the influence of food systems on their respective spatial logics. Following the method of GCC analysis outlined above, the investigation continues by evaluating the role of various agents involved in the food chain and spatial organization. Finally, the study of socio-material arrangements in local contexts is assessed at architectural, urban, and territorial scales, with the case studies themselves functioning as spatial probes of the political economy of food systems.

Food Territories:

The case studies explore how the political economy of food systems interacts with spatial production. Looking at specific episodes of spatial transformation and analyzing them at various scales to identify how global forces act upon local realm—illuminated by the Egyptian context—help to stitch together diffuse strands of this interaction. By identifying political, economic, and social agencies of spatial production, the research discloses how networks of input, production, transportation, trade, processing, distribution, and consumption inflect the ways that power is exercised over people and place. The conclusion will argue that it is not only possible to address political economy through architecture and urban forms, but also that commodity protocols

directed by political and economic policy-making in fact determine the production of space. The co-constitutive relationships between political economy of space and the territorial relations will inform the notion of *territorial reciprocity*, concluding the work by placing the study of the built environment in conversation with Michel Foucault's biopolitical concepts.

Sources

Taking a mixed, qualitative research approach to the subject matter, the investigation of spatial conditions engendered by the political economy of food relies on multiples sources arranged with respect to distinct subject matters: wheat, Egypt, as well as the three sub-topics specific to the case studies.

Wheat

To identify and assemble the activities, flows, and agents involved in the grain chain in accordance with the GCC-inspired methodology requires a collection of primary sources as reference material. While a more abstract recording of activities comprising the grain chain can be made, the actual identification of agents is a more arduous undertaking. With regard to production agents, for example, data on the specifics of the workforce involved in the overall production of wheat is extremely fragmented. There is no recent authoritative study that deals explicitly with international labor relative to crop production. Of the impressive array of work on smallholders in developing countries, few are wheat-specific in their treatment. The World Census of Agriculture does offer data on general structural characteristics such as legal status, gender of holders, employment types, land tenure and land use, however, the information provided only refers to the number and area of holdings involved in wheat production from a limited number of countries.⁴⁹ To obtain data on the business practices of input and trading agents is similarly a challenge. The main hurdle is the opacity with which the majority of commercial transactions are conducted, trade secrecy being the global norm. Firms do not readily disclose information, and no published record of contracts or legal documents exists except for those cases involving litigation. Bilateral arrangements between parties more than likely hold some form of confidentiality clause. Agreements on standards such as Request For Tender (RFT) or future contracts are sometimes available, even if the exact terms of such accords are usually

⁴⁹ Food and Agriculture Organization, *2010 World Census of Agriculture* (Rome: FAO, 2010).

withheld. Whereas most of the major firms associated with the wheat chain are publicly traded on international stock exchanges and markets prices of the commodity are accessible online, their financial operations remain a strictly private matter. With regard to grain trade and international transportation protocols, the Marine Traffic online database provides real-time data on the sea traffic of bulk-carriers (vessel name, model, flag, arrival and departure time from harbors), yet, further more specific details on the boat shipment are not disclosed (i.e., clients, cargo, route).⁵⁰ These setbacks can be partially overcome in that grain terminals and berths can be identified via online satellite images.⁵¹ Nevertheless, what remain unspecified are the actions of the intermediaries. Select information on present trade agreements is published by business and financial market news agencies such as Bloomberg.⁵² Through press agencies like Reuters or Associated Press, the relative lack of secondary literature on the recent activities of companies regarding genetically modified wheat (GM wheat), market shares, mergers and imports can nevertheless be surmounted.⁵³ For general corporate information, commercial materials prepared for clients, and product details are available (i.e., seed specificities, future contracts, facilities) on certain company websites and prove useful when cross-examining accessible information on commercial agents of the grain chain. Data on agriculture, trade, and land use exists in databases from NGOs and international agencies such as the Food and Agriculture Organization, the Foreign Agriculture Service of the U.S. Agricultural Department, the World Bank, and other like institutions. Ultimately, the secondary literature from the disciplines of agricultural, biological, botanical, nutritional sciences, along with the most pertinent works from political economy and development studies all address specific instances in the production of wheat grain.

⁵⁰ "Live Ships Maps," ed. Marine Traffic (Nicosia, Cyprus: Maltenoz Limited).

⁵¹ Google Earth, NASA. For instance, a bulk carrier, which sets off from Ilyichevsk, the principal grain terminal of the Black Sea, and docks at grain berth 93 at Alexandria port, is likely to be delivering Ukrainian wheat to Egypt.

⁵² Tony Dreibus and Whitney McFerron, "Wheat Snaps Slump as Egypt Issues Tender; Corn Gains; Soy Falls," *Bloomberg News*, July 2, 2013, <http://www.bloomberg.com/news/2013-07-02/corn-futures-swing-after-reaching-32-month-low-wheat-rebounds.html>.

⁵³ Carey Gilliam, "Amid Uproar over Escaped GMO Wheat, Monsanto Tests More Strains," *Reuters*, June 4, 2013, <https://www.reuters.com/article/us-usa-wheat-monsanto/amid-uproar-over-escaped-gmo-wheat-monsanto-tests-more-strains-idUSBRE95319X20130604>.

Egypt

Of the extensive literature that exists on Egypt, only those works that directly inform the case studies on food systems and territorial organization are mentioned here. *Rule of Experts: Egypt, Techno-Politics, Modernity* by political theorist Timothy Mitchell examines questions of global capitalism and techno-science throughout the creation of the modern Egyptian state. He addresses the topics of debt, discipline, the institution of private property, territory, circulation and exchange, as well as the interaction of social logics, food security, horticultural imperatives, and political forces.⁵⁴ Mitchell's approach is particularly helpful when examining the primary literature produced by international development agencies on Egypt, specifically in connection with their discourse on food security issues.

Political scientist Ray Bush offers an equally insightful study. In his publications, Bush discusses the effects of neoliberalism on the country, particularly in relation to the economic reform and structural adjustment program (ERSAP), which forms a useful complement to Mitchell's work.⁵⁵ Through the lens of political economy, Bush explicates food riots, food dependency, and agriculture reforms, sounding out the decline of the welfare state and that of the rural world.⁵⁶

Studies addressing food-related questions in the local political context of Egypt inform the timeline provided that charts the nation's complex political history. In *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes*, John Waterbury assessed Egypt's transformation under these administrations, providing a detailed record of the economic trends and policies that still hold sway over the country today.⁵⁷ Fouad and Barbara Ibrahim's *Egypt: An Economic Geography* plots a comprehensive overview of the state of the country and asks crucial questions about the growing population and food supply, water and land shortage, as well as industrialization and the local effects of globalization.⁵⁸ The pre-revolution publication *Egypt on*

⁵⁴ See Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002).

⁵⁵ Ray Bush, "Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt," in *Market-Led Agrarian Reform: Critical Perspectives on Neoliberal Land Policies and the Rural Poor*, ed. Saturnino M. Borras, Cristobal Kay, and Edward Lahiff (London: Routledge, 2009).

⁵⁶ Ray Bush, "Food Riots: Poverty, Power and Protest," *Journal of Agrarian Change* 10, no.1 (2010).

⁵⁷ See John Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes* (Princeton, N.J.: Princeton University Press, 1983).

⁵⁸ See Fouad N. Ibrahim and Barbara Ibrahim, *Egypt. An Economic Geography* (London; New York: I.B. Tauris, 2003).

the Brink: From Nasser to Mubarak by Tarek Osman presents a contemporary account of Hosni Mubarak's three presidential terms, highlighting how food subsidies weigh heavy on the national budget, while speculating on how political stagnation and social injustice might eventually bring down the regime.⁵⁹ Also noteworthy is Carrie Wickham's study on Muhammad Morsi, *The Muslim Brotherhood: Evolution of an Islamist Movement*, outlining, for instance, the "100 day plan" of this movement, including bread's significance in the government's immediate priorities.⁶⁰ These works shed light on how to evaluate the role of food subsidies, production, and security in the instrument of national policy, and how such topics might bear on the study of space.

The case studies on Egyptian territories pertaining to 1) food subsidies and urban space, 2) food production and urbanization, and 3) food security and infrastructure draw upon primary sources and secondary literature, field investigations, official planning and strategy documents, press articles, archival material, maps, satellite imagery, as well as authoritative scholarly works, journal articles, and scientific publications. Among the primary source material used for the case studies, Anglophone Egyptian newspapers and online news platforms are also valuable primary sources of information regarding recent and contemporary events. Readily available material is collected from the newspapers *Egypt Independent (al-Masry Al-Youm)*, *Daily News Egypt*, *Al-Ahram*, and *Mada Masr*, to name but a few. Supervised by government-dominated agencies, most of these media echo official positions, yet often provide content unavailable elsewhere. Comparative, cross-nation datasets produced by the World Bank, USAID, and the Food and Agriculture Organization macro-economic facts concerning Egyptian population, food supply, production and consumption, and per capita income.⁶¹ Figures collected and published by the national Central Agency for Public Mobilization and Statistics (CAPMAS) augment these records.⁶² Scholar Sarah Sabry, however, advises caution vis-à-vis the numbers provided, arguing that the data, in general, is often inaccurate and at times, outright contradictory.⁶³ Nonetheless, in

⁵⁹ See Tarek Osman, *Egypt on the Brink: From Nasser to Mubarak* (New Haven: Yale University Press, 2010).

⁶⁰ Carrie Rosefsky Wickham, *The Muslim Brotherhood: Evolution of an Islamist Movement* (Princeton: Princeton University Press, 2013), 272.

⁶¹ The World Bank, *Arab Republic of Egypt - Urban Sector* (Washington, D.C.: Sustainable Development Department Middle East & North Africa Region, 2008), 44506-EG.

⁶² CAPMAS, *Vital Statistics* (Cairo: Central Agency for Public Mobilization and Statistics, 2017).

⁶³ Sarah Sabry, "Egypt's Informal Areas: Inaccurate and Contradictory Data," in *Cairo's Informal Areas between Urban Challenges and Hidden Potential: Facts. Voices. Visions.*, ed. Egyptian-German Participatory Development Programme in Urban Areas (Cairo, Egypt: GTZ, 2009).

the absence of alternatives, CAPMAS datasets are important for estimating, for example, the ratio of urban to rural populations, respective income levels, and other necessary figures. Among other official sources, publications from Egyptian governmental agencies such as those published across several decades by the Ministry of Health, the Ministry of Agriculture and Land Reclamation, the Ministry of Solidarity, the Ministry of Planning, and the Ministry of Water Resources and Irrigation likewise constitute vital research material.⁶⁴ A case in point is the *Sustainable Agricultural Development Strategy Towards 2030*, a partisan brochure published under Mubarak and still effective today. It is a key document for explaining the current trajectory of Egyptian agriculture as well as related future objectives. Revealing affiliations to prevailing agendas of powerful international agencies, the text unambiguously states that it was produced “in coordination with the Agricultural Research and Development Council, the Food and Agriculture Organization of the United Nations (FAO), with inputs from the International Fund for Agricultural Development (IFAD) and the World Bank.”⁶⁵ Of comparable value, political pamphlets by Egyptian presidents are useful historical documents that reveal much about ideologically informed economic guidelines instated by those in power. Gamal Abdel Nasser’s *The Philosophy of the Revolution* and Anouar Sadat’s *The October Working Paper* both read as personal manifestos regarding the underlying motivations of their respective directives.⁶⁶ ⁶⁷ Hosni Mubarak also published *Vision and Achievements*, albeit a memoir of sorts comprised primarily of projects and guidelines announced via public speeches.⁶⁸ Following official declaration, policies would then take form through strategy papers drafted by national agencies in collaboration with international consultants. Incidentally, this approach to policy-making is also followed by current President Abdel Fattah El-Sisi.⁶⁹ In contrast, the most elaborated form of a program for the future of Egypt by the Muslim Brotherhood, the *Nahda* or Islamist Renaissance, exists only as a

⁶⁴ i.e. Ministry of Planning, *The Five Years Plan 1978-82* (Cairo: Arab Republic of Egypt, 1977).

⁶⁵ Ministry of Agriculture and Land Reclamation, *Sustainable Agricultural Development Strategy Towards 2030* (Cairo: Arab Republic of Egypt, 2009), 15.

⁶⁶ See Gamal Abdel Nasser, *The Philosophy of the Revolution* (Cairo: S.O.P. Press, 1950).

⁶⁷ See Anwar Sadat, *The October Working Paper, Presented by President Mohamed Anwar El Sadat* (Cairo: Arab Republic of Egypt, Ministry of Information, State Information Service, 1974).

⁶⁸ Hosni Mubarak, *President Hosni Mubarak: Vision and Achievements*, Wizarat Al-I'lam Al-Hai'at Al-'Ammah, Li'l-Isti'lamat (Cairo: State Information Service, 1989).

⁶⁹ i.e. *Participatory National Regional and Governorate Strategic Planning for Balanced Spatial Development*, (Government of the Arab Republic of Egypt and the United Nations Development Programme, 2014), 00056761.

transcribed speech of Khairat Al-Shater, a chief strategist of the Brotherhood.⁷⁰ Also useful for this research are official images, public speeches, and political positions expressed about food-related matters such as subsidies, agriculture and rural population, and land reclamation projects, all serving to contextualize debates and key decisions of the nation at particular times. When combined, these official and more popular sources help to discern local dispositions concerning, for instance, food subsidies as a common right, the general negative stigmatization of informal settlements, as well as the manipulative portrayal of food security policies. Addressing this collection of material in relation to Egypt's official stance on questions of food is essential to understanding the ingrained mechanisms that impact socio-spatial relations.

Other primary sources include direct fieldwork conducted in Alexandria and Cairo during President Mahmoud Morsi's short-lived term, which revealed palpable tensions in the vicinity of subsidized bread outlets in urban areas and the extent of accelerated informal urbanization on agrarian land. Additional site visits in 2014, 2015, and 2017 allowed for substantial data collection through interviews with local farmers and inhabitants, onsite observations, group discussions, as well as architectural and topographical surveys.

Food Subsidies and Urban Space, Alexandria

With regard to food subsidies and grain infrastructure in urban spaces in Egypt, literature is sparse at best, with the notable exception of geographer Jörg Gertel's *The Metropolitan Food System of Cairo*, which delivers an in-depth analysis and mapping of commodity distribution in the Egyptian capital—a study later re-contextualized relative to the global economy in his publication *Globalisierte Nahrungskrisen*.^{71 72} This said, there is an abundance of World Bank-affiliated and USAID-funded research in the Egyptian food subsidy system. Studies such as those produced since the late 1990s by the affluent International Food Policy Research Institute (IFPRI) have produced well-informed datasets.⁷³ However, outlining the mechanisms of food subsidies in order to better scrutinize them, IFPRI pursues a questionable reform agenda and thus,

⁷⁰ Democracy Hudson Institute-Center on Islam, and the Future of the Muslim World, "Khairat Al-Shater on the Rise of the Muslim Brotherhood," *Current Trends in Islamist Ideology* 13, (2012).

⁷¹ See Jörg Gertel, *The Metropolitan Food System of Cairo*, ed. Jörg Gertel (Saarbrücken: Verlag für Entwicklungspolitik, 1995).

⁷² See Jörg Gertel, *Globalisierte Nahrungskrisen* (Bielefeld: Transcript-Verlag, 2015).

⁷³ See Mylene Kherallah et al., *Wheat Policy Reform in Egypt* (Washington, D.C.: International Food Policy Research Institute (IFPRI), 1999).

these sources call for cautious consideration.⁷⁴ Literature on food subsidies must therefore be complemented and contextualized by studies on Egypt's foreign grain dependency as explained by William Burns in *Economic Aid and American Policy toward Egypt, 1955-1981* and by Anne Zimmerman' *US Assistance, Development, and Hierarchy in the Middle East Aid for Allies*.⁷⁵ ⁷⁶ Both works review Egypt's reliance on US resources, grain among others, and the long-term loss of state sovereignty triggered by this dependency.

The story of Alexandria's antique and modern infrastructure is well-studied as with the *Atlas Historique de la Ville et des Ports d'Alexandrie*, a complete overview of the successive efforts made to upgrade the harbor facilities in the modern era.⁷⁷ However, urban research and literature on its current conditions remains very limited. In *Alexandria Beyond the Myth*, both Céline Shaalan and Yasser Aref trace a pertinent history of the city's development from antiquity to today.⁷⁸ ⁷⁹ From the field of geography, a few conference papers address spatial transformations such as urban growth and modification of the delta shorelines, while emphasizing the correlated degradation of the environment.⁸⁰ ⁸¹ Yet, available material on the topic of food subsidies and grain imports as addressed in this research is likewise limited. No recent official data on the number of designated bakeries licensed to sell subsidised bread is accessible. Reports by FAO and private grain agencies publish yearly figures on the amount of grain Egypt purchases to

⁷⁴ See Olivier Ecker et al., *Nutrition and Economic Development: Exploring Egypt's Exceptionalism and the Role of Food Subsidies* (Washington, D.C: International Food Policy Research Institute (IFPRI), 2016).

⁷⁵ See William J. Burns, *Economic Aid and American Policy toward Egypt, 1955-1981* (Albany: State University of New York Press, 1985).

⁷⁶ See Anne Mariel Zimmermann, *US Assistance, Development, and Hierarchy in the Middle East Aid for Allies* (New York: Palgrave Macmillan, 2017).

⁷⁷ Louis Linant de Bellefonds Bey, "Mémoires Sur Les Principaux Travaux D'Utilité Publique Exécutés En Égypte Depuis La Plus Haute Antiquité Jusqu'à Nos Jours," in *Atlas Historique De La Ville Et Des Ports D'Alexandrie*, ed. Gaston Jondet (Cairo: Institut Français d'Archéologie Orientale, 1869).

⁷⁸ Cécile Shaalan, "Mapping Alexandria: A Long History of Change," in *Alessandria D'egitto Oltre Il Mito [Alexandria Beyond the Myth]*, eds. Luisa Ferro and Cristina Pallini (Cuneo: Boves, 2009).

⁷⁹ G. Yasser Aref, "Plans and Projects for Alexandria: 1952 to Present," in *Alessandria D'egitto Oltre Il Mito [Alexandria Beyond the Myth]*, Luisa Ferro and Cristina Pallini (Cuneo: Boves, 2009).

⁸⁰ Lofty Azaz Abdou, "Monitor Urban Growth in Alexandria-Egypt Using Satellite Images," in *Remote Sensing of Urban Areas*, ed. Toni Breuer et al. (Regensburg/Germany: Institut für Geographie an der Universität Regensburg, 2001).

⁸¹ Magdy Torab and Mohamed Azab, "Modern Shoreline Changes Along the Nile Delta Coast as an Impact of Construction of the Aswan High Dam," *Journal of Geographia Technica* 2 (2007).

sustain the subsidies program.⁸² The requests for tender issued by GASC, the General Authority for Supply Commodities commissioned to buy grain for Egypt on the international market, as well as press coverage of conflicting relationships among grain trading companies generated by food subsidies constitute the only available sources on the import of grain to Egypt via Alexandria, offering in the best of cases partial insight to an understudied topic.⁸³ Consequently, fieldwork supplies the primary information needed for the research, with site visits and interviews with bakeries owners and patrons as well as mill directors and port authorities being augmented by architectural and urban analysis.

Food Production and Urbanization, Cairo

There is an immense body of knowledge on food production in Egypt as well as on urbanization in Cairo, but further articulation of the specific spatial and urban significance of food production is more limited. In *The Pasha's Peasants*, for example, Kenneth Cuno gives a historical account of the economic and political aspects of agriculture, land tenure, and agrarian reform.⁸⁴ Cuno reviewed Islamic court records and cadastral surveys of private property and food production as well as the origin of modern capitalism in Egypt. The book *Agriculture in Egypt* compares patterns of agricultural production across historical periods and the changes in policy and property throughout different periods of Egypt's agrarian history.⁸⁵ Both works reflect on the links between land tenure and the spatial distribution of population as well as on the relative sizes of estates, a topic particularly pertinent to contemporary land reforms and recent economic adjustment programs. Such issues are again raised in Mahmoud Abdel-Fadil's study *The Political Economy of Nasserism* that addresses the seizure of landlord-held properties, the rising power of the state through modernization, and the onset of informal housing construction.⁸⁶ This last topic in particular is the subject of a plethora of secondary sources by economists, sociologists, and

⁸² Food and Agriculture Organization, *Country Brief on Egypt* (Rome: FAO, 2017).

⁸³ Maha El Dahan and Polina Devitt, "Two Russian Wheat Cargoes, One Argentine Cargo Bound for Egypt Rejected," *Reuters*, March 7, 2017, <http://www.reuters.com/article/us-egypt-wheat-idUSKBN16E1HB>.

⁸⁴ See Kenneth M. Cuno, *The Pasha's Peasants: Land, Society, and Economy in Lower Egypt, 1740-1858* (Cairo: American University in Cairo Press, 1994).

⁸⁵ See Alan K. Bowman and Eugene L. Rogan, *Agriculture in Egypt. From Pharaonic to Modern Times*, Proceedings of the British Academy, vol. 96 (Oxford: Oxford University Press, 1999).

⁸⁶ See Mahmoud Abdel-Fadil, *The Political Economy of Nasserism* (Cambridge: Cambridge University Press, 1980).

geographers, all of who interrogate the stigmatization of informal neighborhoods, their mechanisms of production, and their place in the urban context. The essay “Who is afraid of *ashwa’iyyat*? Urban change and politics in Egypt” by Asaf Bayat and Eric Denis, to name a seminal example, challenges preconceived notions about Cairo’s growth and the ‘ruralization’ of the city, tracing the construction of an image of social violence and religious extremism that is projected onto informal areas, a theme that is later taken up by Diane Singerman in the book *Cairo Contested*.^{87 88} Singerman’s work merges the focus of political economy and ethnography studies, while exploring complex patterns of political and urban space in Cairo, reflecting on neoliberalism and the various ways that power becomes spatially embedded.⁸⁹ The research by Agnès Deboulet, Eric Denis, and Marion Séjourné compiled in *Popular Housing and Urban Land Tenure in the Middle East: Case Studies from Egypt, Syria, Jordan, Lebanon, and Turkey* reconstructs complex practices of land tenure, appropriation, and land commodification in Egypt.^{90 91 92} In *Understanding Cairo*, urban economist David Sims also profiles urban informality, providing equally germane insight to its socio-spatial dynamics.⁹³ Sims challenges the unjust treatment of people living in these areas, calling for legalization and formal recognition of their habitats and ways of life. However, he does not necessarily consider the loss of agrarian land to urbanization a threat, insisting instead that land reclamation and the nation’s reliance on global markets offset the territorial costs of informal growth. As a matter of fact, this is the case for most scholarly works on the transformation of the productive landscape into housing. Dissertations published in

⁸⁷ Asef Bayat and Eric Denis, "Who Is Afraid of *ashwa’iyyat*? Urban Change and Politics in Egypt," *Environment and Urbanization* 12, no. 2 (2000).

⁸⁸ See Diane Singerman, *Cairo Contested: Governance, Urban Space, and Global Modernity* (Cairo: American University in Cairo Press, 2009).

⁸⁹ See Diane Singerman and Paul Amar, *Cairo Cosmopolitan: Politics, Culture, and Urban Space in the New Globalized Middle East* (Cairo: American University in Cairo Press, 2006).

⁹⁰ Agnès Deboulet, "Secure Land Tenure? Stakes and Contradictions of Land Titling and Upgrading Policies in the Global Middle East and Egypt," in *Popular Housing and Urban Land Tenure in the Middle East: Case Studies from Egypt, Syria, Jordan, Lebanon, and Turkey*, eds. Myriam Ababsa, Baudouin Dupret, and Eric Denis (Cairo: American University in Cairo Press, 2012).

⁹¹ Eric Denis, "The Commodification of the *Ashwa’iyyat*: Urban Land, Housing Market Unification, and De Soto's Interventions in Egypt," in *Popular Housing and Urban Land Tenure in the Middle East: Case Studies from Egypt, Syria, Jordan, Lebanon, and Turkey*, eds. Myriam Ababsa, Baudouin Dupret, and Eric Denis (Cairo: American University in Cairo Press, 2012).

⁹² Marion Séjourné, "Inhabitants' Daily Practices to Obtain Legal Status for Their Homes and Security of Tenure: Egypt," in *Popular Housing and Urban Land Tenure in the Middle East: Case Studies from Egypt, Syria, Jordan, Lebanon, and Turkey*, eds. Myriam Ababsa, Baudouin Dupret, and Eric Denis (Cairo: American University in Cairo Press, 2012).

⁹³ See David Sims, *Understanding Cairo: The Logic of a City Out of Control* (Cairo: The American University in Cairo Press, 2010).

the 1980s at the architecture departments of the Massachusetts Institute of Technology and of the University of California-Berkeley (e.g. Mohamed El Sioufi, Moustafa Mourad, Hisham Bahgat) were the first to engage the emergence of informal settlements in this context, but El Sioufi is the only scholar to specifically study the issue in the *Urbanization of Agricultural Land: Informal Settlements of Cairo*.^{94 95 96} Attentive to urban and social conditions, researchers Galila El-Kadi, Reinhard Goethert, or Ahmed Soliman address the obliteration of the local food system as a mere consequence of urbanization and not as a central object of study.^{97 98 99}

To sum up, there is little research on the architectural and territorial consequences of informal settlements vis-à-vis food production, and here again, fieldwork and firsthand site investigations prove invaluable as primary sources of information.¹⁰⁰

Food Security and Infrastructure, Toshka

There are few sources concerning the relationships between food security and space in the Egyptian context. One of the rare works is Jörg Gertel's article "Space, Social Reproduction and Food Security in Cairo" that discusses how changes in the international food system are shaping local food security.¹⁰¹ On the other hand, a large body of literature exists on the Nile River and its dams, though there is scant material on the large hydro-infrastructure of Toshka. The chronology of Nile infrastructure projects is reconstructed from a variety of sources such as press archives accompanying the inauguration of dams, transcripts of colonial administrations, and British

⁹⁴ Moustafa Abdel Khalek Mourad, "The Need for a New Approach: Analysis of the Built Environment of Informal Settlements and Public Housing Policy in Egypt" (PhD diss., Massachusetts Institute of Technology, 1983).

⁹⁵ Hisham Amr Bahgat, "Housing Generation in the Informal Sector in Egypt" (PhD diss., University of California, 1984).

⁹⁶ Mohamed Mahmoud El Sioufi, "Urbanization of Agricultural Land: Informal Settlements of Cairo" (Master diss., Massachusetts Institute of Technology, 1981).

⁹⁷ Galila El Kadi, *L'urbanisation Spontanée Au Caire*, ed. Centre d'Etudes et de Recherches sur l'Urbanisation du Monde Arabe, Urbanisation Du Monde Arabe, vol. 18 (Tours: URBAMA [etc.], 1987).

⁹⁸ Reinhard Goethert, *Kairo: Zur Leistungsfähigkeit Inoffizieller Stadtrandentwicklung* (Köln: Deutscher Gemeindeverlag, 1986), 17, 85.

⁹⁹ Ahmed Soliman, "Tilting at Sphinxes: Locating Urban Informality in Egyptian Cities," in *Urban Informality: Transnational Perspectives from the Middle East, Latin America, and South Asia*, eds. Ananya Roy and Nezar AlSayyad (Lanham, Md.: Lexington Books, 2004), 184.

¹⁰⁰ A portion of the present research on architectural typologies that have emerged from the structure of agrarian land patterns has already been published. See Marc Angélil and Charlotte Malterre-Barthes, *Housing Cairo: The Informal Response* (Berlin: Ruby Press, 2016).

¹⁰¹ Jörg Gertel and Petra Kuppinger, "Space, Social Reproduction and Food Security in Cairo/Egypt," *GeoJournal* 34, no. 3 (1994).

hydrologist Harold Hurst's personal account of his project for irrigation schemes.¹⁰² Tvedt Terje in turn contextualizes these documents and the episodes they recount in *The River Nile in the Age of the British*, which retraces the role played by colonial powers in water politics and thereby highlights the origins of management struggles over a highly contested resource.¹⁰³ In *Water and Sand*, Jessica Barne's essay "Expanding the Nile's Watershed: The Science and Politics of Land Reclamation in Egypt" treats desert expansion as a logical endeavor to procure resources from the constricted territories of the country.¹⁰⁴ The recurring fascination of Egyptian leaders with land reclamation and the urbanization of the desert as panaceas for all of the nation's ills is examined by David Sims in *Egypt's Desert Dreams: Development or Disaster?*¹⁰⁵ Such works help to better define the politics of the infrastructure projects investigated. The discourse on water, food, and land reclamation is substantiated by an examination of primary literature produced by international donors and agencies, along with governmental documents, official images, corporate data, and various media sources. The "National Water Resources Plan for Egypt- 2017," a strategy paper published by the Ministry of Water Resources and Irrigation, a collection of official images documenting the visits of President Hosni Mubarak on Toshka's construction site, and the archival brochure published by contractor Hitachi on its contribution to the pumping station, as well as international and national newspapers are examples of the material used for the research.¹⁰⁶

Ultimately, however, it is the material form, the architecture, and the territorial impacts of the infrastructure that function as the primary sources for all case studies.

¹⁰² "King Edwards' Sister-in-Law Who Dedicated Great Nile Dam," *Chicago Daily Tribune* 11 December 1901. Sir Benjamin Baker, *The Nile Dams and Reservoir* (London: Royal Institution of Great Britain, 1906). Harold. E. Hurst, *The Nile; a General Account of the River and the Utilization of Its Waters* (London: Constable, 1952).

¹⁰³ See Terje Tvedt, *The River Nile in the Age of the British. Political Ecology and the Quest for Economic Power* (Cairo: The American University in Cairo Press, 2006).

¹⁰⁴ Jessica Barnes, "Expanding the Nile's Watershed: The Science and Politics of Land Reclamation in Egypt," in *Water on Sand: Environmental Histories of the Middle East and North Africa*, ed. Alan Mikhail (New York: Oxford University Press, 2012).

¹⁰⁵ See David E. Sims, *Egypt's Desert Dreams: Development or Disaster?* (Cairo: The American University in Cairo Press, 2014).

¹⁰⁶ Ministry of Water Resources and Irrigation Planning Sector, *National Water Resources Plan for Egypt-2017* (Cairo: Arab Republic of Egypt, 2005). Marcia Merry Baker, "Mubarak: Toshka Project Opens Way toward 'New Civilization' in Egypt," *EIR* 24, no. 51 (1997); Shizuichi Sakamoto, "Mubarak Pumping Station Bringing Life to the Desert," ed. Hitachi Industrial Systems Group, Public & Municipal Systems Division (Tokyo: Hitachi Intermedix Co., 2005). Maha El Dahan, "UAE Firm Set to Produce 300,000 Tonnes of Wheat in Egypt's Toshka," *Reuters*, October 27, 2014, <http://af.reuters.com/article/investingNews/idAFKBN0IG0SC20141027>; "Egypt Allocates Additional Land to Toshka Project," *Mada Masr*, August 16, 2016, <https://www.madamasr.com/en/2016/08/12/news/u/egypt-allocates-additional-land-to-toshka-project/>.

In summary, the political economy of food in Egypt is powered by multiple processes and practices that interact on various scales to impact socio-spatial arrangements on the ground. Informed by literature from various disciplines as well as by planning documents, maps, satellite imagery, and field investigations, the research entails an analysis of architecture, urban forms, and infrastructure through the lens of food systems to understand the forces at work driving complex spatial transformations, to discern which forms those changes take, and to articulate how the formative dynamics of these changes impact specific ways of organizing territory.

1. POLITICAL ECONOMY OF FOOD SYSTEMS

1.1 THE CONTEMPORARY RELEVANCE OF FOOD

Urban Food Riots

Food, Poverty, Urbanization and the Global Economy: A Point of Departure

1.2 FOOD SYSTEMS

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Transportation Agents: Truck, Train, Boat

Processing Agents: The Act of Milling

Distribution Agents: Public Agencies, Food Retailers

Consumption Agents: Humanity

Food Regimes

Economic and Governance Agents

Financing Agents: from Bretton Woods to Wall Street

Institutional Agents: FAO, USAID, etc.

Geography of the Grain Chain



1.1 THE CONTEMPORARY RELEVANCE OF FOOD

This is very bad for my government, I have no food, I have nothing!

Me and my children, we will die today!

Anonymous, *Egypt's Violent Day of Anger*. Cairo: Daily News Egypt 2011.

*"I have no food, I have nothing!"*¹ Fearful, desperate calls of Egyptians recorded amid demonstrations that brought down the Mubarak regime in 2011 embody what is at stake in times of change for poor populations of the world. The most basic element necessary to sustain human life, food is an obviously relevant matter, even more so as one in eight people suffer from hunger. 852 million worldwide and 15 percent of all the population of developing countries go hungry.² Paradoxically, every year the record for grain harvests is broken. In 2016, 735 million tons of wheat was produced, and 761 million tons in 2017.³ Looking ahead to the coming season, global wheat production is anticipated to reach 744 million tons in 2018, slightly contracting. Such an accumulation of food stocks clashes with poor population's ability to access affordable food, a discrepancy emphasized by the crises of 2008 and 2011, when high food prices combined with shortcomings of political systems to trigger social unrest, most acutely in urban centers.⁴ Dramatic and visible, such manifestations of popular discontent confirm the global importance of food in the face of current urbanization and global economy.

Urban Food Riots

In 2008, more than twenty-five countries experienced food riots, all of which were located in urban areas of the Southern hemisphere.⁵ In 2011, protests erupted throughout Middle Eastern' cities. Though originally generated by spikes in food prices, these protests evolved to include demands for better democracy, social justice and freedom. Public displays of indignation address broader social and political issues than just the cost of basic necessities. In

¹ Mohamed Effat and Ian Lee, *Egypt's Violent Day of Anger* (Cairo: Daily News Egypt, 2011).

² United Nations, *The Millennium Development Goals Report 2012* (New York: United Nations, 2012).

³ Food and Agriculture Organization, *FAO Cereal Supply and Demand Brief* (Rome: FAO, 2013).

⁴ Marco Lagi, Karla Bertrand, and Yaneer Bar-Yam, "The Food Crises and Political Instability in North Africa and the Middle East," ed. New England Complex Systems Institute (September 2011): 1-15.

⁵ Ray Bush, "Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt," *Third World Quarterly* 28, no. 8 (2007): 119.

addition to criticizing leadership, urban rioters often recognize and condemn external forces acting on local and national policies. In this context of political dissent, urban environments have a spatial relationship to issues of food supply, urbanization and poverty. Furthermore, historical precedents confirm that hunger and scarcity pose a unique threat to order and government in urban areas, with populations of cities being more likely to revolt than their counterparts in rural provinces.⁶ This is in part due to the food dependency of the urban milieu, which relies on external sources for its supply. Michel Foucault in *Security, Territory, Population* defines scarcity and its spatial context as “the present insufficiency of the amount of grain necessary for a nation’s subsistence. (...) The immediate and most perceptible consequences of scarcity appear first of all, of course, in the urban milieu, (...) and with great probability, almost immediately leads to revolt.”⁷ The city as the market place sees the progression of food price rising, then hoarding and dearth. Rural areas, traditionally sites of food production, face shortages in a less sudden manner. Though countryside revolts also occur and rural poverty is undoubtedly a critical issue, the majority of modern-day food riots happen in an urban context.⁸ ⁹ The propensity of citizens to collectively react to threats to their subsistence might be related to the critical mass formed by a city’s population, and by its poor in particular. Also, the urban context increases capacities of popular organization and action, with more accessible participants that are easier to spatially gather and mobilize. Indeed, huge crowds have been involved in recent demonstrations, riots and marches, often counting thousands of protestors.¹⁰ The population engaged in such mass events are largely working class people, students or unemployed young men and women, grouped as net buyers of food that qualify as urban poor. Metropolitan agglomerations of the Southern hemisphere have been expanding rapidly in the past six decades, and along with them an underprivileged population.¹¹ In fact, cities shaped by the dynamics of urbanization are concentrated in less developed regions and are absorbing most

⁶ Steven Kaplan, *Provisioning Paris: Merchants and Millers in the Grain and Flour Trade During the 18th Century* (Cornell: Cornell University Press, 1984), 23.

⁷ Michel Foucault, *Security, Territory, Population: Lectures at the Collège De France. 1977-1978*, ed. Michel Senellart, Francois Ewald, and Alessandro Fontana (New York: Picador, 2009), 30.

⁸ Judy Baker, *Urban Poverty: A Global View*, Urban Papers, vol. no. UP-5. (Washington D.C.: The World Bank, 2008), 2.

⁹ John Walton and David Seddon, *Free Markets & Food Riots. The Politics of Global Adjustment* (Oxford: Blackwell, 1994), 198.

¹⁰ Mindi Schneider, "We Are Hungry! A Summary Report of Food Riots, Government Responses, and States of Democracy in 2008," (Ithaca, NY: Development Sociology, Cornell University 2008).

¹¹ UN Habitat, *The Challenge of Slums: Global Report on Human Settlements 2003* (Nairobi, United Nations Human Settlements Programme, 2003), xxxi.

of the population growth and rural migration.¹² Urban poverty has been attributed in part to this unprecedented transfer of poverty from rural to urban areas and in part to the removal of social subsidies under structural economic adjustment programs.¹³ It has also been suggested that fast urbanization fosters urban poverty because local and national infrastructures have failed to keep up with the demands of a growing population.¹⁴

Restricted access to affordable food combined with rising unemployment and shortcomings of government services exacerbates already harsh living conditions. Responses of informal economies (i.e. housing, employment), though valuable coping mechanisms, have added pressure on city centers and peripheries, and consolidated spatial inequality, social exclusion and precarious living for large portions of the urbanites in these regions. The fact that impoverished city dwellers spend as much as 80 percent of their daily income on sustenance means that they are particularly vulnerable to food price shocks.¹⁵ A revealing case in point is the fact that several food riots have started in poorer urban districts and spread to other areas of cities, with a violence typically directed at symbols of power (e.g. banks, foreign delegations, luxury stores, government buildings). In countries highly dependent on food imports, governments are expected to assure food security. When they fail to do so, their authority is undermined and the political system questioned. Though seemingly instant and spontaneous, politically centered protests mirror an underlying enduring problem. Far from random “burning and looting” errands, rioters’ actions target these institutions deemed blamable for the crisis: buildings of state treasury, international banks and various icons of foreign affluence, exposing direct outcomes of food riots on the built environment. Protesters are well aware of their countries dependence on the global food supply system, and on how local sustenance prices are determined by the international political economy.¹⁶ Food riots of the 1980s and 1990s were acknowledged as an opposition to debt, structural adjustment and International Monetary Fund (IMF) subsidy cuts, forming a pattern identified as the “IMF riot’.”¹⁷ Economic austerity

¹² United Nations Department of Economic and Social Affairs, *World Urbanization Prospects- the 2011 Revision* (New York: United Nations, 2012).

¹³ Rachel Masika, Arjan de Haan, and Sally Baden, *Urbanisation and Urban Poverty: A Gender Analysis* (Brighton, UK: Institute of Development Studies, University of Sussex, 1997), 3, 54.

¹⁴ Walton and Seddon, *Free Markets & Food Riots*, 194.

¹⁵ Eric Holt-Giménez, Raj Patel, and Annie Shattuck, *Food Rebellions! Crisis and the Hunger for Justice* (Oakland, CA: Food First Books, 2009), 6.

¹⁶ Lagi, Bertrand, and Bar-Yam, "The Food Crises and Political Instability in North Africa and the Middle East," 2.

¹⁷ Peter Atkins and Ian Bowler, *Food in Society: Economy, Culture, Geography* (London: Arnold, 2001), 174.

programs forced upon poor indebted countries in exchange for renegotiated IMF loans, slashing of state food subsidies and incentivizing the cultivation of cash crops instead of basic commodities led to steep increases in food prices, sometimes overnight, triggering fear of food scarcity and intensifying political discontent. Such public protests should not be considered separately from political dissent; several spontaneous food riots evolved rapidly into protests for political change when middle classes and opposition organizations joined low-income urban dwellers.¹⁸

In short, underprivileged urban populations of authoritarian regimes suffering from state-imposed austerity measures benefiting foreign debtors are likely to riot in case of a food crisis.¹⁹ In recent protests, the link between variations in international food prices and social unrest has been openly established, including criticisms of the impact of existing globalization, further economic restructuring, the destruction of local systems of production and distribution, or the commodification of food by the current international food order: "Modern food riots occur in response to a new and ever more integrated global system."²⁰ It appears imperative that these correlations be clearly identified and evaluated, as primary indicators of the relationships between the political economy of food systems and the built environment.

Food, Poverty, Urbanization and the Global Economy: A Point of Departure

There is evidence supporting the hypothesis that urban food riots provides insight into the effects of the world food system on built environments in both urban and rural spaces. Three distinctive preliminary themes emerge from reflecting on the spatial implications of such protests. First, in addition to mapping an over-arching geography of inequalities between developing countries of the Southern hemisphere and the Northern industrialized world, these events also indicate local urban poverty and inequality. Low-income urban dwellers are directly affected by elimination of social services and food subsidy cuts that are characteristic of austerity programs' directives, marking a direct correlation between global practices and their local effects. Given this context, a study of the mechanisms of food supply is essential in revealing the interdependences between economic, social and political strategies and physical space. For instance, in addition to exposing broad patterns related to supply procedures and origins, a close

¹⁸ Marc Cohen and James Garrett, "The Food Price Crisis and Urban Food (in)Security," *Environment and Urbanization* 22, no. 2 (2010).

¹⁹ John Walton and Charles Ragin, "Global and National Sources of Political Protest: Third World Responses to the Debt Crisis," *American Sociological Review* 55, no. 6 (1990): 876.

²⁰ Walton and Seddon, *Free Markets & Food Riots*, 23.

look at local food subsidy access points may illuminate important relationships between the provisioning of cities, social processes, and spatial form. Also important to consider is the reverse effect of urban food riots on national policies and international politics, given that popular protests are a form of resistance to poverty and food price inflation and have led to democratization of food regimes and social justice.²¹ Secondly, the spatial context of food riots raises questions about the effect of urban growth on developing countries' food systems and politics. Urbanization patterns in these regions provide favorable terrain for riots: rural migration has transported poverty from the countryside to the city, new urban groups (e.g. religious groups, communities) are organized populations with little political leverage and uneven access to public infrastructures and population growth is highest in underprivileged urban areas. Proposed causes of food crises include Neo-Malthusian specters of overpopulation, questions on the "limits to growth" and a rising demand for food commodities in developing countries.²² Arguments for these causes focus on the accelerated physical expansion of urban areas and the points of friction between food production and urban growth. Identifying the form of spatial changes brought about by rapid urbanization on land available for agriculture could provide insight into the impact of growth dynamics and their adverse effects on local food supply. Thirdly, the fragility of the urban food supply chain as a catalyst for conflict and a trigger of food riots raises questions about physical, political and economic access to nutrition. The pressing question of food security reveals deeper issues in the relationships between urban food systems and rural land, the magnitude of developing countries dependency on foreign imports and aid as well as the influence of external expert knowledge on national projects. A review of political agendas and their corresponding spatial consequences would illuminate correlations between governance and broader contingencies generated for the sake of national food security and global imperatives such as large-scale infrastructure projects at a territorial scale.

Urban protests offer an inspiring point of tangible interaction between food systems, poverty, urbanization and the global market economy meanwhile providing insight into the world food system at large. Driven by the complexity of human nutrition and its many implications, this approach uses the basic makeup of the political economy of food to shed light on how food systems impacts the built environment, and vice versa.

²¹ Ray Bush, "Food Riots: Poverty, Power and Protest," *Journal of Agrarian Change* 10, no. 1 (2010): 127.

²² See Club of Rome, *The Limits to Growth; a Report for the Club of Rome's Project on the Predicament of Mankind*, ed. Donella H. Meadows (New York: Universe Books, 1972).

1.2 FOOD SYSTEMS

The idea of a 'food system' is a convenient means of conceptualizing the relationship between the different forces acting upon the commodity flows from producer to consumer. The idea is not new. Geoff Tansey and Tony Worsley, *The Food System- a Guide* (London: Earthscan, 1995), 9.

A “food system” refers to the interrelation of forces acting on commodity flow from producer to consumer, as well as the contingent combination of relevant factors: economic, social, cultural, political, technological and so on.²³ It integrates the ideas of a “food chain” and a “food economy” with the term “system” to indicate “the interconnection beneath the surface of things.”²⁴ In this sense, the food system links biological aspects (production and ecology), economic and political aspects (power and control over parts of the system) and social and cultural aspects (human relations, community and cultural values on food consumption) as one complex entity. Indeed, it includes all phases involved in the feeding of humanity: inputs and outputs, processes and infrastructure, labor, research and education. Located within a framework of the political economy of development and derived from world systems theory, the idea of a food system draws primarily from the Global Commodity Chain (GCC) analysis, originally drafted to study industrial commodities and the changes brought about by market liberalization, economic reforms and globalization (See Introduction). Understanding the food system as a commodity chain allows for a comprehensive and trans-disciplinary approach by integrating biology, nutrition, anthropology, economics, politics, and geography. While the epistemology of food studies is immense and spans a rich variety of disciplinary and theoretical contexts, the food system approach and associated concepts of commodity chain analysis such as GCC, food networks systems of provision and food circuits form the body of methods attributed to a political economy of food studies that this research draws on. Though not a cohesive theoretical framework, the food *filières* research tradition is to be considered as well, in particular regarding the study of agricultural commodities in a post-colonial context. Geographers have also challenged ideas of space and place in food, though the more spatially conscious approach of urban food systems is stemming from development and agriculture studies. Likewise relevant to the present work, the urban system and metabolism concepts offer a combined insight from architectural and natural sciences. Primarily, this section outlines the

²³ Atkins and Bowler, *Food in Society*, 9.

²⁴ Geoff Tansey and Tony Worsley, *The Food System - a Guide* (London: Earthscan, 1995), 1.

theoretical framework and approach for analyzing developments induced by the political economy of food; it explores the ideas and methods pertinent to the contemporary reading of food systems. While reviewing possible research directions within the various disciplines of food studies, it appears significant that in this vast inventory the spatial dimension is largely overlooked. A few analyses examine geographical contingencies, yet the impacts of commodity chain dynamics on space at the scale of the built environment remains neglected. Secondly, given the circumstances, this research attempts to tackle the relative absence of spatially focused work by extracting principles from existing methods to propose flexible research guidelines pointed at urban, rural and territorial realms.

World Systems

While scholars have undertaken reconstructions of food supply structures from as early as 1856 on particular food chains, most of these food studies have been fragmented prior to the commodity chain approach.^{25 26} This is because separate disciplines have addressed the matter in their own terms and without theoretical coherence. In this context, the commodity chain approach, within the framework of world systems concept, provides a holistic comprehension of commodity flows at a global scale, unraveling the exploitative relationships between raw material producers and consumption sites. The concept of a food system derives from the world system idea coined by Immanuel Wallerstein in *The Modern World System: Capitalist Agriculture and the Origins of the European World Economy in the Sixteen Century*.²⁷ Wallerstein's theory is particularly valuable as a primary approach to the detailed fraction of world systems that represents the food system because it focuses on explaining why the modern economic system developed into today's capitalism. World-system theory typically argues against the claim that unhindered exchange between two countries is always beneficial if they produce mutually desirable goods at different degrees of efficiency, an idea formulated by proponents of the classical modern economic theory of free trade such as David Ricardo.²⁸ In contrast to this logic, world system theories claim that free trade benefits advance industrial economies but slow development of poorer economies, a perspective that many contemporary critics argue modern

²⁵ See George Dodd, *The Food of London* (New York: Arno Press, 1976).

²⁶ See C. Raison, *The Milk Trade: A Comprehensive Guide to the Development of the Dairy Industry* (Virtue and Company, 1933).

²⁷ See Immanuel Wallerstein, *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century, with a New Prologue*, vol. 1 (Berkeley: University of California Press, 2011).

²⁸ See David Ricardo, *The Principles of Political Economy & Taxation* (New York: J.M. Dent & Sons, 1911).

global capitalism derives from.²⁹ Fundamentally leftist, the world system theory focuses on explaining the historical rise of the West and the continuous poverty of non-Western societies, providing a theoretical framework for the redistribution of the world's economic wealth. Politically oriented, this materialist approach to the study of change outlines political systems of different regions using the four categories of core, periphery, semi-periphery and external areas. The world system theory also describes the relative position of regions within the world economy. The central ideas characterizing the world system are the power hierarchy between core and periphery, in which powerful and wealthy “core” societies dominate and exploit poor peripheral societies, and the crucial role of technology in this imbalance. Advanced or developed countries form the core, and the less developed are in the periphery. This is adapted from the dependency theory; a neo-Marxist interpretation of development processes, understanding the “periphery” by looking at core-periphery relations. Wallerstein draws on Marxists approaches regarding social conflicts among materially based human groups, including accumulation processes and competitive class struggles. His theorization of world system in business cycles and reciprocal, redistributive, and market modes of economic organization bears the influence of Karl Polanyi and Joseph Schumpeter. For instance, the world system theory is framed within a tradition of seeing economic development and international economic change as influenced by the expansion and contraction of 70-year Kondratieff Cycles, waves of economic life.³⁰ The world system theory also owes much to the *Annales* School, and to the historical and geo-ecological regions approach of Fernand Braudel.³¹

²⁹ Daniel Chirot and Thomas Hall, "World-System Theory," *Annual Review of Sociology* 8, Annual Reviews (1982): 87.

³⁰ See Immanuel Wallerstein, "Kondratieff Up or Kondratieff Down?," *Review (Fernand Braudel Center)*, (1979).

³¹ See Fernand Braudel, *Civilization and Capitalism- 15th-18th Century, vol. II: The Wheels of Commerce*, trans., Sian Reynolds, III vols., (London: Book Club Associates, 1983).

Global Commodity Chain Analysis

Global commodity chains are “network[s] of labor and production processes whose end result is a finished commodity” as defined by Terrance Hopkins and Immanuel Wallerstein.³² A question central to their investigation is “whether and to what extent a capitalist world-economy was an organizing force and structural reality.”³³ Further elaborated by the sociologists Gary Gereffi and Richard Appelbaum, the global commodity chain (GCC) analysis is clearly rooted in world system theory, though it does not draw on the theory’s historical and cyclical aspects. Focused on global dynamics of production, consumption and retailing and the study of the series of operations in the industrial commodities production process, the underlying structure of GCC incorporates four research trajectories.

Food Networks, Systems of Provision, Commodity Circuits and Food Filières

Four main strands of research specifically addressing food unfold from the commodity chain approach: food networks, systems of provisions, commodity circuits, and food *filières*, though the latter differs because of its specific post-colonial focus.

Developed as a reaction to the debate on a systemic idea applied to food commodities, the notion of food networks claims that a linear concept simplifies and suppress the human factor (e.g. questions of gender and working classes).³⁴ Drawing from the Actor Network Theory (ANT) developed by Bruno Latour that provides a link between actors (human, objects and hybrids), the food networks framework offers a possible point of analysis for spatial and geographical outcomes of globalization.³⁵ ANT has been extended to the field of geography and spatial concepts to address how actors are operating within a network, and how one actor may affect others though separated by space, specifically in the production and judgment of food.³⁶ For this research framework, the claim that the interactions between global and local are reciprocal is particularly relevant: Global actors affect local contexts (i.e. nations, regions,

³² Terence Hopkins and Immanuel Wallerstein, "Commodity Chains in the World-Economy Prior to 1800," *Review (Fernand Braudel Center)* 10, no. 1 (1986): 159.

³³ *Ibid.*, 159.

³⁴ Deborah Leslie and Suzanne Reimer, "Spatializing Commodity Chains," *Progress in Human Geography* 23, no. 3 (1999): 404.

³⁵ See Bruno Latour, "The Powers of Association," in *Power, Action and Belief: A New Sociology of Knowledge*, ed. Paul Kegan (London: Routledge, 1986).

³⁶ See Terry Marsden and Alberto Arce, "Constructing Quality: Emerging Food Networks in the Rural Transition," *Environment and Planning A* 27, no. 8 (1995).

locales, production units, households, bodies); local actions can alter global processes (e.g. local resistance, consumer unions, social movements).³⁷

The systems of provision concept developed by political economists Ben Fine and Ellen Leopold informs production and consumption of food, arguing for a “vertical” analysis by tracing connections along the commodity chain.³⁸ An alternative to the classical “horizontal” approach that focuses on a single factor influencing food consumption and then generalizes its effects across the world economy, the systems of provision idea argues for a distinction between different food commodities based on their organic properties. In this sense, this method recommends addressing different commodities with different approaches. A system of provision’s approach offers a balanced comprehension of linkages of production and consumption to food studies. However, few of the systems of provision works are conducted with a geographical and spatial approach.

Related to this philosophy, yet responding to doubts about the accuracy of the commodity chain approach as applied to food because it is too linear a concept, the commodity circuits’ idea has been developed by human geographers. As opposed to a finite and simplistic direct interpretation, this line of thought acknowledges the boundless nature of circuits while alerting to the origins of commodities.³⁹ It highlights circulations of knowledge and discourse over materiality flows. This latest approach relates to a broader sector of social studies interested in the ideas of networks, flows and mobility rather than in societies and places. In particular, Manuel Castells’ work on flows of capital and information, their influence on production and consumption, and the extra-territorialization of networks emphasizes linkages and socio-economic and political assemblages as new analysis tools.⁴⁰

While global commodity chain analysis and similar concepts appear as a largely unified research field, the francophone food *filières* framework contextualizes differently. Also called *Approche Filière*, sometimes translated as Commodity Chain Analysis, it differs from GCC in its political and theoretical approach. Developed by researchers at the Institut National de la Recherche Agronomique (INRA) and the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), the food *filières* tradition emerged as a need to

³⁷ Richard Le Heron, *Globalized Agriculture: Political Choice* (Oxford: Pergamon Press, Books Division, 1993), 32-33.

³⁸ See Ben Fine and Ellen Leopold, *The World of Consumption* (London: Routledge, 1993).

³⁹ See Richard Johnson, "The Story So Far: And Further Transformations," in *Introduction to Contemporary Cultural Studies*, ed. David Punter (London: Longman, 1986).

⁴⁰ See Manuel Castells, *The Rise of the Network Society, The Information Age: Economy, Society and Culture*, Vol. I (Massachusetts: Blackwell Publishing, 1996).

provide a structure to the colonial and post-colonial French context and the study of agricultural commodities produced in the colonies.⁴¹ Drawing from a composite collection of theories including systems analysis, industrial organization, institutional economics and Marxist economics, the *filières* approach aims at identifying the agents and activities that contribute to the production of a commodity, asserting a comprehensive structure from raw material to final product.⁴² Applied in particular to agricultural products, this empirical research tradition involves mapping out commodity flows and the measure of inputs and outputs, the prices and value added along a chain assessing how public policies, investments and institutions affect local production systems.⁴³ A substantial part of the research conducted within the *filières* thinking focuses on regulations, transactions and costs and the impact of public institutions on flows of commodities and local production systems. *Filières* analysts generally underline the negative effects of market liberalization in developing countries.

Each of these angles deploys the tracing of commodities, whether as chains or isolated snapshots of circuits, and the identification of their driving forces. Most of the scholars occupied with contemporary food studies and commodity chain analysis subscribe to the following consensus: the commodification of food, through the industrialization of agricultural production and distribution, has undergone consolidation in recent decades. Transnational corporations have increased their monopoly over the global food system; and many governments have proven unable to achieve food security for poorer populations. While media attention on the food riots of 2005, 2008 and 2011 contributed to the perception of these crises as sudden and of a temporary nature, they may reveal a deeper dysfunction of the world food supply chain and of the global economic order.⁴⁴ In fact, it appears that the underlying questions posed by food researchers address the globalization of food systems and the complexity inherent to the integration of food production, distribution and consumption into the global economy. In these circumstances, a commodity chain approach demands an attentive insight onto the political economy of food. Most importantly, the expanding role of capital through the industrialization of agriculture, the ensuing rise of a global agro-business at every level of production, the

⁴¹ See Philip Raikes, Michael Friis Jensen, and Stefano Ponte, "Global Commodity Chain Analysis and the French Filière Approach: Comparison and Critique," *Economy and Society* 29, no. 3 (2000).

⁴² See Jérôme Coste and Johny Egg, "Regional Dynamics and the Effectiveness of Economic Policies: The Case of Cereal Markets in West Africa," in *Economics of Agricultural Policies in Developing Countries*, eds. Michel Benoit-Cattin, Michel Griffon, and Patrick Guillaumont (Paris: Editions de la Revue Française d'Économie, 1996).

⁴³ Fabien Tallec and Louis Bockel, "Commodity Chain Analysis: Constructing the Commodity Chain Functional Analysis and Flow Charts," in *EasyPol* (Rome: UN Food and Agriculture Organization, 2005).

⁴⁴ Christopher Rosin, *Food Systems Failure: The Global Food Crisis and the Future of Agriculture* (London: Earthscan, 2012), 6.

centralized global control exerted by mercantile structures and the impact of regulatory systems or international financial institutions are to be scrutinized.

While it appears clear that food systems are indissociable from the global economy and political, economic, and social matters, this research remains primarily concerned with spatiality. Therefore, the focus of geographers on features of place, context and setting, as well as on social-spatial processes related to food production, distribution and consumption is a substantial input to consider.

Geographies of Food

Because the primary focus of commodity chain analysis is the international trading system and the increasing economic integration of global production chains, materiality and space are not matters central to GCC, or to the *filières* approaches. In fact, most of the previously mentioned food systems frameworks overlook the physical impact of commodity chains in favor of a focus on social, economic and institutional aspects without territorial groundings. For instance, the international component of chains is treated as a technical and socio-historical factor of differentiation among global chains rather than as a contextual constituent. Studies in the fields of geography, environmental science and development studies, however, specifically address some spatial aspects of commodity chains. In "Spatializing Commodity Chains," Deborah Leslie and Susan Reimer consider geographical contingencies as a formative factor of commodity chains. They claim that space and place are influential to the nature of commodity flows, to the articulation of politics of consumption and to the formation of industrial policies, citing regionally specific policy as an example.⁴⁵ Arguing that commodity chains, in particular at consumer levels, are instrumental in the production of space such as the home, Leslie and Reimer make the point that place mediates relationships across the chain through retailing, advertising or consumption sites. Conversely, several studies assert the primary relevance of production factors and production locales, and there is a strong body of work pertaining to geographies of consumption too, identifying connections between places along commodity chain and revealing complex implications of consumer actions.⁴⁶ This approach's focus is set on the final stretch of commodities chains and on the spatial expression

⁴⁵ Leslie and Reimer, "Spatializing Commodity Chains," 404.

⁴⁶ See Peter Jackson and Nigel Thrift, "Geographies of Consumption," in *Acknowledging Consumption* (London: Routledge, 1995).

of social and physical processes of consumption for various goods.⁴⁷ It is noteworthy that existing lines of research pertaining to geographical contingencies of consumption often consider goods at large, and are not targeting spatial conditions of food systems specifically.⁴⁸ David Harvey mentions in *Between Space and Time: Reflections on the Geographical Imagination* that “the grapes that sit upon the supermarket shelves are mute; we cannot see the fingerprints of exploitation upon them or tell immediately what part of the world they are from.”⁴⁹ This ignorance is what recent works in food geography, a subfield of human geography, try to tackle. Attention given to place, scale, context and spatial organization of food systems by human geographers is focused on questions of locality, representation, and sociality.⁵⁰ Though partially addressed in GCC analysis and similar concepts, it is more through agro-food studies, cultural food geographies, agriculture and rural food sciences that tangible dimensions of food have been observed through the lens of political economy. These studies address issues such as ecologically sustainable relationships between food producers, processors and consumers; economy, ethics and ecology of food provision; relocalization; and local food production to name a few.⁵¹

Notably absent from those studies are territorial and urban dimensions. Explicitly addressing the scale of the city and urbanization as well as the relationships between rural, local and national territories, urban food systems and urban metabolism will be considered next as consequential to an insight on food commodities and space.

Urban Food Systems

At the nexus of geography, anthropology and economic history, concerned with the feeding of cities in general, and more specifically with urban food channels as they reflect the local influence of the political economy, the urban food systems angle differs from the linearity of the commodity chains approach because it is horizontally defined. It examines food-producing areas (rural, urban, domestic and foreign), marketing networks (exchange and distribution), and urban consumption centers. These segments ensure the production, supply

⁴⁷ See Ian Cook and Philip Cragg, "The World on a Plate. Culinary Culture, Displacement and Geographical Knowledges," *Journal of Material Culture* 1, no. 2 (1996).

⁴⁸ See Juliana Mansvelt, *Geographies of Consumption* (London: Sage, 2005).

⁴⁹ David Harvey, "Between Space and Time: Reflections on the Geographical Imagination," *Annals of the Association of American Geographers* 80, no. 3 (1990): 422.

⁵⁰ *Wheat Facts and Futures 2009*, (Mexico, D.F.: CIMMYT: International Maize and Wheat Improvement Center, 2009).

⁵¹ See Terry Marsden et al., "Agricultural Geography and the Political Economy Approach: A Review," *Economic Geography* 72, no. 4 (1996).

and conveyance of goods, linking producer to consumer, peasant to state, supply with demand, and cities to their local context. As such, nutritional supply chains are entrenched in an articulated social, economic and spatial structure. Mostly utilized in the field of development studies, the concept of urban food systems is engaged with the reconstruction of food supply in developing countries. The focus on cities is justified because “urban agglomerations form isolable units of analysis, carved out by their intersect with an aspect of social life for which regularity, predictability, and accurate synchronization are at a premium.”⁵² As mentioned earlier, somewhat neglected by human geographers and the field of food geography, research on food systems is either framed by policy-oriented and crisis-oriented investigations with a focus on economic perspective, or as geographical socio-economic, symbolic and socially produced phenomenon, and the intersection between food systems and the built environment is little explored.⁵³ There is, however, a body of knowledge that the seminal introduction of Jane Guyer’s *Feeding African Cities* organizes into three national approaches. American researchers, through economic and policy-oriented analysis, have been concentrating on trade networks, government institutions, and history of market organizations, assessing configurations of power as critical to food prices.⁵⁴⁵⁵ British scholars’ focus has been set on monitoring urban wages, underlining the importance of class and local social structures in food production and distribution, with economic welfare, political stability, poverty, and inequality issues at heart.⁵⁶ Francophone literature has been primarily concerned with forms of social organization, structures of provisioning, and the role of hinterlands in supplying cities. Various urban researchers have engaged in specific urban-rural food themes and the constant concern of administration to control food supply, tension between consumer and producer, operatives of the grain trade and central policy.⁵⁷ By superimposing social and political processes to urban and rural spheres, these studies on the provisioning of cities are the closest to a spatial analysis of the

⁵² Jane I. Guyer, *Feeding African Cities: Studies in Regional Social History* (Manchester: Manchester University Press for the International African Institute, 1987), 6.

⁵³ Melanie Bedore, "Just Urban Food Systems: A New Direction for Food Access and Urban Social Justice," *Geography Compass* 4, no. 9 (2010).

⁵⁴ See William Jones, *Marketing Staple Food Crops in Tropical Africa* (Ithaca, NY: Cornell University Press, 1973).

⁵⁵ See Amartya Kumar Sen, *Poverty and Famines: An Essay on Entitlement and Deprivation* (Oxford: Oxford University Press, 1982).

⁵⁶ See Rowena Lawson, "The Supply Response of Retail Trading Services to Urban Population Growth in Ghana," in *The Development of Indigenous Trade and Markets in West Africa*, ed. Claude Meillassoux (London: Marris, 1963), 377-98.

⁵⁷ See Philippe Haeringer, "Abidjan Au Coin De La Rue : Éléments De La Vie Citadine Dans La Métropole Ivoirienne," *Cahiers de l'analyse des données* (1985).

food system that development studies' approach can deliver (i.e. Steven Kaplan's excellent historical analysis of politics of grain trade in France).⁵⁸ Based on ecology, environment and biological studies, the urban metabolism idea offers a system-oriented view on the effects of material and substance flows not addressed by the urban food system approach, perhaps moving closer to a spatial and material understanding of food systems and their relationships to urban and rural territories.

Urban Metabolism and Urban Systems

Coined by Abel Wolman in *The Metabolism of Cities*, urban metabolism is defined "as the sum total of the technical and socioeconomic processes that occur in cities, resulting in growth, production of energy, and elimination of waste."⁵⁹⁶⁰ Another designation states "cities transform raw materials, fuel, and water into the built environment, human biomass and waste."⁶¹ This definition expands to include four flows: water, materials, energy, and nutrients, in the context of the spatial relationships of cities with their hinterlands and global resource webs. Focused on assessments of accumulation processes, the quantified studies feature the sustainable development of cities as a major concern. This is usually estimated via two main methods employed for assessing cities, both quantitative and relatively technical: "emergy" (*sic*) and mass balance.⁶² The first, developed by systems ecologists, describes metabolism in terms of biology and solar energy equivalents.⁶³ The second and most popular approach is Peter Baccini and Paul Brunner's, which treat city's flows as mass fluxes (water, material and nutrients) calculated in joules.⁶⁴ In *Metabolism of the Anthroposphere*, the analogy of the city as a biological organism with metabolic processes is introduced. The quantitative method employed in this work is the material flow analysis (MFA), which calculates the material and energy balance at regional or national scales, identifying the most relevant processes. Food consumption in Swiss

⁵⁸ Kaplan, *Provisioning Paris*, 1984.

⁵⁹ Christopher Kennedy, John Cuddihy, and Joshua Engel-Yan, "The Changing Metabolism of Cities," *Journal of Industrial Ecology* 11, no. 2 (2007): 43.

⁶⁰ See Abel Wolman, "The Metabolism of Cities," *Scientific American* 213, (1965).

⁶¹ Ethan Decker et al., "Energy and Material Flow through the Urban Ecosystem," *Annual Review of Energy and the Environment* 25 (2003): 715.

⁶² Christopher Kennedy, Stephanie Pincetl, and Paul Bunje, "The Study of Urban Metabolism and Its Applications to Urban Planning and Design," *Environmental Pollution* 159, no. 8-9 (2011).

⁶³ See Eugene Odum and Gary Barrett, *Fundamentals of Ecology* (Belmont, CA: Thomson Brooks/Cole, 1971)

⁶⁴ See Peter Baccini and Paul H Brunner, *Metabolism of the Anthroposphere: Analysis, Evaluation, Design* (Cambridge, MA, USA: MIT Press, 2012).

private households is one of the examples of an MFA proposed, in a very exhaustive study, from kitchen to waste. Within the urban metabolism field, other analyses use engineering tools with an environmental concern, such as Life Cycle Analysis (LCA) or Multi Attribute Utility Theory (MAUT) to quantify the material systems generated by basic activities. Life Cycle Analysis follows a product (cradle-to-grave analysis) to estimate its environmental impacts; Multi Attribute Utility Theory includes other ecological aspects in its assessment. It appears clear that such quantitative methodologies are concentrated on the understanding of input and output in the study of urban metabolism, contrasting with the socially concerned geographical approach previously discussed.⁶⁵ ⁶⁶ Criticism of urban metabolism studies proposes that the calculation of flows of “things” restricted on physical parameter estimates fails to recognize the makeup of the urban as a socio-environmental metabolism, and urbanization as a social process of transforming territories.⁶⁷ Because of its strong interdisciplinary background, however, the urban metabolism method allows for a more comprehensive assessment of the patterns and processes of urban energy systems. Baccini acknowledges that these processes are “objects of the humanities and the social sciences” and further stresses that “metabolic studies are to be developed in a transdisciplinary procedure.”⁶⁸

Attempts to sketch a fusion of both humanities and quantitative sciences have led to *Netzstadt: Designing the Urban*, the fruit of a collaborative effort between Peter Baccini, environmental scientist and Franz Oswald, architect.⁶⁹ In this study, Baccini and Oswald, departing from the urban metabolism term, prefer to use the notion of urban systems, which they define as “an all-encompassing three-dimensional network (...) with a high concentration of people, goods, and information.”⁷⁰ The *Netzstadt* model was prompted by the need for clarity in confronting the complexity of the urban phenomena with regard to design, and it draws from the diverse fields of architecture, natural and engineering sciences and economics. The transdisciplinary method offers systemic elements that function as set of tools to identify

⁶⁵ See Peter Baccini, "A City's Metabolism: Towards the Sustainable Development of Urban Systems," *Journal of Urban Technology* 4, no. 2 (2007).

⁶⁶ Hans-Georg Bohle, "Metropolitan Food Systems in Developing Countries: The Perspective of "Urban Metabolism"," *GeoJournal* 34, no. 3 (1994): 245-251.

⁶⁷ Nikolas Heynen, Maria Kaika, and Erik Swyngedouw, *In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism*, vol. 3 (London, New York: Taylor & Francis US, 2006), 33.

⁶⁸ Baccini and Brunner, *Metabolism of the Anthroposphere*, 81.

⁶⁹ See Franz Oswald, Mark Michaeli, and Peter Baccini, *Netzstadt: Designing the Urban* (Basel: Birkhauser, 2003).

⁷⁰ *Ibid.*, 46.

and quantify urban environments. Consistent with this diversified approach, four groups of basic human needs and activities are outlined: to nourish and recover, to clean, to reside and work, to transport and communicate. The study lays out the physiological characteristic of urban systems and the criteria employed to evaluate them: Identity (the cultural and social layer relating to how people can identify to a city through icons and images for instance), diversity (the variety of functions performed in the city), flexibility (the ability of the city to adapt to changes), degree of self-sufficiency (the degree of autonomy and physical reliance on exterior resources), and resource efficiency (the balance between consumption and availability of resources). Finally, the four major components of urban metabolism are water, food (biomass), construction materials and energy. The method proposed by Oswald and Baccini has been used in comprehensive studies of metabolism, offering interpretations of urban systems and assessments of their sustainability.⁷¹

Considering that the first point of analysis within the present thesis aims to identify the theoretical framework in which to address the intersectional moments between the built environment and food as they relate to territories, the urban system definition of goods is particularly noteworthy: “goods are defined in economic terms but have physical form (material composition).”⁷² In Oswald and Baccini’s chapter on nourishment, the physiological aspect of food in the context of the Swiss *Mittelland* and its ecological indicators are quantified in terms of energy demand, proposing that the nourishing activity “requires a territory of agricultural area which (...) cannot generally be covered by a systems’ own territories.”⁷³ Furthermore, the claim that processes related to food production, distribution and consumption “encompasses all territories, processes and goods” is instrumental to developing a spatial approach to the relationships between food systems and territories, which this research aims to accomplish. Thanks to its transdisciplinary perspective, this methodological procedure tackles a conceptual gap between food systems and materiality in a territorial context that other fields have neglected. Providing “a scientific analysis of the phenomenon of urbanity,” it offers a basis for analysis, which recognizes urban space and territory and considers their physical qualities. It is clear, however, that urban food systems cannot be solely interpreted by their ecological processes and must be considered within the political and social systems and the configurations of power

⁷¹ Sabine Barles, "Society, Energy and Materials: The Contribution of Urban Metabolism Studies to Sustainable Urban Development Issues," *Journal of Environmental Planning and Management* 53, no. 4 (2010).

⁷² Oswald, Michaeli, and Baccini, *Netzstadt*, 58.

⁷³ *Ibid.*, 170.

they operate within.⁷⁴ The present research is therefore aiming for a flexible and heuristic framework interrelating material flows with social, economic and political aspects within urban, regional, national and global territories.

It is the aim of this thesis to investigate the relationships between resources and space, food and territory. The preceding review identified a range of major methods developed by different disciplines for obtaining insights into the feeding of humanity. These frameworks offer valid research angles for food systems and sub-structures of food production, distribution and consumption. While it appears that geography and the urban metabolism approach have addressed spatial characteristics of food in the most convincing manner, not one method emerges that encloses all of the aspects that this study is concerned with. This is not to invalidate any of these research schemes; on the contrary, this work capitalizes on the theoretical framework previously built and claims existing reconstructions of value chains and food systems to form a broad overview that would enclose both the political economy of food systems and help identify its effects on the built environment. In this sense, the appropriating and aggregating of existing knowledge is essential to the custom-made approach of mixed methods developed in the present investigation: the conceptual framework is formed with the belief that the centrality of food as a mean of physical and social sustenance with material impacts on space and the organization of territory commands a holistic methodology. It thus must encompass the identifiable concepts developed through the recurring concern of several academic disciplines. Based on these premises, the analysis attempts to bridge economic and political issues (the political economy), the physical aspects of food systems, and the built environment. Firstly, privileging the global commodity chain method, a single commodity is selected – wheat – to be the primary object of study, restricting the topic to a graspable yet considerable section of the food system.

⁷⁴ Heynen, Kaika, and Swyngedouw, *In the Nature of Cities*, 1947.

1.3 GRAIN, WHEAT, AND BREAD

There is nothing better than wheat.

Le Ménagier de Paris (c. 1393) in Maguelonne Toussaint-Samat, *A History of Food* (Chichester, West Sussex, U.K.; Malden, MA: Wiley-Blackwell, 2009), 130.

Food is defined as “material consisting essentially of protein, carbohydrate, and fat used in the body of an organism to sustain growth, repair, and vital processes and to furnish energy.”⁷⁵ The array of what humanity consumes for its sustenance appears at first overwhelming, but with a higher protein content than other major cereals, maize (corn) or rice, wheat is the most of eatable vegetable protein and is hence the ultimate human food grain source. Wheat has long been the basic staple of the civilizations of Europe, West Asia and North Africa, and Maguelonne Toussaint-Samat in *A History of Food* names “cereals as civilizers.”⁷⁶ Grains, essentially wheat and barley, played an essential role in the settlement of humanity because it determined to the location of the first habitats. Archeological research revealed that hunter-gatherer populations of the Paleolithic age settled in areas where spontaneous cereals were abundant, thus establishing a primal connection between food and space. Among other factors, geography favorable to crops corresponds to increasing life expectancy and progress of human settlements, eventually leading to the creation of cities. Toussaint-Samat highlights this correlation with a linguistic analogy: “Not for nothing does the same word, *culture*, apply to both intellectual development and the tilling of the soil.”⁷⁷ Archeo-botanists also agree that agriculture has been the fuel for urban civilizations in Egypt, Mesopotamia, Greece and Rome, and by extension, Europe.⁷⁸ It is not the intention of this work to dive in depth into the history of grain and humanity, which is extensive and disputed; however in order to contextualize the importance of the crop today, this section presents a portrait of wheat as the world’s most planted, produced, traded and consumed cereal and commodity. It introduces the historical significance of grain as a commonplace item and its role as a motivating force in the development of civilizations. Furthermore, this depiction aims to provide an historical and

⁷⁵ Merriam-Webster Dictionary, "Food - Definition," 2013, nd. Web (2013).

⁷⁶ Maguelonne Toussaint-Samat, *A History of Food* (Malden: Wiley-Blackwell, 2009), 114.

⁷⁷ *Ibid.*, 114.

⁷⁸ Alain Bonjean and Emmanuel Picard, *Les Céréales À Paille : Origine, Histoire, Économie, Sélection* (Paris: Softword ; Groupe ITM, 1990).

cultural outline to the current situation of world production, the system of wheat trade, the nutritional value of wheat, as well as its processing and consumption patterns. This part of the study offers context to the current physical procedures of global wheat supply, setting the stage by defining a preliminary framework for the connections between the political economy of grain and its correlated effects on space and the built environment addressed in the following sections.

Wheat, the Conqueror

Wheat, maize and rice are the three major crops in agriculture, making up the “plants of civilization” that according to Fernand Braudel in *The Limits of the Possible*, shaped and organized human material and spiritual life, becoming “ineradicable structures.”^{79 80} There is little doubt that through the trinity of production, distribution and consumption, wheat occupies a substantial role in human development. A brief observation of wheat’s historical geography confirms its worldwide presence and role in the formation of human territories. The plant was first domesticated through proto-agriculture in the Northeast of the Fertile Croissant. In 10,000 BC, surface irrigation of crops started to develop from the Nile Valley to Mesopotamia. Populations of Ancient Egypt cultivated wheat in 6000 BC, followed by regions of today’s Libya, Soudan and Ethiopia. From the sea routes of South Italy and Sicily, Tunisia, Morocco and Algeria were conquered. Mastery of watering techniques allowed wheat to grow in dry regions as well. The crop’s transmission followed the coastal areas of Italy, France, Spain and the Danube and Rheine Valleys, with wheat reaching Northern Europe around 5000 BC. At the same time, wheat culture spread through the Caucasus and to the South of Russia, ultimately covering the whole of Europe. Access to Asia occurred via Iran, Pakistan and the Indus Valley (5300 BC). Following silk routes from Turkmenistan, culture of the crop reached the Indian subcontinent and Burma, spreading towards Yunnan. It had extended to China by 1300 BC.⁸¹ Compared with Europe and Asia, the circulation of wheat in America is recent. Spanish colonization imported it to South America in 1529. British colonial powers brought wheat to Australia in 1788. A second wave of occidental wheat species was introduced into conquered and colonized regions of North America, the Maghreb, the Commonwealth and India. While at first the crop was handpicked in its wild state, agriculture grew to include soil

⁷⁹ Maximilien Sorre, *Les Fondements De La Géographie Humaine*, vol. 2 (Paris: A. Colin, 1947).

⁸⁰ Fernand Braudel, *Civilization and Capitalism- 15th-18th Century*, vol. I: *The Limits of the Possible*, III vols., (London: Book Club Associates, 1981), 107.

⁸¹ Jack R. Harlan, "The Early History of Wheat: Earliest Traces to the Sack of Rome," in *Wheat Science, Today and Tomorrow*, ed. Lloyd Thomas Evans and William J. Peacock.(Cambridge: Cambridge University Press, 1981).

preparation methods, seed selection and seeding timing knowledge. In terms of land use, fertile riverbeds and wetlands were slowly cultivated into fields, and irrigation techniques progressed. A land-demanding crop, wheat can not be sown two years in a row on the same plot, meaning “the space required has to be two or three times the surface area it occupies.”⁸² This two or three-year rotation system was necessary for the land to recover fertility and to feed livestock needed for tilling and manuring. Grain and cattle were thus complementary. Braudel insists on the sophisticated structure of land exploitation that propels men, animal and plants together towards harvests. Despite an elaborated production system, poor preservation means, lack of transportation and insufficient infrastructures prevented abundance and scarcity remained chronic until the nineteenth century. This era corresponds with the development of steam power and railway routes, bringing access to available arable land in North America, Russia and Australia. According to historians, agricultural productivity rates commenced a slow but regular increase in 1850.⁸³ Seed selection and early hybrids research resulted in genetic science and amelioration of wheat seeds for higher yields. Thanks to new agricultural techniques (i.e. in-line seeding, mechanization, tilling), wheat productivity in the Western world increased substantially throughout the twentieth century.

Wheat Production Today

The co-evolution of human populations alongside wheat is not set. In fact, the cereal’s high productivity, its significant land use, geographic importance, and the amount of work force engaged in its production positions the crop as an evolving contemporary matter. The production of wheat has intensified between 1950 and 1970 due to mechanization of agriculture known as the Green Revolution. Planting monocultures of hybrid plant varieties, applying inorganic fertilizers, the use of irrigation water and fossil fuels for machinery and pesticides have led to spectacular increases in yields. It is believed that productivity has reached its biological potential in developed countries, and yields there are triple that of developing countries.⁸⁴ This demonstrates the role of political and economic factors in the mechanisms of wheat

⁸² Braudel, *Civilization and Capitalism- 15th-18th Century*, vol. I: *The Limits of the Possible*, 114.

⁸³ Alain Bonjean, "Histoire De La Culture Des Céréales Et En Particulier De Celle Du Blé Tendre," *Les Dossiers de l'environnement de l'INRA*, no. 21 (2001).

⁸⁴ See David Cole and Susan Horton, *World Grain Trade and Its Financing: Past Patterns and Future Prospects* (Cambridge: Harvard Institute for International Development, Harvard University, 1985).

production.⁸⁵ It is true that wheat production rate grew faster than population. The number of people on the planet has doubled (from 3 billion in 1960 to 7.2 billion in 2013) but wheat production has almost tripled from 1960, and since 1990 remained relatively constant. Over 600 million tons are harvested per year. This is considered to be a major achievement of the twentieth-first century. Today, wheat is grown over on 249 million hectares of land: 15 percent of the world-cultivated surface, more land area than any other commercial crop.⁸⁶ Production is fairly concentrated within ten countries that harvest 75 percent of the world production.⁸⁷ China has the largest area dedicated to the crop, followed by the U.S.A., India, and Russia. The cereal is produced nearly everywhere in the world, supplanting rice and corn in Asia and Latin America. However, wheat cultivation is currently facing competition for available land-use from biofuel, urbanization, and industrial expansion. Threats to wheat production are also related to climate change, raising issues of soil degradation, desertification and scarcer water resources; the area available for crop production could decrease in the next decade.⁸⁸ The current geography of wheat culture is concentrated in the temperate areas of the Northern Hemisphere between the 30th and 60th latitudes (North America, Europe, Asia and North Africa). In the Southern hemisphere, wheat culture is located between the 27th and the 40th latitudes (Australia, Argentina, Brazil and South Africa). Statistics estimate that 2.3 billion people are engaged in agriculture worldwide.⁸⁹ From one country to the other, the type, scale and organization of producers and farmers vary. The FAO measures agricultural production force with the term "farm power." It defines three types of agriculture depending on the power sources used for land clearance and preparation, planting, fertilizing, weeding, irrigation, harvesting, transport and processing: human labor, draught animal power and engine-driven machinery.⁹⁰ The costs of wheat production vary from USD 100 /hectare (Argentina) to USD 600 /hectare (Europe), depending on the farming structure, from large-scale mechanized exploitations in developed countries to small family farms using manual and animal labor in developing ones, and

⁸⁵ Brian T. Oleson, "World Wheat Production, Utilization and Trade," in *Wheat*, eds. Walter Bushuk and Vladimir Rasper (Glasgow: Springer US, 1994), 1-11.

⁸⁶ Gary Vocke and Olga Liefert, *Wheat Outlook* (Washington, D.C.: United States Department of Agriculture, 2013), 1-17.

⁸⁷ *Ibid.*, 1-17.

⁸⁸ *Wheat Facts and Futures 2009*, 13

⁸⁹ See Food and Agriculture Organization, "Faostat Database," ed. FAOSTAT (Rome, Italy: FAO, 2013).

⁹⁰ Food and Agriculture Organization, *World Agriculture: Towards 2015/2030: An FAO Perspective* (Rome; London: FAO, 2003)..

contingent on net costs of various inputs (seeds, irrigation, fertilizers, pesticides) and equipment (machinery, labor, energy).⁹¹

Wheat Trade

Wheat dominates the world food trade and is one of the most important commodities in global commerce with over 175 million tons traded per year.^{92 93} While considering Ancient Rome is known for receiving some of its wheat supply from Egyptian provinces, and the Mediterranean area grain from the Baltic region, Braudel argues that local and international grain exchanges only truly flourished in the sixteenth century.⁹⁴ Part of the colonial drive to establish control overseas was food security, leading to consistent grain flows from East and South towards Europe.⁹⁵ The perilous conditions of a distant supply, however, means cities preferably fed on a radius of 20 to 30 km on its countryside surpluses. With less than 1 percent of the total consumption at the time, the trade of wheat remained insignificant until the eighteenth century, when long-distance trade of goods, concentration and large-scales mercantile systems developed. After the Corn Laws designed to artificially protect cereal prices and guarantee profit for British landowners were repealed in 1846, the international wheat trade emerged with the first standard contracts drafted in London. Some of today's biggest European commercial grain-trading firms were established at that time (e.g. Louis-Dreyfus); milling and grain-handling dealers like Cargill thrived in the U.S. One of the factors that led to the current hegemony of North American grain in the world wheat trade was the country's national development and the expansion of cultivation towards its Western territories in the 1850's. Improvement in harvesting equipment and development of waterways and railroad infrastructures such as the canal connecting the Illinois River to Lake Michigan enabled farmers to ship their products to merchants along the river. These dealers accumulated, stored and then shipped grain to Chicago and Milwaukee where purchasers would inspect and chose the bundles at delivery. Grain input became reliable, and transport cheaper and faster, marking the

⁹¹ Dmitry Prikhodko and Rodion Rybchynsky, *Wheat Flour* (Rome: Food and Agriculture Organization, 2009), 10.

⁹² Walter Bushuk and Vladimir Rasper, *Wheat: Production, Properties and Quality* (Glasgow: Blackie Academic and Professional, 1994), 51.

⁹³ Foreign Agricultural Service/USDA, *Grain: World Markets and Trade* (Washington, USA: United States Department of Agriculture, 2013).

⁹⁴ Braudel, *Civilization and Capitalism- 15th-18th Century, vol. II: The Wheels of Commerce*, 127.

⁹⁵ Stephanie Mercier, "The Evolution of World Grain Trade," *Review of Agricultural Economics* 21, no. 1 (1999): 228.

entry of American wheat into Europe.⁹⁶ Today's most important grain exchange, the Chicago Board of Trade (CBOT), was originally a central dealing facility where farmers and dealers would deal in "spot" grain and exchange wheat crops for immediate cash settlement. This trading form evolved as farmers and dealers committed to buying and selling future exchanges of the commodity. Future contracts and forward contracts belong to the class of securities known as derivatives, both of which are used in present-day wheat trading. With future contracts, the exchange of commodities is done through the buying and selling for deferred delivery. The contract buyer agrees to take delivery from the seller of a specific quantity of wheat at a predetermined price on a future delivery date. These legally binding agreements are standardized and worth 5,000 bushels.⁹⁷ CBOT mini contracts have a 1,000-bushel value. CBOT wheat futures and options are the most traded globally.⁹⁸ For instance, CBOT Black Sea Wheat Futures have a minimum block trade amount of 10 contracts and are deliverable in Russian, Ukrainian and Romanian harbors on the Black Sea in three months time. However, most futures contracts end without the physical delivery of the commodity. In fact, it is the contract that is traded and not the commodity itself. Intermediate gains or losses are posted on the exchange market each day during the life span of the futures contract, and correspond to the difference between today's futures price and yesterday's futures price. Investors will exit the contract before the delivery date, and it will be squared and settled in cash. Futures are traded on exchanges (where contracts are standardized) such as the Chicago Mercantile Exchange (CME) or the New York Mercantile Exchange (NYMEX).

Forward contracts, the actual selling of wheat, are traded over-the-counter (where the contract specification can be customized directly between the parties). These grain-trading contracts are independent, bilaterally negotiated, private contracts in which the price and length of the contract are determined by negotiation, though the Grain and Feed Trade Association standards are widely used. Typically, the price is determined at the signing of the deal, and the delivery will take place 6 months after at harvest. Forward exchange contracts involving commodities imply the settlement of transactions and the exchange of goods and money between sellers and buyers taking place in the present, as opposed to the futures market where such exchanges takes place on a specified future date. Prices in cash and futures market tend to

⁹⁶ Carolyn Steel, *Hungry City: How Food Shapes Our Lives* (London: Vintage, 2009), 32.

⁹⁷ A bushel is a unit of weight used for dry commodities, equivalent to 27 kg. 1000 bushels are equal to 27 tons, 5000 bushels are equal to 136 tons.

⁹⁸ "CBOT Wheat Futures and Options," CME Group, accessed 20 November, 2013, <http://www.cmegroup.com/trading/agricultural/cbot-wheat-futures.html>.

move parallel to one another, and when a futures contract expires, its price will align with those of the real market. Not all wheat trade is done through forward contracts, and there are alternative mechanisms such as public bids or tender systems for imports. If a country wishes to import wheat, an actual international transaction could unfold as follows: A government authority will issue a Request For Tender (RTF), a formal invitation to suppliers to bid for a defined amount of grain. These tenders are published internationally through tender services, allowing businesses to receive and respond to live tenders from a range of public and private sources. RTF are specific, and term the amount, quality, origin, time and place of delivery of the requested wheat. Intermediaries (brokers) compensated on commission will be linking buyers and sellers. Sellers or suppliers willing to respond will provide a guarantee (bid and performance bonds).⁹⁹ No binding contract is made until the buyer accepts a tender. The supplier identifies wheat sources and will proceed to transfer the requested grain. In most contracts, traders will sell the wheat before it is being loaded for export, so that the buyer carries the financing charges of the goods in transit. International trading houses ensure the regrouping, storage, processing and transport (in particular maritime transport) of the grain. Such transactions activate a series of actors, facilities and activities performed by freight forwarders, road transporters, railway operators, warehousemen, carriers, shipping companies, banks and insurers, trading companies, government agencies and international financial institutions, each playing a role to insure the completion of the operation and the elimination of the risks. Wheat prices are highly volatile due to reasons such as sporadic shortages in supply and the political economy (e.g. export subsidies, tariffs). Increasing demand for food, feed, and bio-fuel along with weather conditions, freight and storage costs suggest that wheat prices will remain high in the future. As an indication, the peak in wheat prices reached USD 429.50/ton in March 2008.¹⁰⁰ Grain traders' margins are USD 2-5/ton. Currently, wheat trade represents 21 percent of world wheat consumption. This means most of the cereal is consumed within the country where it is produced, or processed and exported in other forms. Yet, world wheat trade nearly doubled since 1995, when it was estimated at 108 million tones, most of which was imported by developing countries. This trend has been increasing despite rises in local production. Developing countries account for two-thirds of all wheat imports, up from less than half in 1961. The U.S., EU-27, Canada, Russia, and Ukraine are top exporters. In 2013, the top

⁹⁹ Eric Bishop, *Finance of International Trade* (Amsterdam: Elsevier, 2004), 77-78.

¹⁰⁰ Prikhodko and Rybchynsky, *Wheat Flour*, 17.

importers were Egypt, China, Brazil, Indonesia and Algeria.¹⁰¹ As the most traded food crop worldwide, wheat is also the largest food import in developing countries and a major portion of emergency food aid.

Wheat Feeding the World

Termed wheat or bread wheat, *Triticum spp.* is a grass family member and a cereal grain. The product of a cross between three different grass species that happened around 10,000 B.C., the plant initially grew wild in the Middle East and Ethiopian Highlands. The most commonly grown type is *Triticum aestivum*, used for bread. Compact wheat is considered a subspecies, such as *T. aestivum* subsp. *compactum* used for pastries and *Triticum durum* for pasta. Though there are about 30,000 varieties of 14 species, only 1000 varieties are actually cultivated. According to quality, color and growth time, the combinable categories are hard and soft, red and white, spring and winter wheat. Hard and soft refers to the bread-baking quality. Hard wheat produces high-gluten and protein flour, used for western bread types and noodles. Soft wheat is lower in protein and better for cakes and pastries. These can be combined into semi-hard wheat, used for unleavened breads (e.g. Indian chapattis, Asian steam bread). Red and white refers to the color of exterior kernel of the wheat grain itself. Spring and winter indicates the growing seasons. Winter wheat is sown from September to December in the Northern hemisphere and ready to be harvested by early July. Spring wheat is planted in the spring and harvested in late summer or early fall. Wheat is also graded in test weight, protein content, moisture and foreign material content. Easily digested, wheat kernels contain gluten, a protein that enables fermentation using carbon dioxin.¹⁰² The “viscoelasticity” property needed for the raising of leavened bread is unique to the cereal. Due to its history of safe human consumption and high nutrition value, wheat is the basic staple food of Europe, West Asia and North Africa, and the most important food grain as source of carbohydrate for humans. In the developing world, 16 percent of total dietary calories come from wheat, whereas it corresponds to 26 percent in developed countries.¹⁰³ For example, wheat provides 500 kcal of food energy per capita per day in China and India and over 1,400 kcal per capita per day in Iran and Turkey (min. intake per person per day is 1,800 kcal). Despite the various types of wheat, the differences in nutritional value between high-protein for human consumption and low-protein for animal feed are not

¹⁰¹ Vocke and Liefert, *Wheat Outlook*,17.

¹⁰² Haldore Hanson et al., *Wheat in the Third World* (Boulder, Col: Westview Press, 1982).

¹⁰³ Wheat Facts and Futures 2009, 2.

pronounced. Wheat is also a source of minerals, such as iron and selenium. The latter is a micronutrient of which content varies widely depending on its presence in the soil. Typically, Western European wheat has about 1/10th of the amount of selenium present in North-American wheat. While microbiological details do not belong in this study, it is interesting to note a direct correlation between the soil composition and trading practices: because U.S. imports into Europe have declined substantially in the past decades the intake of selenium among Europeans has decreased accordingly.¹⁰⁴ Wheat is primarily consumed as flour for breads and other baking products. The rest, known as durum wheat, is utilized as semolina for pasta and to produce medium-dense breads and couscous in Mediterranean and Middle Eastern countries.¹⁰⁵ Nearly 2/3 of the world production is used for human food, the remainder is used for animal feed, seed and non-food such as bio-fuel.¹⁰⁶ Unsuitable for food use, low-grade grain is sold to industries to make adhesives, paper additives and other products such as alcohol. A non-perishable good of excellent nutritional value, easy to store and transport and providing 20 percent of the calories for the human population by direct (bread, pasta) and indirect (meat, milk, eggs) consumption, the significance of wheat as a world staple is evident.

Wheat Processing and Consumption

Wheat is consumed as food in various forms, all of which involve processing. Practiced by Babylonians, Egyptians and Israelites, the grinding of the first domesticated species of wheat, emmer (*Triticum dicoccum*) and spelt (*Triticum spelta*), to separate grains from stem was done by human and animal stepping (with stones and later by hydraulic force). Development of crushing techniques with smaller stones, pestle and mortar eventually led to milling methods. The flour produced was then consumed as porridge or in soups. With the addition of water, salt, and yeast, ancient Egyptians produced bread from 2500 BC onward, pouring kneaded dough in pre-heated moulds. Funerary decorations of Ancient Egypt depict wheat harvesting, grinding, kneading and baking.¹⁰⁷ In fifth century BC- Greece, wheat bread (*atos*) could be bought in bakeries. 329 bakeries are recorded in Rome in 30 BC.¹⁰⁸ Processing, milling, and baking have

¹⁰⁴ P. R. Shewry, "Wheat," *Journal of Experimental Botany* 60, no. 6 (2009).

¹⁰⁵ Food and Agriculture Organization, *Bread Wheat - Improvement and Production* (Rome: FAO, 2002).

¹⁰⁶ Gurbachan S. Ranhotra, "Wheat: Contribution to World Food Supply and Human Nutrition," in *Wheat*, eds. Walter Bushuk and Vladimir Rasper (London: Springer, 1994).

¹⁰⁷ Tomb of Ramses III, Kings Valley, 1186–1155 BC.

¹⁰⁸ Toussaint-Samat, *A History of Food*, 204.

become more mechanized following the industrial revolution, but processing methods vary (e.g., hand production, small-scale semi-mechanized or mechanized production and large-scale commercial production). In industrial milling factories, the processing of wheat grain means 75 percent of the wheat weight is extracted as wheat. This number declines with the size and quality of the mill. The majority of wheat for food is milled into flour to be used for bread, noodles, biscuits, cakes, for instance. The bran is used as feed. Flour trade represents 8 percent of total world wheat trade. Flour is substantially less traded because it is subject to tariff restrictions, logistical concerns and quality issues (i.e. transport, conservation). Bread is shown as a prime symbol of nourishment through its importance in Judeo-Christian traditions such as the Jewish Passover and as symbol of Jesus in the Christian Eucharist. In many non-Christians cultures as well, bread is highly respected. In Muslim communities of Central Asia or the Middle East, bread loaves must be kept upright, never left on the ground or thrown away in public. Such practices and cultural and religious traditions reflect the historical relevance of bread as indispensable staple. Bread is also linguistically related to humanity living together. Etymologically, “companions” comes from Latin: *com*, together and *panis*, bread. Authorities since early ages have been well aware of its political relevance and the importance of control over bread price, quality and weight. French King Dagobert imposed a law regulating the price of bread in the seventh century. While the consumption of white flour and bread have been associated with prosperity since early times with white bread belonging on the tables of great lords, bread consumption today depends on several factors. In developing regions, these include government controls over wheat trade and industry privatization, development rate and diet changes according to food habits of developed countries as well as postcolonial influences. Urbanization plays a significant role in bread consumption, as increasing urban populations prefer processed food and poor rural migrants have reduced access to alternatives. In fact, urban migration in African countries steadily increased demand for bread as a staple convenient to buy, cook, and store.¹⁰⁹ A number of governments heavily subsidize wheat, a practice suspected to fuel rural migration. Also, because wheat to produce bread is massively imported, most countries of the Southern hemisphere (with the notable exception of Argentina and Brazil) have a net food trade deficit, a matter subject to further investigation within the present research.¹¹⁰

¹⁰⁹ See Gunilla Andr  and Bj rn Beckman, *The Wheat Trap: Bread and Underdevelopment in Nigeria* (London: Zed Books, 1985).

¹¹⁰ Food and Agriculture Organization, *FAO Statistical Yearbook 2012* (Rome: FAO, 2012), 1-567.

1.4 THE POLITICAL ECONOMY OF GRAIN

What happens to grain between seeding and the time when it will have finally produced all the profits that it can? The unit of analysis will no longer be the market therefore, with its effects of scarcity-dearness, but grain with everything that may happen to it and will happen to it naturally, as it were, according to a mechanism and laws in which the quality of the land, the care with which it is cultivated, the climatic conditions of dryness, heat, and humidity, and finally the abundance or scarcity, of course, and its marketing and so forth, will also play a part.

Michel Foucault, *Security, Territory, Population : Lectures at the Collège De France, 1977-1978*, 37.

Adorning the frontispiece of the Chicago Board of Trade building, on either side of the clock on its facade, stand two magnificent stone sculptures: An Egyptian man with a sheaf of wheat and a Native American man carrying an ear of corn. Trade, territorial claims, and cereal grains appear in these grand representations with a cruel irony today: struggling for food security, contemporary Egypt is a major purchaser of exported U.S. grain; the current supremacy of North America as an important world grain producer has been facilitated by appropriation of Native American territories by farmer-settlers.¹¹¹ The building itself is the *locus* and manifestation of the American grain trade and the architectural expression of its hegemony, the Board of Trade having been the highest skyscraper at the time of construction in 1930. Holding wheat and corn, the statue of Ceres, Roman goddess of agriculture and *grain*, caps the imposing edifice.¹¹² The apparent simplicity and rigor of the relationship of mankind to grain suggested by the austere Art Deco statues could not be more deceptive. The hundreds of transactions, agents, forces, and influences its industry encompasses to produce, transport, process, and distribute grain are overwhelming. Braudel confirms this intricacy: "As soon as one looks at the question of grain, one realizes what a complicated phenomenon it is."¹¹³ The goal of the following research segment is to investigate current global systems of wheat production, distribution, and consumption in their structural and economic agencies, towards an understanding of their physical outcomes. The study thereby seeks at first to disentangle some

¹¹¹ Angie Debo, *And Still the Waters Run: The Betrayal of the Five Civilized Tribes* (Princeton: Princeton University Press, 1968); Spencer Henson and Rupert Loader, "Barriers to Agricultural Exports from Developing Countries: The Role of Sanitary and Phytosanitary Requirements," *World Development* 29, no. 1 (2001).

¹¹² Joseph J. Korom, *The American Skyscraper, 1850-1940: A Celebration of Height* (Boston: Branden Books, 2008), 406.

¹¹³ Braudel, *Civilization and Capitalism- 15th-18th Century, vol. II: The Limits of the Possible*, 109.

of the complexity inherent in the dynamics of commodity chains. As mentioned in the introduction, the method reflects the examination narrated by Karl Marx in *A Contribution to the Critique of the Political Economy*, in which the economic system is approached through capital, land, labor, state, foreign trade, and world markets.¹¹⁴ In *The Condition of Postmodernity*, the Marxist geographer David Harvey underlines the pertinence of such a method: “Marx begins *Capital*, (...), with an analysis of commodities, those everyday things (i.e. food, shelter, clothing) which we daily consume in the course of reproducing ourselves. Yet the commodity IS, he avers, 'a mysterious thing' because it simultaneously embodies both a use value (it fulfills a particular want or need) and an exchange value (I can use it as a bargaining chip to procure other commodities).”¹¹⁵ This particular focus on the commodity constitutes the primary interpretation of the section 1.4) THE POLITICAL ECONOMY OF GRAIN. Additionally, the approach draws from the Global Commodity Chain concept adopted by the disciplines of development and microeconomics studies to analyze the international trading system and the economic integration of production and marketing chains. As understood and included in the present research methodology, the definition of commodity chains as “a network of labor and production processes whose end result is a finished commodity” holds potential for illuminating actors and forces involved in commodity flows and contributing an approach to the political economy of food and grain.¹¹⁶ Following the chain downstream, this study concurs with the consensus in commodity research methods that a chain comprises all stages from production to consumption. Because the value grain generates is in part related to its movement through space and time rather than its processing alone, grain flows are structured in a singular way that differs from the flow of manufactured goods on which global commodity chain vertical approaches have traditionally focused.¹¹⁷ Therefore, the research venture beyond the strict politico-economic thinking generally employed and offers a composite and flexible viewpoint. The work is structured in four parts, which constitute the preliminary outline for an approach to the spatial manifestations of the food system and the grain chain.

Firstly, the framework is established by mapping out the physical actions necessary from the production of wheat seed to the consumption of bread. In the painstaking process of tracing

¹¹⁴ See Karl Marx, *A Contribution to the Critique of Political Economy*, trans. S.W. Ryazanskaya (New York: International Publishers, 1970).

¹¹⁵ David Harvey, *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change* (Oxford: Blackwell, 1990), 100.

¹¹⁶ Raikes, Jensen, and Ponte, “Global Commodity Chain Analysis”, 409.

¹¹⁷ *Ibid.*, 410.

the commodity, the definition of operations that form the wheat chain is reconstructed in the part entitled Flows Of Grain. Seemingly straightforward in following flow materiality, the technicalities of the physical outline of the grain supply chain offer an entry point into the complexities of its political economy and the myriad of actors it involves from seed to mouth.¹¹⁸ The second part identifies the driving forces and actors carrying out the chain's functions, providing a thorough assessment of all Key Agents Of The Grain Chain, with the protagonists grouped by categories. In this study, primary agents are the entities that contribute directly to the production, the transformation, and delivery to the final market of a single agricultural commodity: wheat. Secondary agents are mentioned when their activities are relevant to the determination of the product (e.g., indirect input agents like fertilizer companies or manufacturers of milling machinery). This inventory remains intentionally distant from spatial definitions, rather listing the providers of inputs and services along the wheat chain, and their economic and social attributes. Certain concepts and terms are appropriated from the vocabulary of economics because they are necessary to define accurately the condition of the described agents. Third, an overview of past and present Food Regimes contextualizes wheat within the broader realm of today's world food order and the strategic role of agriculture and food in the world capitalist economy.¹¹⁹ Finally, by recognizing the Economic and Governance Agents against the backdrop of the international food system's arrangements, the fourth section uncovers the economic ideologies and financial instruments operating within the grain chain. The goals of this last part are to contribute to the understanding of interactions among the identified agents and to examine the contours of the current political economy of food and of grain in light of these. This section of the work calls attention to certain physical implications of the commodity chain relevant for further research by concluding with an overview of the Geography of the Grain Chain. Unique in that it takes a holistic view of the supply chain by identifying all stages of the grain chain and all agents in their political-economic agencies, the study's approach forms a descriptive study to identify elements, forces, and moments in the grain chain that hypothetically bear impacts on the organization of space, urban forms, and territory, impacts that are explored in the subsequent chapter 2.) EGYPTIAN TERRITORIES.

Flows of Grain

¹¹⁸ Derek Byerlee, "The Political Economy of Third World Food Imports: The Case of Wheat," *Economic Development and Cultural Change* 35, no. 2 (1987).

¹¹⁹ Philip McMichael, "A Food Regime Genealogy," *The Journal of Peasant Studies* 36, no. 1 (2009).

The primary concern of the Flows Of Grain examination is to grasp the physical procedures of global wheat production and distribution from seed to mouth. Reviewing the available empirical evidence and existing literature, this section intends to determine the successive functions resultant in the supply of wheat. By identifying each step (sowing, growing, harvesting, transportation, cleaning, drying, milling, storage, packaging and distribution), a summary of the concatenation of material actions that compose this chain is generated. This descriptive tracing of commodity flow is outlined in order to identify actions and forces involved from raw materials to consumption; it encompasses the complete sequence of operations that will lead downstream, much as a classical commodity chain analysis does with economic agents. Borrowing from the approaches on food systems addressed earlier, it establishes the framework for the subsequent investigation of related economic and social agents and their impacts on space and the built environment.

Seed is said to be the first link in the food chain.¹²⁰ When a seed is sown in a suitable soil, it germinates. This seminal gest of seeds' dispersal over space and time is determinant to the production of wheat. Historically cultivated as a self-pollinated crop, wheat is a natural hybrid derived from interspecies. Wheat grain can be used as seed with farmers replanting dried and cleaned parts of the previous harvest. Worldwide, a majority of farmers practice seed saving; in industrialized countries, however, the custom is in decline due to the rising importance of the global seed industry and increased use of certified, licensed seeds and hybrids.¹²¹ Certified wheat seed can be used to produce further generations of certified seed or can be planted by farmers for grain production.¹²² Farmers or cooperatives selected and contracted by a seed company produce basic seed on specialized farms. Once approved, seeds are listed in catalogues for producers to choose and marketed through local agents to be sold to farmers to grow. In addition to certified seed, there is hybrid wheat seed, which is not genetically modified but the product of artificial cross-pollinating.¹²³ The production of hybrids seeds is carried out on

¹²⁰ ETC Group, *Who Owns Nature? Corporate Power and the Final Frontier in the Commodification of Life* (Ottawa, 2008).

¹²¹ Philip Howard, "Visualizing Consolidation in the Global Seed Industry: 1996–2008," *Sustainability* 1, no. 4 (2009).

¹²² The Organisation for Economic Co-operation and Development (OECD) Seed Schemes' authorities award certification to those who comply with requirements and controls throughout the cropping, seed processing and labeling operations. OECD norms define four types of seeds: breeder, pre-basic, basic and certified seed.

¹²³ Hybridization is a specific, controlled cross of two parent plants: the result of a male plant pollinating another female plant from a similar species. To produce commercial hybrid wheat seed, companies grow two parent lines in the field each year, designate the male and female parents, and carry out pollination through Chemical Hybridizing Agents (CHA), artificial growth regulators that suppress pollen production. These chemical hormones are considered as pesticides; applied at an early stage of

agricultural research farms in the U.S.A., France and China. Hybrid crops produce a first generation harvest of great resistance and nutritional value, an example of so-called *hybrid vigor* or *heterosis* (also termed F1). The following generation, however, does not replicate those performances and produce an unsatisfactory harvest. Hybrid grain therefore cannot be resowed. While researchers have so far concluded that hybrid wheat produces better yields and holds similar nutritive qualities to the typical variety, the cost of sterilization and seed production remains prohibitive.¹²⁴ Controversial Genetic Modification (GM) methods and the application of DNA technology were first tested in 1997.¹²⁵ GM wheat is not yet commercialized; ongoing research claims such wheat seeds will be on the market in 2020.¹²⁶

To grow wheat, regardless if from hybrid or basic seed, the soil must be ready for it to be planted (i.e. removing weeds, shaping rows, nutrient addition). The process of soil preparation for cultivation is known as tillage. Depending on the economic level, climate, nature of the ground and rainfall, different types of machinery are employed for plowing the soil (e.g. ploughs in non-industrialized parts of the world, harrows in Russia, scarifier in Australia). Industrialization of agriculture and powered machinery have replaced men or animals in developed countries. Ley farming, land moisture, growing legumes and chemical fertilization, are a few of the varied preparation practices used in developing countries.

Wheat is an annual plant that once sowed, needs about 103 days to grow for spring wheat and 147 days for winter wheat to grow. The wheat plant has long leaves and heads composed of flowers. The flower groups form spikelets, each having two to six flowers depending on the variety. In most spikelets, two or three of the flowers become fertilized, producing grains. The Zadok scale defines ten major growth stages of the wheat plant during its life cycle: Germination, seedling, tillering, stem elongation, booting, heading, flowering, milk, dough and ripening.¹²⁷ Stages of development of the crop are critical for growers to accurately predict in order to deal with frost, heat, drought, diseases, insects and weeds. Several actions are

vegetative growth on field strips of female plants, it will render male flowers sterile. The harvest seed from the female is the hybrid seed. Plants sterilized with CHA will produce seeds that will not reproduce.

¹²⁴ Jorrie. P. Jordaan, "Hybrid Wheat: Advances and Challenges," in *Increasing yield potential in wheat: Breaking the barriers*, ed. M. Reynolds et al. (Mexico: CIMMYT, 1996).

¹²⁵ Ryan Whitford et al., "Hybrid Breeding in Wheat: Technologies to Improve Hybrid Wheat Seed Production," *Journal of Experimental Botany* 64, no.18 (2013).

¹²⁶ Carey Gillam, "Monsanto Says Biotech Wheat Moves Closer to Market," *Reuters*, January 8, 2014, <https://www.reuters.com/article/monsanto-wheat/update-1-monsanto-says-biotech-wheat-moves-closer-to-market-idUSL2N0KI1K520140108> .

¹²⁷ Brian Fowler, "Growth Stages of Wheat," in *Winter Wheat Production Manual*, (Saskatoon: University of Saskatchewan, 2013).

executed during plant growth: fertilizer inputs, irrigation, herbicide, insecticide, and fungicide applications, and the timing for these is best determined by crop growth stage rather than calendar date. For instance, because winter crops are often disturbed by frost, the ground must be rolled in the spring to consolidate the soil around the roots. Pesticide and nitrogenous fertilizers can be sprayed from helicopters or airplanes over a weak growing crop, to protect it against fungus and insects. Water is also a crucial input for certain producing areas because appropriate irrigation can improve yields.¹²⁸ Though 90 percent of the industrialized world's wheat is grown under rain-fed conditions, almost 65 percent of wheat produced in developing countries is irrigated (especially in India and China).¹²⁹ Surface irrigation is a gravity flooding method (water flowing from basins into channels at the borders of plots) frequent in these regions. Other types of irrigation used in the production of wheat are mechanized. For sprinkler irrigation, water is pumped through a pipe system and then sprayed onto the crops through rotating sprinkler heads, imitating rainfall (center-pivot or circle irrigation). Drip irrigation systems conveys water under pressure through a pipe system to the fields, where it drips slowly onto the soil through emitters, allowing only the immediate root zone of each plant to be wetted.¹³⁰

Harvest in the Northern Hemisphere (82 percent of world production) occurs between April and September and between October and January in the Southern hemisphere (18 percent of world production).¹³¹ In developing countries, classical tools such as the scythe, sickle, and flail are still widely used; in the industrialized world, however, combine harvester does harvesting. The machine cuts the standing grain, threshes it from the straw, cleans it and releases it into bags, grain reservoirs or grain trailers driven alongside the combine. The crops should be ripe and relatively dry for harvesting. If the grain is above a 14 percent humidity level, it must be dried under controlled conditions (i.e. aeration and cooling) to avoid damage by insects. This is the main objective of all sun and mechanical grain drying techniques and storage systems.¹³² Windrows, sheaves, stooks, shocks or stacks methods allow the grain to dry before it

¹²⁸ Food and Agriculture Organization, *Crop Water Information: Wheat* (FAO, 2013).

¹²⁹ Wheat Facts and Futures 2009, 67.

¹³⁰ Elizabeth C. Brouwer, *Irrigation Water Management: Irrigation Methods*, ed. International Institute for Land Reclamation and Improvement, Training Manuals (Rome: Food and Agriculture Organization, 1988).

¹³¹ USDA Joint Agricultural Weather Facility, *Global Crop Production Review, 2011* (Washington: USDA National Agriculture Statistics Service, 2012).

¹³² Thomas S. Payne, "Harvest and Storage Management of Wheat" in *Bread Wheat* ed. Food and Agriculture Organization, FAO Plant Production and Protection Series (Rome: McFarlane, 2002).

is moved to storage. On-site small-scale temporary storage involves containers such as pots or bags, bags in bunkers, sealed “tents,” underground pits, and ventilated cribs. This movement from harvesting sites to storage initiates the grain logistics chain towards domestic use and export markets. After harvest, in the Northern Hemisphere, grain is brought to wooden or concrete tower silos near towns from the surrounding grain-growing areas. Depending on the distance, the grain is transported by trucks (26 tons), trains (100 tons per hauling car, 10,000 tons in a train) or barges (1,500 tons per barge, 22,500 tons in 15 barges).¹³³ These transportation modes are the supply lines from the hinterlands, converging wheat from middle-scale inland storage towards major wheat export hubs and their transloading and storage facilities. Such large-scale bulk storage facilities are usually centralized bins and bunkers cooperatively or privately-owned. Common in major wheat exporting countries, grain elevators are massive concrete constructions composed of one or several towers. Often, the harvest is dropped outside of the building or in an adjacent warehouse. From there, a bucket elevator or a conveyer belt will scoop it to deposits in the silos. Average grain elevators can hold from 1,060 up to 3,500 cubic meters.¹³⁴ Grain is then stored for a certain amount of time before being further transported by train, truck or barge to a domestic flourmill or to a major export port where silo-terminals are located. Official inspection and weighing of grain happens at harbor terminals through samples takes. Most of the world grain exporters follow the U.S. Grain Standards Act, and inspectors sample, weigh, control and certify every wheat shipment exported. Wheat defined as “dry for shipment” (humidity rate below 14 percent) can be stored for 12 months or longer provided that the appropriate temperature, moisture and ventilation criteria are fulfilled. If necessary, wheat is also cleaned by going through separation machines (removing stones and foreign materials) and being fumigated (with phosphine, chloropicrin, or methyl bromide) prior to export. A portion of the grain harvest is processed into flour at harbor mills, and then shipped in gunny or polythene bags enclosed in cotton sacks at 25kgs or 50 kg each. These bags are mostly packed into cargo containers for transportation and manually unpacked at the destination. After being inspected at the harbor grain terminal, wheat destined for export via maritime transport is loaded by grain pumps and conveyors in bulk carriers docked at a loading berth. The average loading speed of grain occurs at the rate of 5,000 tons an hour. Bulk carriers are a type of vessels designed to transport grain and other bulk solids (mostly

¹³³ Adam Sparger and Nick Marathon, *Transportation of U.S. Grains: A Modal Share Analysis* (Washington: U.S. Dept. of Agriculture, 2013).

¹³⁴ Douglas W. Kent-Jones, “Cereal Farming”, Encyclopædia Britannica Online, accessed July 24, 2013, <http://www.britannica.com/EBchecked/topic/1343927/cereal-farming..>

coal, ore and cement). The most commonly used for grain are Handysize-type vessels. These carriers have a capacity of 10,000 to 35,000 tons and undertake 34 percent of the world dry bulk market.¹³⁵ Prior to loading, carriers must be cleaned: "Grain clean" is the most common requirement and one of the five standards of "hold cleanliness." It is required for the majority of bulk cargoes (all grains, cement, fertilizers). The industry-accepted definition of a "grain clean" carrier is "clean, swept, washed down by fresh water and free from insects, odor, residue of previous cargo."¹³⁶

Wheat, a bulk granular material, is a dangerous load. The grain has an angle of repose (slip angle) of 28° from the horizontal. If the ship rolls more than this angle, the load can shift and eventually capsize the vessel. Therefore the International Maritime Organization (IMO) has a strict "Code for Safe Carriage of Grain in Bulk" that must be complied with to assure the stability of ships that carry grain cargoes.¹³⁷ This regulation concerns weight, upright position of the vessel at loading, gravity centers, and trimming of grain loads. When a vessel arrives at port for grain loading, local authorities inspect its structural stability and issue a pass allowing the cargo to be charged. Once at sea, carriers head towards major grain markets and follow the main maritime routes, corridors of a few kilometers in width linking ports. Because of fuel costs, the average maximum speed of bulk carriers varies between 10.5 and 14.5 knots (20 to 25 km/h).¹³⁸ Upon arrival to its destination, local harbor authorities will inspect the grain cargo before the carrier is allowed to unload. Depending on the available infrastructure at the arrival harbor facilities, the grain will be unloaded at dedicated grain berths. Some harbor grain elevators have a "marine leg" which is an elevating conveyor that can be lowered into the hold of a ship for unloading grain through a bucket chain. The most usual methods of unloading are mobile hydraulic pumps combined with belts and conveyers. Unloading speed varies from 500 to 2,000 tons an hour and can take one to two full days to be completed, depending on the available equipment. While some harbors have *in situ* mills where the incoming wheat is tested and its quality controlled, grain is usually transported from the harbor facility to an inland silo or a mill

¹³⁵ "Bulk Carrier," Marine Connector, accessed 20 July, 2013, <http://maritime-connector.com/bulk-carrier/>.

¹³⁶ U.S.Grains Council, "Importer Manual," in *Buying/Selling* (Washington: U.S. Grains Council, 2004). <http://www.grains.org/index.php/importer-manual-overview>.

¹³⁷ International Code for the Safe Carriage of Grain in Bulk, *International Grain Code* (London: International Maritime Organization, 1991).

¹³⁸ "Structural Integrity & Design Limitations of Modern Seagoing Bulk Carriers", Bulk Carrier Guide, accessed 20 July, 2013, <http://www.bulkcarrierguide.com/design-limitations.html>.

by train, lorry or if bagged, by truck.¹³⁹ It is unloaded and generally stored again in silos or warehouses. Some countries stock strategic reserves to buffer prices and insure food security. Typically, the reserves are optimally located at the point of entry of grain into the country and attached to existing facilities. Though small quantities of wheat are retained (e.g. for animal feeds or to produce starch, malt, gluten, alcohol), the biggest part of the import is intended for human consumption and therefore milled. Prior to storage and grinding, grain is cleaned from any impurities, such as chaff, stones, iron particles and broken kernels by standard mechanized machines if available. Flour production is based on the mechanical extraction of the core part of the kernel, the endosperm (inner part of the wheat grain) that contains the bulk portion of the kernel's protein and carbohydrates, from the bran (outer coating). The extraction rate depends on the type and design of the mill. Small amounts of water are usually added to the wheat to ensure easy separation of the bran from the endosperm. The moisturized wheat is stored for about 8–20 hours, depending on the type of wheat (soft, medium or hard). It is then passed over a series of fluted break rolls. After passing through the rolls, particles are sorted on a sifting machine. Eventually the wheat going through the break system is turned into flour, semolina, pollard or bran. Sifting with a purifier machine separates each of these products. The mill main final products are wheat germ or pollard, which is fine bran, and flour; wheat bran, semolina, wheat germ and wheat germ oil are considered secondary and derived products. At this stage, mixing wheat types can be done to achieve a specific flour quality. The flour is then stored in bins before being bagged for distribution.¹⁴⁰ Packaged in 50-kilogram polypropylene woven bags, milled wheat has a shelf life of a year minimum. Most of the wheat flour produced in mills is used for bread making, and the bags are generally manually loaded and unloaded into small trucks, and delivered from the mill to industrial retailers, local outlets and bakeries. Mechanized or semi-mechanized bread-making processes are common both in developed and developing countries, using high-speed mixing of water and flour (2/5 ratio) plus yeast and salt. Leavened bread does not require special equipment for fermentation; the dough is covered to rest until it is inflated with carbon dioxide. The stretching and folding of dough to achieve a smooth consistency is kneading, done either by hand or with a powered kneader. After kneading, the

¹³⁹ Julian Lampietti et al., *The Grain Chain : Food Security and Managing Wheat Imports in Arab Countries* (Washington, DC: World Bank, 2011).

¹⁴⁰ Danilo Mejia and Beverly Lewis, *Wheat: Post-Harvest Operations* (Rome: Food and Agriculture Organization of the United Nations, 1999).

dough is divided into bits and shaped into the desired form.¹⁴¹ These pieces are then placed in wood, charcoal, gas or electric ovens, depending on what is locally available. Baking times for bread are 30–40 minutes with a 200°C temperature. As an example, about 525 loaves of flat bread can be produced from a bag of 50 kg of flour.¹⁴² If there is *in situ* distribution and sale, loaves are stored on drying racks. In the case of industrialized production, paper or polythene packaging is used to keep the bread clean during further transport. Modes of retail and distribution of bread varies. Bakeries that include a point of sale will receive flour, then bake and retail the bread in the same day. These bakeries may deliver fresh bread to smaller outlets. Industrial production units supply stores, requiring local transport. After purchase, bread is usually consumed within one or two days. If not, it is used as animal feed or discarded. Other food waste happens throughout the chain such as damage at production, spillage at post-harvesting and storage, degradation during processing, and loss throughout distribution and consumption.

This linear description of the grain chain, while drawing from food systems frameworks, solely encompasses non-site specific continuations of logistical actions and movements that results in the flow of grain as a commodity, from seed to mouth. Intentionally bracketing out the economic, social and political agents acting upon this flow, this fastidious examination of the wheat chain sheds light on significant facts. While wheat production and processing methods differ depending on geographical location, it is fair to say processes are rather similar throughout the developing world, with variations due to availability of agricultural inputs and farming scale. The gap between developed and developing countries is also apparent in procedures of harvesting, transportation, cleaning, drying, storage, packaging and marketing. This suggests that differences in wheat logistics differ largely due to social, economic and institutional factors, which are the focus of the following section on Key Agents Of The Grain Chain.

Key Agents of the Grain Chain

The linear flow of a commodity along the chain has been defined by scholars of Commodity Chain Analysis as “composed of a series of operations or transformations, a set of

¹⁴¹ "Baked Goods," in *Small-Scale Food Processing - a Guide for Appropriate Equipment*, ed. Peter Fellows and Ann Hampton (London: Intermediate Technology Publications, 1992).

¹⁴² Mona El-Fiqi, "Differences over Bread," *Al-Abram Weekly*, 2013, <http://weekly.ahram.org.eg/News/1888/18/Differences-over-bread.aspx>.

agents and a system of markets (in terms of both physical flows and their monetary equivalents), as well as the behavior of the agents as guided by their economic interests.”¹⁴³ Following this definition, a majority of agents operating along the chain can be identified and classified based on the sector they belong to: input, production, trade, processing, distribution, or consumption. Based on Commodity Chain Analysis terminology, “the generic term ‘agent’ (...) refer[s] to all agents of the same type: the agent ‘farmer’ refers to all farmers, the agent ‘trader’ for all traders.”¹⁴⁴ This approach is comprehended as global and the term “grain chain” is understood as to encompass the actors that pertain to the production of wheat worldwide. In full awareness that activities differ from one area to the next, and means are diverse and unequally efficient from country to country, the research ambition is nonetheless to give an overview of all active components of the system. Agents involved in this global production chain include those who contribute directly and act upon the transformation of the commodity: input agents, production agents, trading agents, processing agents, distributing agents, and end consumers. Among those primary agents, some perform multiples roles (e.g., input and trade agents, trading and processing agents). Players with indirect yet significant inputs to the global grain chain are considered as ‘secondary agents.’ For instance, actors within a sub-system whose sole purpose is to service the chain (e.g., transportation agents) are mentioned in the context of the service they provide to primary agents. Economic and Governance Agents while characterized as secondary because they are engaged in other activities besides the grain chain, are addressed in a separate section. With the identification of these actors, the underlying themes of capital, land, labor, state, foreign trade, and world markets emerge as central to addressing a political economy approach to the food chain and its effects on the built environment. Correspondingly, agents are portrayed within each activity segment according to their most decisive attributes, e.g. geographic distribution and national entities, economic value and stock market importance, mechanical or manual labor form, public and private ownership. In a techno-economic context, this section formulates a descriptive analysis to identify elements and forces illuminating differential power relationships in the grain chain, as well as “some of the key characteristics of contemporary capitalism, and the dynamics of change which have emerged in the age of globalization.”¹⁴⁵

¹⁴³ Tallec and Bockel, *EasyPol*, 2.

¹⁴⁴ *Ibid.*, 6.

¹⁴⁵ Raikes, Jensen, and Ponte, "Global Commodity Chain Analysis and the French Filière Approach: Comparison and Critique", 409.

"It's fair to say there are folks who don't like biotechnology and who would use this as an opportunity to make problems."¹⁴⁶ This quote by Robb Fraley, Chief Technology Officer of Monsanto, the global leader in agribusiness, responded to the discovery of a strain of non-approved genetically modified (GM) wheat in a field in Oregon, suggesting sabotage by GM opponents. In the summer of 2013, a farmer noticed that a type of wheat growing in his field resisted herbicide, and he brought the crop to a professor of weed sciences at Oregon State University, who identified it as a Monsanto GM product. In the wake of this incident, Japan and South Korea cancelled tenders to purchase U.S. wheat, citing that "consumers [were] jittery about gene-altered food imports."¹⁴⁷ American grain producers subsequently filed lawsuits against Monsanto accusing the biotech seed developer "of failing to protect the U.S. wheat market from contamination by its unauthorized wheat."¹⁴⁸ This episode not only revealed the ongoing existence of controversial GM wheat research, but also shed light on actors at each stage of the sequence of grain consumption (input agents, producers and end-consumers), thereby revealing relationships within the global grain chain as well as the magnitude of interdependency throughout.¹⁴⁹

Certainly, seed is the initial materialization of the grain plant, but the soil is often fertilized with agricultural chemicals before sowing. Fertilizers are chemical supplements produced and commercialized by agribusiness companies. Their intensity of use varies. In organic farms and parts of the developing world, production practices such as crop rotation, adjustments to planting and harvesting dates, and the use of beneficial organisms have limited the use of synthetic chemicals. In the developed world, however, fertilizers are widely employed along with herbicides, insecticides, and fungicides. Demand trends are on the rise worldwide, and the intensity of use has grown parallel to the intensification of land productivity and increased food production goals.¹⁵⁰ In liquid, solid, and gas form, three main fertilizers are

¹⁴⁶ Charles Rabbot, "U.S. Finds Unapproved Genetically Modified Wheat in Oregon," *Reuters*, May 29, 2013, <https://www.reuters.com/article/us-wheat-monsanto-idUSBRE94S1GD20130529>

¹⁴⁷ Amran Abocar and Richard Pullin, "U.S. Genetically Modified Wheat Stokes Fears, Japan Cancels Tender," *Reuters*, May 30, 2013, <https://www.reuters.com/article/us-wheat-asia/wrapup-1-us-genetically-modified-wheat-stokes-fears-japan-cancels-tender-idUSL3N0EB1JC20130530>

¹⁴⁸ Carey Gilliam, "U.S. Farmer Lawsuit Filed against Monsanto over GMO Wheat," *Reuters*, June 6, 2013, www.reuters.com/article/2013/06/.../us-usa-monsanto-lawsuit-idUSBRE9530U32013060

¹⁴⁹ Jack Kaskey, "Monsanto Resumed Field Trials of Roundup Ready Wheat" *Bloomberg*, May 31, 2013, <https://www.bloomberg.com/news/articles/2013-05-31/monsanto-resumed-field-trials-of-roundup-ready-wheat>

¹⁵⁰ Food and Agriculture Organization, *Current World Fertilizer Trends and Outlook to 2016* (Rome: FAO, 2012), 7.

applied to the soil to return nutrients to a field after harvest: nitrogen, phosphate, and potash.¹⁵¹ If not natural as animal manure, chemical nitrogen production requires a large supply of energy, water and natural gas. Rock phosphates are extracted by mining and converted to the phosphoric acid used as fertilizer. Potassium –potash is found in deep sedimentary rocks, and is a mined commodity.¹⁵² China, India, the United States and Brazil are the principal consuming countries. The main input agents on the global market of fertilizers are agribusinesses or large chemical companies based in Western Europe and North America. Nutrien (merger of former Potash Corp. from Canada with **Agrium Inc.**), Monsanto and CF Industry Holdings (U.S.A.), Uralkali and Belaruskali (Russia and Belorussia), Yara International (Norway) are the world's leading companies. Because commercial fertilizers firms are supplying agents of agricultural input and do not deal directly with wheat as commodity, they can thus be considered secondary agents.¹⁵³ Such companies perform multiple indirect roles in the grain chain, and are therefore included in this analysis in order to address the overlap of agents' activities. For example, the fertilizer giant Mosaic belongs to the grain-trading agent Cargill.¹⁵⁴ The direct effects of the production and use of commercial fertilizers as a sub-system of the grain chain (e.g., water and air contamination, excessive water consumption, changes to the landscape related to mining activities) as well as possible indirect impacts on space (food production and related urbanization) remain controversial.¹⁵⁵

Seeds are a major input of the wheat production process. Wheat-seed is a natural in-breeder, and seeds issued from harvests are exchanged between plant breeders and local farmers. In contrast, licensed seeds are owned and marketed exclusively by a company, accounting for 85 percent of the world seed market.¹⁵⁶ In *First the Seed: The Political Economy of Plant Biotechnology*, Jack Kloppenburg explains how after the Green Revolution, seed as one of humanity's capita has been commoditized through the development of hybridization and plant

¹⁵¹ David Clay and Gregg Carlso, "Fertilizers Used in Wheat Production," in *IGrow Wheat: Best Management Practices for Wheat Production in South Dakota* (Brookings, South Dakota: South Dakota State University, 2011).

¹⁵² It is turned into potassium sulfate, a fertilizer (potassium chloride and sulfuric acid).

¹⁵³ Michael Livingston and Craig Osteen, "Pesticide Use & Markets," *Farm Practices & Management, Chemical Inputs* (2012), accessed 24 May, 2013, <http://usda.proworks.com/topics/farm-practices-management/chemical-inputs/pesticide-use-markets/>

¹⁵⁴ Monsanto Company, "About Mining Operations," (2010), accessed 24 May, 2013, <http://www.monsanto.com/soda-springs/pages/about-mining-operations.aspx>.

¹⁵⁵ United Nations Environment Programme, *Environmental Aspects of Phosphate and Potash Mining* (Nairobi, Paris: United Nations Environment Programme (UNEP) and International Fertilizer Industry Association (IFA), 2001), 2.

¹⁵⁶ Sarah Smith, *Commercial (Conventional and Biotech/G M) Seeds Market for Soybean, Corn, Cotton and Others* (London: Report Buyer, 2013).

breeding technology, with a correlating increase in the use of chemicals for weed control.¹⁵⁷

Kloppenborg claims that “the motivation behind hybrid research is less the prospect of realizing an enhanced yield than it is the prospect of a more complete commodification of the seed.”¹⁵⁸

Pharmaceutical and chemical companies of industrialized nations, some the result of post-World War II military structures, have benefited from the development of the commercial seed industry, with the expansion in active retailing of transgenic crops in the 1990s. The current commercial world seed market is valued at USD 45 billion with the U.S.A., China and the European Union as main domestic markets.¹⁵⁹ Historical trajectories, mergers and acquisitions contributed to the existence of conglomerates consolidating their hegemony over the seed, fertilizer and pesticides industry. Philip Howard in *Visualizing Consolidation in the Global Seed Industry* identifies the six major stock exchange-traded firms, nicknamed the “Big Six Life Science Corporations” or “Gene Giants.”¹⁶⁰

The world’s largest is currently the aforementioned Monsanto, an American-based multinational chemical and agricultural biotechnology corporation (Headquarters in Saint-Louis, Missouri, 22.000 employees). The company was founded in the early twentieth century and was sequentially a saccharine and a polystyrene fabricant, as well as a hydrogen and LED manufacturer. As a chemical company, it produced the herbicide Orange (Agent Orange), bovine hormones, the insecticide Dichlorodiphenyltrichloroethane (DDT), and other controversial products.¹⁶¹ The firm’s strategy relies on the use and enforcement of biological patents, and it generates profit by seed sales and licensing its genetic seed technology to other companies. Monsanto’s seed products such as Roundup Ready corn crops are genetically modified to resist Monsanto’s Roundup herbicides. Farmers normally would have to sow rows with space between them in order to till their fields for pest and weeds control. By eliminating the need to till, a higher density of planting is possible, increasing yields. Monsanto developed Roundup Ready wheat (MON 71800) but repealed its authorization request in 2004 due to public resistance and concerns from wheat exporters about rejection of GM wheat by foreign

¹⁵⁷ See Jack Ralph Kloppenborg, *First the Seed. The Political Economy of Plant Biotechnology* (Chicago: University of Wisconsin Press, 2005).

¹⁵⁸ *Ibid.*, 242.

¹⁵⁹ Estimated Value of the Domestic Seed Market in Selected Countries for the Year 2012, *Seed Statistics*, ed. International Seed Federation, in the ISF Resource Centre, accessed 5 May, 2018, http://www.worldseed.org/isf/seed_statistics.html.

¹⁶⁰ Howard, "Visualizing Consolidation in the Global Seed Industry: 1996–2008," 1274.

¹⁶¹ Michael G. Palmer, "Compensation for Vietnam's Agent Orange Victims," *The International Journal of Human Rights* 8, no. 1 (2004).

markets. While “there are currently no biotechnology wheat varieties for sale or in commercial production,” the company admitted to conducting tests on GM spring wheat in North Dakota since 2011.¹⁶² ¹⁶³ The firm is testing Roundup-Ready spring wheat and non-GM varieties of seeds on 1,500 hectares of test fields and in five wheat breeding research centers in American wheat-growing areas. Roundup has been “classified as probably carcinogenic to humans” by the World Health Organization in 2015.¹⁶⁴ Licensed hybrid wheat seeds are commercialized by the Monsanto-owned WestBred Assets, a sister company that works with smaller registered seed producers. Seed production is a sub-chain of wheat production: farmers buy certified seeds and agree to grow a contracted amount of grain acreage for the upcoming season.¹⁶⁵ The grain is then bought back, stored and retailed to farmers-producers.¹⁶⁶ Intellectual Property (IP) restrictions in the form of Utility Patent and Plant Variety Protection regulate the use of purchased seed. The buyer-grower of the protected variety is prohibited by law from saving its harvests seed for planting the next season. Monsanto is enforcing the patent aggressively and prosecutes farmers for infringement in North American Courts.¹⁶⁷ Internationally, the biotech firm expanded by buying foreign wheat seed companies and is now present in 60 countries.¹⁶⁸

Monsanto’s rival, DuPont Pioneer, used to dominate the U.S. seed market in the mid 1990s, a position achieved by purchasing Pioneer Hi-Bred, the leader in hybrid seeds at the time. Originally a gunpowder mill created in 1802 (du Pont de Nemours and Company), the firm is an American chemical company (Headquarters in Wilmington, Delaware, 60.000 employees). DuPont Pioneer Hi-Bred sells 14 varieties of Pioneer hybrid wheat (non GM) in various countries. Similar to Monsanto, Pioneer claims that selling patented hybrid wheat is

¹⁶² Monsanto Company, "Wheat Research and Development," *Agricultural Seeds* 2013, no. 29, November 2013, <http://www.monsanto.com/products/Pages/wheat.aspx>.

¹⁶³ Carey Gilliam, "Amid Uproar over Escaped GMO Wheat, Monsanto Tests More Strains," *Reuters*, June 4, 2013, . <https://www.reuters.com/article/us-usa-wheat-monsanto/amid-uproar-over-escaped-gmo-wheat-monsanto-tests-more-strains-idUSBRE95319X20130604>

¹⁶⁴ Tom Polansek, "Monsanto Weed Killer Can 'Probably' Cause Cancer: World Health Organization," *Reuters*, March 21, 2015, <http://www.reuters.com/article/2015/03/20/us-monsanto-roundup-cancer-idUSKBN0MG2NY20150320>.

¹⁶⁵ In the U.S.A., the marketed wheat varieties differ from one region to the other and claim to be location-specific. For instance, the WestBred Grainfield type “Hard Red Winter Wheat” is advised for the American central and southern plains and is “best adapted north of Interstate 70 due to its medium to medium-late maturity.”

¹⁶⁶ WestBred, "Variety Summary," in *WB-Grainfield Yield Review*, ed. Monsanto Company (Kiowa, Kansas: WestBred, Central & Southern Plains, 2013), 4.

¹⁶⁷ Carey Gilliam, "Organic Growers Lose Decision in Suit Versus Monsanto over Seeds," *Reuters*, June 10, 2013, <https://www.reuters.com/news/picture/organic-growers-lose-decision-in-suit-ve-idUSBRE9590ZD20130610>

¹⁶⁸ See Christoph Then, "Patente Auf Leben-Companies Bought by Monsanto (1995-2005)," accessed 29 November, 2013, http://www.greenpeace.de/fileadmin/gpd/user_upload/themen/patente_auf_leben/greenpeace_ge_companies_bought_by_monsanto_eng.pdf.

justified in order to protect seeds' quality and a "genetic package that takes an average of twelve years, and over a million dollars annually to develop."¹⁶⁹

The third biggest company involved in the seed and pesticides business is the Swiss-based Syngenta (Headquarters in Basel, 27.000 employees). The firm originates from the merger of Novartis Agribusiness and Zeneca Agrochemicals in 2000. Syngenta markets hybrid and GM seeds. Through its wheat-breeding program, AgriPro, Syngenta produces and sells hybrid wheat in the U.S. using a similar patent strategy (Plant Variety Protection) to Monsanto. Conducting research on 70 sites in Europe, the United States and Canada, Syngenta is also active internationally through sister firms and claims presence in 90 countries.¹⁷⁰

Though these three companies dominate the global market of commercial wheat seed, Bayer, Dow Agrosiences, and BASF too are involved in seed, fertilizer, herbicide, and biotechnology industries, albeit less prominently. The German firm Bayer AG is a pharmaceutical and chemical company that acquired Aventis CropScience in 2002 and fused it with its agrochemicals division (Bayer Pflanzenschutz) to form Bayer Crop Science. The biotechnology business is focused on pesticides and seeds. The wheat seeds commercialized by Bayer Crop Science are pretreated with pesticides and fungicides. One of these products, Gaucho, is suspected to be a risk for honeybees.¹⁷¹ Under the umbrella of the Dow Chemical Company (funded in 1897, based in Indianapolis, Indiana), Dow Agrosiences produces pesticides and biotechnology goods, and is a much smaller agent on the global seed market.¹⁷² It is however very active in joint ventures and is aiming to increase its transgenic crops offerings.¹⁷³ Its wheat is widely marketed under the brand Hyland *Seeds*. The German firm BASF, though one of the biggest chemical companies worldwide, represents a relatively low share of the global seed market through its biotechnical department BASF Plant Science. Despite its lesser wheat-breeding activity, the company is well known for its research oriented in climate-change crop stress issues and GM development. Its wheat seed line bears the name Clearfield and the non-genetically modified herbicide-tolerant seeds are to be designed for use with the corresponding

¹⁶⁹ "Facts About Patented Wheat Varieties," DuPont Pioneer, accessed 29 November, 2013, <https://www.pioneer.com/home/site/us/products/wheat/facts-about-patented-varieties/>.

¹⁷⁰ Thomas Bernauer et al., "Government Regulation and Public Opposition Create High Additional Costs for Field Trials with Gm Crops in Switzerland," *Transgenic Research* 20, no. 6 (2011), 1228.

¹⁷¹ Laura Maxim and Jeroen Van der Sluijs, "Uncertainty: Cause or Effect of Stakeholders' Debates?: Analysis of a Case Study: The Risk for Honeybees of the Insecticide Gaucho[®]," *Science of the Total Environment* 376, no. 1 (2007).

¹⁷² Dow Chemical Company, along with Diamond Shamrock Corporation, Uniroyal Inc., Thompson Chemical Company, Thompson-Hayward Chemical Company and Monsanto also produced Agent Orange.

¹⁷³ Howard, "Visualizing Consolidation in the Global Seed Industry: 1996–2008," 1278.

herbicide Beyond.¹⁷⁴ BASF also collaborates with Monsanto on drought-resistant corn research.¹⁷⁵ Other partnerships between DuPont-Pioneer Hi-Bred and Syngenta from 2004 to 2010 allowed both companies to share knowledge on original breeder seeds for corn and soybeans. In 2018, Bayer was to purchase Monsanto, after agreeing to sell its vegetable seeds, pesticides, and agriculture technology businesses to BASF.¹⁷⁶ Such agreements illustrate how acquisitions, collaborations and joint-ventures allow biotechnology companies to share knowledge and consolidate their market positions while remaining in competition.

Through the use of chemical responses and various other strategies, the influence of input agents is well established over the agricultural sector, yet the matter of wheat seed requires more nuanced attention. The patent of licensed seeds and the business model upon which major agribusinesses depend relies on property rights and respect of regulations. While these are effective in America and developed countries, most developing countries do not implement such regulations. Combined with the facts that wheat hybrid cultivars have not achieved much better quality than replanted seeds, hybrid wheat seed production remains expensive and hybrid's second-generation harvests are of poor quality, the attractiveness and profitability of hybrid wheat seed remains disputable. Often licensed seed must be combined with the purchase of fertilizers and pesticides, and the prices of fertilizer has increased markedly since 2011, creating a disincentive for farmers to invest in hybrid and biotechnology, in particular for smallholdings. Regarding GM wheat, it garners continuous public opposition worldwide and, though several biotechnological companies have pledged to deliver GM wheat seeds for the market before 2020, its commercialization is hotly debated. In fact, there is consistent resistance to the use of gene technology in food production.¹⁷⁷ These are a few elements that can be considered as mitigating effects of agribusiness inputs (seed and fertilizers alike) on the wheat chain. Private agents, however, continue to dominate this agricultural-input sector of the wheat chain through pervasive use of biotechnology, fertilizers and pesticides in industrialized countries and growing use in developing nations. This concentration of power into consolidated agribusiness

¹⁷⁴ BASF Crop Protection USA, "Clearfield Wheat Stewardship Guidelines," (2012), accessed 3 December, 2013, <http://agproducts.basf.us/products/research-library/clearfield-wheat-stewardship-guidelines.pdf>.

¹⁷⁵ "BASF and Monsanto in Crop Research," *The New York Times*, March 22, 2013, <http://query.nytimes.com/gst/fullpage.html?res=9504E2DA1430F931A15750C0A9619C8B63>.

¹⁷⁶ Aoife White and Naomi Kresge, "Bayer Clears EU Hurdle for Monsanto Deal with Sale to Basf," *Bloomberg*, March 21, 2018, <https://www.bloomberg.com/news/articles/2018-03-21/bayer-clears-eu-hurdle-for-monsanto-deal-with-basf-sale-pledge>.

¹⁷⁷ Michael Siegrist, Melanie Connor, and Carmen Keller, "Trust, Confidence, Procedural Fairness, Outcome Fairness, Moral Conviction, and the Acceptance of G.M. Field Experiments," *Risk Analysis* 32, no. 8 (2012).

monopolies has affected the commodification of seeds, wheat and food in general and characterizes input agents of the global wheat chain.

Production Agents: Small, Medium, Large

Farmers are the seminal physical and economic agents of the grain chain: the ones who work the land and grow the wheat, *the* actual producers of the commodity. A material person, the farmer and the farm can also be considered as financial units. Agricultural studies have brought about numerous classifications approaches to farming types and systems and one standardized ordering has not emerged. Yet, there is a research consensus evoked in *Comparative Farming Systems* by Billie Turner and Stephen Brush: “the farm, the village, the area, as the unit of analysis.”¹⁷⁸ Development agencies, international non-governmental organizations, agribusiness companies and several research and academic institutions widely rely on a classification focused on livelihoods units; farmers assets (human, natural, physical, financial and social) terms farming typologies.¹⁷⁹ According to the definition of the Food and Agriculture Organization in the 2000 World Census of Agriculture, an agricultural holding is an economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form, or size. Single management may be exercised by an individual or a household, jointly by two or more individuals or household, by a clan or tribe, or by a juridical person such as a corporation or a government agency. The holding’s land may consist of one or more parcels, located in one or more separate areas or in one or more territorial or administrative divisions, providing the parcels share the same production means utilized by the holding, such as labor, farm building, machinery or drought animals.¹⁸⁰

Although giving a comprehensive overview of the world agriculture in general and of wheat farming in particular is illusory because each region has their particular culture, set of institutions, and production factors such as climate and soil types, there are recognizable patterns of farming agents. Based on farm typologies, focus is set on identifying the producers of wheat within the global context of the food system. Firstly, it is possible to identify trends in

¹⁷⁸ Billie Turner and Stephen Brush , *Comparative Farming Systems* (New York: Guilford Press, 1987), 3.

¹⁷⁹ See William Solesbury, *Sustainable Livelihoods: A Case Study of the Evolution of D.F.I.D. Policy* (London: Overseas Development Institute, 2003).

¹⁸⁰ Food and Agriculture Organization, *2010 World Census of Agriculture* (Rome: FAO, 2010), 6.

the geography of agriculture holdings. Secondly, the types of production agents can be outlined by size. This classification is related to scale (number and area of holdings), socio-economic factors (legal status, gender, employment, land tenure and land use) and sources of “farm power” used for wheat production (human labor, draught animal power and engine-driven machinery). While 2.3 billion people are engaged in agriculture and farming, it is not known how many are working in producing wheat worldwide.¹⁸¹ Data specifically concentrated on wheat farmers is scarce, except for specific areas: In 1997, there were 46.300 wheat farms in the U.S.A.¹⁸² Rather fixed on general agriculture activity by country, the World Census of Agriculture yet contains national results by crops. In term of geography, the distinction between producers in developed and developing countries is essential.¹⁸³ Distributed by nation and region, the census gathers the number of wheat producing units, wheat cultivated surfaces, and average wheat field surface per holding for 64 countries.¹⁸⁴ Supported by such figures, country-specific observations can be made and trends extracted. For instance, 80 percent of the 6 million Pakistani farms cultivating the arable area of the country are growing wheat on 9 million hectares making Pakistan the country with the highest ratio of wheat producers per capita. On average, each holding cultivates 1,8 hectares (ha) of wheat. China, India and Ethiopia accounts for the most agricultural holding units (193 million, 119 million and 10 million respectively). Ethiopia, Tanzania, Nepal, Albania and Egypt have the smallest average size of wheat-cultivated area, which is less than half a hectare by farming unit. At the other side of the spectrum, the largest wheat growing farms are in the Americas with an average size per holding over 100 hectares (Canada, U.S.A., Uruguay). The world average area of wheat production is 25 ha. per farm. Whilst there are discrepancies in numbers, the world surface on which 360 millions farming units produce about 680 million tons of wheat is estimated to be between 172 and 249 million hectares.¹⁸⁵ Regionally, Asia cultivates 50 percent of this area. Stating the obvious, the area where wheat is produced is mainly rural, peri-urban, and rarely urban. It signifies that agents of production are predominantly rural. This rurality of production is to be contrasted with the fact that three quarters of the world’s poor live in the countryside, and are

¹⁸¹ See Food and Agriculture Organization, "Faostat Database."

¹⁸² John Reeder, *Wheat Trading Practices Competitive Conditions between U.S. And Canadian Wheat* (Washington, D.C.: U.S. International Trade Commission, 2001), 2-7.

¹⁸³ Food and Agriculture Organization, *World Agriculture: Towards 2015/2030: An FAO Perspective* (Rome; London: Food and Agriculture Organization, 2002).

¹⁸⁴ See Appendix A.

¹⁸⁵ Vocke and Liefert, *Wheat Outlook*, 1-17.

engaged in farming.¹⁸⁶ Rural migration is a response to this imbalance. It is a feature of modernization with impacts on the countryside and its production capacity, but mainly a crucial factor of urbanization.¹⁸⁷ This concern will be addressed later in the continuation of this work. In this study, in order to identify the size and type of wheat production agents worldwide, the farming units are classified according to small, medium and large categories.

A smallholder farm is a small size, family operated unit. There is no norm regarding the planted surface of small-scale farms, however definitions vary between less than 2 to 5 hectares of cropland. In the developed world, family farms are mainly profit-driven units, deriving labor and enterprise from the family. In the developing world, a smallholder is usually engaged in subsistence farming, with sustaining a family as main objective, growing a range of crops and maintaining animals, and dependent on household members for most of the labor. Wheat is predominant in subsistence grain-growing agriculture in several areas. Because of their small scale and focus on sustenance, most smallholders are producing wheat for personal and local consumption and little for the world markets. Friedrich Engels was predicting a gloomy future for them: "Small production in agriculture (...) is irretrievably going to rack and ruin" and today there is intense speculation on whether small farms can survive under globalization.¹⁸⁸ This issue is reflected in the discordant opinions on the relationship between farm size and land productivity.¹⁸⁹ While a few studies suggest that small farm size are associated with a low volume of production, increased per unit costs and low net farm income, other research indicates that these farms produce more per unit of land than larger ones, due to an intensive use of land and optimized fertilizer inputs, and because family workforce results in less labor transaction costs. Small production units are also providing the largest source of employment and income to the rural world, with family farms the predominant form of agriculture in Asia and Sub-Saharan Africa. In terms of social groups, the majority of agricultural workforce and a large numbers of smallholders in the developing world are women. In Sub-Saharan Africa for

¹⁸⁶ See The World Bank, *World Development Report 2008: Agriculture for Development* (Washington: The World Bank, 2007).

¹⁸⁷ Michael Lipton, "Migration from Rural Areas of Poor Countries: The Impact on Rural Productivity and Income Distribution," *World Development* 8, no. 1 (1980): 11.

¹⁸⁸ See Haroon Akram-Lodhi and Cristobal Kay, *Peasants and Globalization: Political Economy, Agrarian Transformation and Development* (London: Routledge, 2012).

¹⁸⁹ Shenggen Fan and Connie Chan-Kang, "Is Small Beautiful? Farm Size, Productivity, and Poverty in Asian Agriculture," *Agricultural Economics* 32, (2005).

instance, women contribute 60-80 percent of the labor used to produce food both for household consumption and for sale.¹⁹⁰

The medium size farm is not a unit of study as dear to international non-governmental organizations and academic institutions as its smaller counter-part, and available data is scarce. In-between small subsistence units and large corporations, the size of holdings varies from 5 up to 10 hectares. Because of the relatively larger size of cultivated land, medium holdings are most likely to be using machinery as “farm power” for grain production, which might be rented. Medium-size units often practice contract farming, employ wageworkers and hire smaller farmers to cultivate some of their land. It is difficult to assess the global relevance of medium-size farming on wheat production, but it appears that such units are the basis of rural economies and settlement patterns in many parts of rural North America where they are involved in local and regional trade of grain.¹⁹¹ These farms are mostly efficient units of production significant to domestic and international markets. In the 1980s, they accounted for 40 percent of the farm production value of the U.S.A. Though largely subsidized by governmental programs, one of the issues many medium-sized family farms in the developed world are facing is substantial debt. The constant pressure to increase yields in order to maintain revenue drives to buying more equipment and inputs, the so-called “technological treadmill.”¹⁹² With indebted farmers going out of business selling their land to the remaining ones, the general reduction of farmers’ population and landowners appear to result in an increasingly centralized ownership and larger farms.

Large-scale farms are mechanized holdings, mostly non-family entities corporations based on waged employment producing in large volumes, with a size from 10 hectares of cropped land and above. In both developing and developed countries, mass wheat production takes place on farms using capital-intensive technology, with tractors, tillage equipment and combines. Such units dominate production for the wheat international market. Most of these large-scale enterprises are oriented towards commercialization and value addition of agriculture, and belong to the agro-industry sector defined as agribusiness: “agriculture operated by business; specifically, a part of a modern economy devoted to the production, processing and distribution

¹⁹⁰ Food and Agriculture Organization, *Women, Agriculture and Rural Development: A Synthesis Report of the Africa Region* (Rome: FAO, 1995).

¹⁹¹ Thomas Daniels, "A Rationale for the Support of the Medium-Sized Family Farm," *Agriculture and Human Values* 6, no. 4 (1989).

¹⁹² See Willard Cochrane, *Farm Prices: Myth and Reality* (Minneapolis: University of Minnesota Press, 1958).

of food (...) and by-products including the financial institutions that fund these activities.”¹⁹³ The largest wheat growing farms are in Canada (average 149 hectares of wheat per holding), U.S.A. (109 ha.) and Uruguay (101 ha). Most farm property in North America is still with individuals and families, as corporations own only 5 percent of U.S.’s farmland.¹⁹⁴ This is partly because federal governments there, fearing that major industries may fall under foreign control, have passed laws restricting corporate and foreign ownership of farmland, from limitations on foreign corporate ownership to the prohibition of farmland tenure by any non-family corporation.¹⁹⁵ ¹⁹⁶ Corporate firms circumvent such restrictions by farming land through contracted work under the guise of individual farms. The amount of land under their control is substantial in particular in countries with no specific restrictions on foreign ownership or use of land like Uruguay, Argentina, Chile, Colombia, Paraguay, and Venezuela.¹⁹⁷ Prominently present in these Latin American countries, El Tejar is a major global player in large-scale farming and a paradigmatic example of a leasing and land-owning agribusiness. The Argentinian conglomerate is the largest farm in the Southern hemisphere, with 1.1 million hectares under cultivation (120,000 ha. in Argentina, 34,000 in Uruguay, 17,000 in Brazil, and 8,000 in Bolivia). According to the business news agency Bloomberg, it was the world’s largest grain producer in 2011.¹⁹⁸ Though El Tejar’s primary crops are soybeans and corn, it is exemplary of the type of business model involved in primary agriculture production in general and a variation of the contract farming business arrangements used in North America wheat production areas. Typically, this type of farmland holders or management companies pay machinery owners and operators a specific fee for planting and harvesting a crop. El Tejar is financially backed by the U.S. private equity firm Capital Group and the London-based hedge fund Altima Partners via its development finance institution Altima One World Agriculture Fund (AOWAF), an arm of the International Financing Corporation—which belongs to the

¹⁹³ See Gabor Konig, Carlos A. da Silva, and Nomathemba Mhlanga, *Enabling Environments for Agribusiness and Agro-Industries Development* (Rome: Food and Agriculture Organization of the United Nations, 2013).

¹⁹⁴ Cynthia Nickerson et al., *Trends in U.S. Farmland Values and Ownership* (Washington: United States Department of Agriculture, 2012).

¹⁹⁵ Martin J. Troshynski, "Corporate Ownership Restrictions and the United States Constitution," *Ind. L. Rev.* 24, (1990).

¹⁹⁶ Statutes of Saskatchewan, "The Saskatchewan Farm Security Act," in *Part II - Farm Land Security* (Saskatchewan, Canada: The Queens Printer, 1974).

¹⁹⁷ Stephen Hodgson, Cormac Cullinan, and Karen Campbell, "Landownership and Foreigners: A Comparative," *FAO Legal Papers* 6 (1999).

¹⁹⁸ Lucia Kassai, Rodrigo Orihuela, " Hedge-Fund Backed El Tejar to Test IPO Market on Bond Sale," *Bloomberg Personal Finance*, May 9, 2011, <https://www.bloomberg.com/news/articles/2011-05-09/hedge-fund-backed-el-tejar-tests-ipo-appetite-with-300-million-bond-sale>.

World Bank.¹⁹⁹ Investing USD 75 million in farmland in South America in 2009, a shift in its strategy from leasing to owning farmland, Altima Partners announced wanting to create “the first Exxon Mobil of the farming sector.”²⁰⁰ In response to the 2007-2008 global food crisis, the apparent export competitiveness of large-scale farms in Eastern Europe and Latin America fueled by private capital investments has been praised, though voices also raised to object the large amounts of land acquired by these conglomerates and the opacity of land transfers.²⁰¹ The shift from publicly owned wheat production assets towards a more privatized system of agriculture in which companies control large tracts of agricultural land is well illustrated by the Russian company Ivolga: Prior to its restructuring in 2011, the large-scale farming corporation controlled 1.5 million hectares of land (800,000 ha. of land in Kazakhstan, and 700,000 in Russia).²⁰² In Kazakhstan, the United States Agriculture Department (USAD) and its Foreign Agricultural Service (FAS) estimates that grain-trading and non-agricultural companies (energy and resource-extraction enterprises) have taken over management of struggling cooperatives and consolidated smaller farms, without acquiring land ownership.²⁰³ These companies control 5-10 percent of the country’s agricultural land, and FAS reports claim that “consolidation of small, independent farms is the prevailing trend and the future of agriculture will be based on large-scale land ownership.”²⁰⁴ This oracle is shared with the Food and Agriculture Organization (FAO) which announced the diminution of subsistence farming as “farmers respond to the increased opportunities that development and urbanization create; farms are likely to decrease in number whilst increasing in size.”²⁰⁵

¹⁹⁹ David Burch and Geoffrey Lawrence, "Towards a Third Food Regime: Behind the Transformation," *Agriculture and Human Values* 26, no. 4 (2009).

²⁰⁰ Louise Lucas, "Investors Wary of Going Back to the Land," *The Financial Times*, January 28, 2013, <https://www.ft.com/content/afba4574-4b8e-11e2-887b-00144feab49a>.

²⁰¹ See Hans P Binswanger, Klaus Deininger, and Gershon Feder, "Power, Distortions, Revolt and Reform in Agricultural Land Relations," *Handbook of Development Economics* 3 (1995).

²⁰² Richard Orange, "Ivolga Puts World's Biggest Farm up for Sale," *The Telegraph*, February 13, 2011, <https://www.telegraph.co.uk/finance/newsbysector/constructionandproperty/8321543/Ivolga-puts-worlds-biggest-farm-up-for-sale.html>

²⁰³ Mark Lindeman, "Kazakhstan Wheat Production: An Overview," (2005). http://www.fas.usda.gov/pecad2/highlights/2005/03/Kazakh_Ag/.

²⁰⁴ Mark Lindeman, "Russia Trip Report: Grain Outlook Favorable Despite Volga Valley Dryness," *FAS*, June 10, 2002, http://www.fas.usda.gov/pecad2/highlights/2002/07/russia_trip_report/.

²⁰⁵ See "Agricultural and Food Marketing Management," in *Marketing and Agribusiness Texts* (Rome: FAO, 1997), <http://www.fao.org/DOCREP/004/W3240E/W3240E00.HTM>.

Currently, developed countries tend to have a larger farm size average and fewer small farms, while the trend is smaller holdings in Asia and Africa. This means farm size diverged internationally. On the one hand, smallholders are cultivating wheat on small surfaces, mostly laboring for their own consumption and local markets: a type of farming that shed light upon crucial questions pertaining to rural migration, urbanization and national food security. On the other hand, profit-driven large farms operate on vast land areas to produce wheat in massive quantities, an agribusiness type of farming questioning the role of food as a global political and financial instrument, on trade practices, dependency, foreign direct investment and rising land acquisitions. The two contrasting trends that are the small farm and the large business-oriented unit appear contradictory in practice, yet form the main body of production agents of wheat within the global food system and the grain chain.

Trading Agents: Public, Private

In the summer of 2010, Russian farmers reported that wheat-growing conditions were dramatically deteriorating due to a severe drought. Following this announcement, Prime Minister Vladimir Putin banned all exports of grain in an attempt to curb domestic food prices.²⁰⁶ Simultaneously, major wheat-producers America and Australia were suffering similar conditions and Canada's harvests had been partly spoiled by floods. The following January, an all-time peak in food prices ensued with long-term international political consequences. French President Nicolas Sarkozy blamed speculative trading practices for the food price volatility, pointing fingers specifically at investors, banks and traders.²⁰⁷ The American Senate had already conducted an investigation into the integrity and functioning of commodity markets in the aftermath of the 2008 food crisis. In his testimony then, Steven H. Strongin, Managing Director with the investment bank Goldman, Sachs & Co said that "the role of financial participants in the commodity futures markets is often (...) misunderstood" and that he did "not think that (...) investors have been responsible for excessive price volatility in the Wheat market."²⁰⁸ Such a statement appears debatable considering that in an attempt to refute Sarkozy's accusations, the Swiss grain trader Glencore International confessed to having made a speculative bet on rising wheat prices in the early stages of the Russian drought. In addition,

²⁰⁶ Andrew Kramer, "Russia, Crippled by Drought, Bans Grain Exports," *The New York Times*, August 5, 2010, <https://www.nytimes.com/2010/08/06/world/europe/06russia.html>

²⁰⁷ Lagi, Bertrand, and Bar-Yam, "The Food Crises and Political Instability in North Africa and the Middle East."

²⁰⁸ Steven Strongin, Testimony on "Excessive Speculation in the Wheat Market" (Washington: U.S. Senate, 2009), 14.

Glencore's traders admitted to advising the country on imposing a grain export ban. The firm claimed to having lost money in this operation because the ban blocked Russian wheat that Glencore had bought to export to Egypt, whose regime fell shortly after.²⁰⁹ It is tempting to speculate about this collection of events, as they appear to illustrate so evidently the impact of major international trading houses on political spheres and world population via the grain chain.²¹⁰ Prior to examining the influence of such structures on the global wheat chain, it is necessary to contemplate these agents' operating mechanisms and characteristics.

After harvest, grain changes ownership several times. Various trading agents (e.g., local and cooperative traders, brokers, public agencies, trading houses) operate in the buying and selling of wheat before processing. In developing countries, the amount of exported wheat is relatively low, and trading flows represent only 20-50 percent of the wheat produced.²¹¹ As an indication, the price of wheat is usually evaluated in US Dollar per bushel or per metric ton and fluctuates. For example, wheat was estimated USD 294.4 per metric ton on Monday, April 28, 2014 (for "Wheat, No.1 Hard Red Winter, ordinary protein"), while it was 317 USD in 2009 and USD 199 in 1999.²¹² Farmers sell parts of their harvest to a local grain merchant, a government or a parastatal agency, which will manage its storage for a few months to a year before selling it to be milled into flour or exported. In most countries, the buyer is typically a merchandiser or buying agency that buys grain and resells it either to end users in the domestic market or to a client in an importing country. Three main types of trading agents handle wheat movement from production to processing agents: state-enterprises, private traders and international trading houses.

Worldwide, most wheat is privately traded but for a few state-marketing authorities.²¹³ As defined by the General Agreement on Tariffs and Trade (GATT), State-Trading Enterprises (STE) are "governmental and non-governmental enterprises, including marketing boards, which have been granted exclusive or special rights or privileges, including statutory or

²⁰⁹ Javier Blas and Jack Farchy, "Glencore Reveals Bet on Grain Price Rise," *The Financial Times*, August 24, 2011, <https://www.ft.com/content/aea76c56-6ea5-11e0-a13b-00144feabdc0>

²¹⁰ Marie Maitre and Sybille de La Hamaide, "G20 Ministers Meet to Tackle Surging Food Prices," *Reuters*, June 21, 2011, <https://www.reuters.com/article/us-food-summit-france/g20-nears-farm-data-deal-to-tame-prices-idUSTRE72F8QK20110316>

²¹¹ Umar Baloch, *Wheat: Post-Harvest Operations* (Rome: Food and Agriculture Organization of the United Nations, 1999), 7.

²¹² The World Bank, "Global Economic Monitor (G.E.M.) Commodities" (Washington: The World Bank Group, 2014).

²¹³ Lamon Rutten and Frida Youssef, "The Major Players in International Food Trade" in *Financing Normal Levels of Commercial Imports of Basic Foodstuffs* (Rome: Food and Agriculture Organization of the United Nations, 2003).

constitutional powers, in the exercise of which they influence through their purchases or sales the level or direction of imports or exports.”²¹⁴ In the 1990s, the World Trade Organization (WTO) had record of almost a hundred of these public food-trading enterprises, with the largest in Australia, Canada, South-Korea, Indonesia, Japan, and New Zealand.²¹⁵ Considered by the WTO as market intermediaries that manipulate market prices and are therefore “not consistent with WTO provisions,” most government-owned grain agencies have been disbanded in recent decades (Australia, Canada, South-Korea, Indonesia). Some function alongside private-sector traders (Syria, Egypt, Algeria) and a few remain in a monopoly position (China, Japan, Pakistan).²¹⁶ When Australia’s public trader, the Australian Wheat Board Ltd. (AWB) was privatized in 1999, it maintained a monopoly on wheat exports until 2010; its grain business shares including most storage and transport infrastructures were subsequently bought by the trading giant Cargill, the remaining activities were sold to the Canadian fertilizer firm Agrium Asia Pacific Limited.²¹⁷ The Canadian Wheat Board (CWB) used to be the world’s largest wheat exporter as “a farmer-controlled corporation (...) that markets wheat and barley through a “single desk” on behalf of farmers.”²¹⁸ Until 2012, Canadian farmers under its jurisdiction were obliged to sell their harvest of wheat to the CWB. The Canadian government voted to privatize the institution before 2016.²¹⁹ Prior to this, the volume of grain handled by these two structures previously accounted for a third of the world wheat exports. South Korea completely liberalized its wheat imports in 1990. In 1998, Indonesia abolished BULOG, its National Food Logistics Agency, and opened wheat operations to private traders. Among the remaining STEs, the China National Cereals, Oils and Foodstuffs Import and Export Corporation (COFCO) is a state-owned agency that exercises full control over international and domestic trade on wheat and other cereals for the Chinese government. Before China joined the WTO in 2001, COFCO had exclusive rights to import grains from the international markets. China is a

²¹⁴ Article XVII (of GATT 1994), "General Agreement on Tariffs and Trade 1994," (Geneva: World Trade Organization, 1994).

²¹⁵ OECD Publishing, *State Trading Enterprises in Agriculture* (Paris: Organisation for Economic Co-operation and Development, 2001).

²¹⁶ World Trade Organization, "Technical Information on State Trading Enterprises", World Trade Organization, accessed January 15, 2014, http://www.wto.org/english/tratop_e/statra_e/statra_info_e.htm.

²¹⁷ Wendy Pugh, "Cargill Pursues Growth in Australia after Buying Awb Assets on Food Demand," *Bloomberg*, December 16, 2010, <https://www.bloomberg.com/news/articles/2010-12-16/cargill-pursues-growth-in-australia-after-buying-awb-assets-on-food-demand>.

²¹⁸ Rutten and Youssef, "The Major Players in International Food Trade".

²¹⁹ Andrew Mayeda and Whitney McFerron, "Canada to Implement Wheat Board Law Regardless of Court Ruling, Ritz Says" *Bloomberg*, December 16, 2011, <https://www.bloomberg.com/news/articles/2011-12-16/canada-would-ignore-court-injunction-on-wheat-board-legislation-ritz-says>.

significant wheat producer and importer, making COFCO a dominating agent at both local and global levels of the wheat chain.²²⁰ A diversified company, the corporation invests “in hotel and leisure facilities, real estate, agro-industrialized projects as well as (...) abroad as part of its overall portfolio.”²²¹ COFCO Tunhe Co., a branch of the agency, is publicly traded on the Shanghai Stock Market. Japan, a major wheat importer, controls its import trade through the General Food Policy Bureau (GFPB), under the authority of the Ministry of Agriculture, Forestry and Fisheries (MAFF). A governmental single-desk, it buys and delivers foreign grain through licensed wheat trading companies (Mitsui, Mitsubishi, Marubeni).²²² The agency controls wheat imports prices through a system of quotas and high resale prices to protect and subsidize its domestic wheat production.²²³

A few other wheat-trading public agencies are involved in importing wheat, notably to supply a particular constituency - e.g., the army. These STEs co-exist with private traders. Syria's General Establishment for Cereal Processing and Trade (HABOOB) is the country's state-run agency for wheat imports. In Egypt, the state-entity is the General Authority for Supply Commodities (GASC) under the authority of the Ministry of Supply and Internal Trade. It is appointed by the Egyptian State to provide wheat for the food subsidy program run by the government to feed urban populations.²²⁴ Since 1993, Egyptian private-sector millers have been able to purchase wheat directly on the foreign market. Pakistan maintains a ban on private sector wheat imports and exports; the Trading Corporation of Pakistan is in charge of export and imports of wheat and other commodities.²²⁵ The Algerian Cereal Agency (OAIC) retained a monopoly of cereal imports until 1995. As the main supplier to the domestic market, the agency buys local grains and still accounts for most of the wheat imports.²²⁶ It appears from this overview that of the six top wheat importers that are Egypt, China, Brazil, Indonesia,

²²⁰ Niu Shuping and David Stanway, "China 2013/14 Wheat Imports Seen at 7.5 Mln T after Bad Weather," *Reuters*, September 23, 2013, <https://www.reuters.com/article/china-wheat-import/china-2013-14-wheat-imports-seen-at-7-5-mln-t-after-bad-weather-idUSB9N0DU00D20130923>.

²²¹ Steve McCorrison and Donald MacLaren, "An Assessment of the Economic Effects of COFCO," in *International Agricultural Trade Research Consortium*, China's Agricultural Trade: Issues and Prospects Symposium *Beijing* (July 3, 2007).

²²² Weining Mao et al., *Wheat Import Demand in the Japanese Flour Milling Industry: A Production Theory Approach* (Department of Agricultural Economics, North Dakota Agricultural Experiment Station, North Dakota State University, 1997).

²²³ Aurelia George-Mulgan, *Japan's Interventionist State: The Role of the Maff* (London: Routledge, 2004).

²²⁴ Akhter U. Ahmed et al., *The Egyptian Food Subsidy System: Structure, Performance, and Options for Reform* (Washington, D.C.: International Food Policy Research Institute (IFPRI), 2001), 14.

²²⁵ Asmat Raz, *Grain and Feed Annual Report-Pakistan* (Washington: USDA, 2010).

²²⁶ Nabila Hales, *Grain and Feed Annual Report-Algeria* (Washington: USDA, 2013).

Algeria and Japan, two have STEs that control the import of wheat (Japan and China) and two have import systems largely dominated by STEs (Egypt and Algeria).²²⁷ While this pattern highlights the enduring significance of public agencies in the import trade of wheat, the majority of wheat trading is nevertheless private. In addition to state structures, there are private local trading agents who function mostly as importers, sometimes within a public framework (tender system). In developing countries, these are usually local private traders with limited financial strength and little support from local governments. These small traders import a whole range of bulk food commodities, including wheat.

In addition to the public agency and the small private operator, a third type of trading agent is the international trading house.²²⁸ The leading world trading agents are corporations that coordinate movement of large quantities of grain directly from farmers to processors. They operate extensive grain distribution networks and own country elevators where producers deliver and sell grain or pay to store their grain until they sell it. Grain trade companies and agribusiness firms that merchandise grain often double as transportation and processing agents and are involved as production agents (for contract farming, land-ownership) and input agents (fertilizers, seeds) In the mechanized wheat-producing areas of the world, big grain-trading companies have employees at the local level. With excellent knowledge of wheat cultivation, these agents are assigned an area where they stay in close contact with wheat-growers, and have organized buying patterns. Supported by communication and measurement technologies, local traders will know the state of the growing crop and forthcoming harvests at all times and help to determinate market prices.²²⁹ In this way, major trading companies source grown grains from suppliers locally, buy when farmers want to sell and store grain until users want to buy it. Designated by journalists and experts alike with the simple evident acronym “ABCD,” four grain-trading firms have established their domination on the international grain market.²³⁰ In addition to trading wheat and other commodities, these firms control much of the physical infrastructures at nearly all levels of the food chain. Archer Daniels Midland (ADM), Bunge, Cargill and Louis-Dreyfus have consolidated a dominant position over the grain trade in

²²⁷ Karen Ackerman and Praveen Dixit, *An Introduction to State Trading in Agriculture* (United States Department of Agriculture, Economic Research Service, 1999).

²²⁸ Food and Agriculture Organization, *Financing Normal Levels of Commercial Imports of Basic Foodstuffs* (Rome: FAO, 2003), Annex 4.

²²⁹ Alex Wendell (Commodity Trader at Macquarie Group, Former Grain Agent with Cargill-Australia), interview by Charlotte Malterre-Barthes, personal interview (Singapore, 2013).

²³⁰ Gregory Meyer, "Bunge, Cargill, Dreyfus and ADM Face New Challenges," *The Financial Times*, September 18, 2013, <https://www.ft.com/content/dc1a8b88-1fd7-11e3-aa36-00144feab7de>.

particular and the food system in general.²³¹ As family grain businesses, these firms have participated of the growth of the international grain trade with their milling and grain-handling operations for 150 years. In 1970, Cargill, Continental Grain, Louis-Dreyfus, Bunge, André & Co. and Mitsui/Cook were trading 60 percent of the global wheat trading flows.²³² In 1999, the world's largest grain exporter Cargill bought Continental Grain Company, the second largest at the time. André & Cie, the world's fifth largest trader by volume went bankrupt in 2000 and was bought partially by ADM and Noble. By order of importance, the leading companies in the world are currently believed to be Cargill, ADM, Bunge and Louis Dreyfus.²³³

The largest wheat-trading house by size, value and trading volume is Cargill, listed by Forbes as the largest private company in the U.S.A. with USD 136.7 billion annual revenues (Headquarters in Minnetonka, Minnesota, 140,000 employees worldwide).²³⁴ Cargill's common equity shares are still in the hands of its founding family (MacMillan and Cargill). Originally a grain trader, the company was founded in 1865.²³⁵ Cargill retains its original function and is thus primarily a trading agent, though it is indirectly involved in almost all levels of the wheat chain.²³⁶ In the company's own words, "Cargill is an international marketer, processor and distributor of agricultural, food, financial and industrial products and services."²³⁷ Apart from dealing with agricultural commodity trading and processing, the company claims to offer "hundred of products (...) for farmers, food companies, manufacturers, energy and financial providers."²³⁸ Cargill's global activities spectacularly span the entire food system.²³⁹ It had already entered the feed business "from seed to feed to slaughter" in the 1930's (i.e. livestock

²³¹ Dan Morgan, *Merchants of Grain* (Lincoln, NE: Penguin Books, 2000).

²³² Krebs (1992) in Jörg Gertel, "Inscribed Bodies within Commodity Chains. Global Wheat and Local Insecurity," in *Cross-Continental Agro-Food Chains: Structures, Actors and Dynamics in the Global Food System*, ed. Niels Fold and Bill Pritchard (London: Psychology Press, 2005), 110.

²³³ Prikhodko and Rybchynsky, *Wheat Flour*, 22.

²³⁴ America's Largest Private Companies, *Forbes*, ed. Forbes, in the Forbes LLC, accessed 11 January, 2014, <https://www.forbes.com/sites/andreamurphy/2017/08/09/americas-largest-private-companies>.

²³⁵ Brewster Kneen, *Invisible Giant: Cargill and Its Transnational Strategies* (Halifax: Fernwood Publishing, 1995).

²³⁶ Cargill dominates three sectors in the U.S.A.: the grain trade, and pork and beef packing industries. Jon Lauck, *American Agriculture and the Problem of Monopoly: The Political Economy of Grain Belt Farming, 1953-1980* (Lincoln [u.a.]: Univ. of Nebraska Press, 2000), 178.

²³⁷ Kneen, *Invisible Giant*, 5.

²³⁸ Cargill Incorporated, "Cargill Products & Services", accessed January 18, 2014, www.cargill.com.

²³⁹ Cargill owns 55% of Mosaic shares, the world's largest phosphate-fertilizer producer.

feed production, slaughtering and processing cattle, poultry).²⁴⁰ Over time, the company acquired and built grain elevators, mills, exporting facilities, feedlots, processing plants, slaughterhouses and other operations in North America and abroad.²⁴¹ Cargill exported some 15 million metric tons of wheat in 2011 from its U.S. facilities.²⁴²

Publicly traded, Archer Daniels and Midland (ADM) is a commodity trading and food-processing firm (Headquarters in Decatur, Illinois, 30.000 employees).²⁴³ Founded in 1902, the company started as a seed crushing business. The firm controls a network of grain elevators and transportation facilities to procure, store, clean and transport wheat and other agricultural commodities. ADM's impressive grain transportation network includes truck, rail, barge, port, and ocean-going vessel handling and freight services. ADM "procures, transports, stores, processes, and merchandises agricultural commodities and products."²⁴⁴ ADM also transforms crops into fuels and chemicals and is a major producer of ethanol.²⁴⁵ Its trading operations are run by its global merchandiser, German-based Alfred C. Toepfer International, which trades over 40 million tones yearly of grains, oilseeds and oils. With sales offices worldwide, the global merchandiser operates inland, river, and export facilities in Argentina, Romania, Ukraine, and the United States.²⁴⁶ ADM exported 13.2 million metric tons of wheat from the U.S. in 2011.²⁴⁷

Originally Bunge y Born (1818), Bunge Limited is a grain-trading company established in Amsterdam that later moved to Brazil (30.000 employees). With headquarters in New York, the company is registered in the Bermudas, an offshore financial center. In a similar fashion to Cargill and ADM, Bunge Limited has been expanding its activities beyond the grain trading business into fertilizing industries, sugar and bioenergy, edible oil products, milling products and various agribusiness. Bunge's integrated operations stretch from sourcing grain to consumer

²⁴⁰ Kneen, *Invisible Giant*, 39.

²⁴¹ Lauck, *American Agriculture and the Problem of Monopoly*, 60.

²⁴² Karl Plume and Tom Polansek, "With Gavel Gone, Asia Grain Traders Face Tougher Climb," *Reuters*, May 30, 2012, <https://www.reuters.com/article/us-gavelon-marubeni-deal-idUSBRE84U04V20120531>.

²⁴³ "Profile: Archer Daniels Midland Co (Adm)," *Reuters*, accessed January 24, 2014, <https://www.reuters.com/finance/stocks/company-profile/ADM>

²⁴⁴ Company Profile for Archer-Daniels-Midland Co (Adm), *Bloomberg*, ed. Bloomberg Markets, accessed January 20, 2014, <http://www.bloomberg.com/quote/ADM:US/profile>.

²⁴⁵ "ADM Resumes Running Ethanol Plants at Full Capacity," *Reuters*, May 1, 2013, <https://www.reuters.com/article/adm-ethanol-capacity-idUSL2N0DI28820130501>.

²⁴⁶ "Archer-Daniels-Midland to Pay \$54 Mln over U.S. Bribery Charges," *Reuters*, December 10, 2013, <https://www.reuters.com/article/adm-bribery-idUSL2N0JZ22U20131220>.

²⁴⁷ Plume and Polansek, "With Gavel Gone, Asia Grain Traders Face Tougher Climb."

foods and are conducted through subsidiary companies. Bunge also participates in the purchase, storage, transport, processing and sale of wheat, though the principal agricultural commodities that the company handles are soybeans, rapeseed or canola and sunflower seed. Bunge provides financial services to producers and farmers from whom it purchases grain through prepaid short-term commodity purchases contracts. Bunge's preferred operating territory has long been South America, where most of its agribusiness activities and assets are located, and where it is the biggest grain miller.²⁴⁸

Louis Dreyfus Group is a grain trading company that was founded in France in 1851 and is currently active in global processing, trading and merchandising of commodities (grains, oilseeds, rice, sugar, ethanol, coffee, and cotton). It is also involved in transportation and international shipping, as well as in telecommunication infrastructures and real estate (Headquarters in Amsterdam, 35.000 employees). The branch Louis Dreyfus Armateurs owns and manages ocean vessels. The group withdrew from energy trading and from domestic grain merchandising in the U.S. while maintaining an important role in world trading in grain, including exporting from the United States. In 1993, following a joint-venture agreement, ADM assumed operational control over the fifty U.S. grain elevators owned by Louis Dreyfus.

This outline of the four global commodity giants is far from a complete overview of the trading agents involved in the commerce of wheat. In addition to the ABCD companies, a FAO report lists about twenty "major international grain (...) trading companies."²⁴⁹ Among these, significant companies with facilities (export terminals, silos, mills, transport infrastructures) can be summarized by geographical zone. North America as a prime area of wheat production holds a concentration of competitors to the ABCD companies. CHS Inc. (publicly traded agribusiness owned by farmers and cooperatives), The Andersons (publicly listed independent trader) and Paterson Global Foods are the most important grain traders, elevators operators, fertilizer distributors and rail cars managers.^{250 251} Apart from the semi-privatized Canadian Wheat Board, the most significant Canadian-based grain-trading houses

²⁴⁸ "Profile: Bunge Limited", *Reuters* (2014), accessed 24 January 2014, <https://www.reuters.com/finance/stocks/companyProfile/BG>.

²⁴⁹ Rutten and Youssef, "The Major Players in International Food Trade," Chap. 2.

²⁵⁰ "Profile: Chs Inc," *Reuters* (2014), accessed 24 January 2014, <https://www.reuters.com/finance/stocks/company-profile/CHSCP.O>.

²⁵¹ "Profile: The Andersons Inc," *Reuters* (2014), accessed 24 January 2014, <https://www.reuters.com/finance/stocks/companyProfile/ANDE.O>.

are Richardson International Ltd. (grain-handling port facilities and mills), and the smaller Parrish & Heimbecker (flour and feed milling, grain marketing, transportation and logistics).²⁵²

In Asia, the Japanese trading house Marubeni has been challenging the longstanding dominance of big grain-trading firms and is the third largest wheat exporter from America. In 2012, Marubeni bought U.S. grain trader Gaviolon, establishing the shortest sea route from the U.S. Central Plains supply to Asia for grain commerce.²⁵³ Mitsubishi and Mitsui/Cook are two other important Japanese grain-trading firms. A few Asian grain-trading houses should be mentioned: the Singapore-based “NOW” companies Noble, Olam and Wilmar (with warehouses and export elevators in South America, Europe and the Middle East) are taking on Asia's rising demand for wheat flour. In Australia, in 2011, the three major local traders were GrainCorp, CBH and Viterra. GrainCorp (grain handler, provides storage, transportation, flour milling and mixing services) controls 280 wheat storage sites and seven of the nation's 10 ports that ship grain in bulk. In 2013, ADM's plan to acquire GrainCorp was blocked by Australian authorities, which claimed that a “100 percent foreign acquisition of this key Australian business” was not in the nation's interest.²⁵⁴ The cooperative CBH (Co-operative Bulk Handling owned by 4,000-grain growers) exports most of the Western Australian grain harvest and operates grain trade through CBH Grain Pty Ltd.²⁵⁵ In 2013, the largest publicly traded commodity trader, Swiss-based Glencore International acquired Viterra Inc. (grain handling and marketing, elevators, terminals, retail outlets in Canada and Australia, processing) making it another relevant player of the global grain trade.²⁵⁶ Though primarily active in trading minerals and metal commodities, and considered a new comer on the grain market, Glencore Grain, a subsidiary of Glencore Xstrata, buys, process, handles and markets wheat. It claims to farm 300,000 hectares of owned or leased land in Australia, Paraguay, Russia, Ukraine and Kazakhstan.²⁵⁷

²⁵² Market Wire, "Acquisition of Dover by Parrish & Heimbecker Completed," *Reuters*, February 6, 2009, <http://www.marketwired.com/press-release/acquisition-of-dover-by-parrish-heimbecker-completed-tsx-dvi-946645.html>.

²⁵³ Yuko Inoue and Emi Emoto, "Marubeni Buys Gaviolon for \$3.6 Billion as It Eyes China," *Reuters*, May 29, 2012, <https://ca.reuters.com/article/idCABRE84S0A720120529>.

²⁵⁴ Jason Scott and Elisabeth Behrmann, "ADM's \$2 Billion Graincorp Bid Blocked by Australia," *Bloomberg*, November 29, 2013, <https://www.bloomberg.com/news/articles/2013-11-28/australian-treasurer-hockey-rejects-adm-takeover-of-graincorp>.

²⁵⁵ Bloomberg Businessweek, "Company Overview of Cbh Grain Pty Ltd," *Food and Staples Retailing*, January 27, 2014, <https://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapid=5503616>.

²⁵⁶ Ian Austen, "Viterra Deal Gives Glencore Influence in Global Wheat Trade," *The New York Times*, March 20, 2012, <https://mobile.nytimes.com/.../viterra-deal-gives-glencore-influence-in-global-wheat-trade>.

²⁵⁷ Glencore Grain Pty Ltd, "About Us", accessed January 27, 2014, <http://www.glencoregrain.com.au..>

On European ground, France is a major grain-producing country and a privileged exporter to its former colonies on the African continent. Union InVivo (a farmer-owned cooperative, with global merchandiser Toepfer) exported 8 million tones of wheat in 2011. Together with fellow cooperative players Axereal, Lecureur and family-owned Soufflet, these firms claim the bulk of France's grain exports.²⁵⁸ There are smaller specialized firms like *Nidera* (a Dutch privately owned trader, seed producer and distributor in South America) or Swiss-based Solaris Commodities (trading only grain from Black Sea, Ukraine).²⁵⁹ In fact, energy-focused traders moving into agriculture and grain trading appear to be on the rise. Following Glencore, the world's largest independent oil trading house, Dutch-based Vitol, expanded into grains trading.²⁶⁰ In addition to these huge commodity-trading companies, local trading houses and public agencies, brokers are independent grain trading agents linking buyers and sellers, remunerated on a commission basis. Their role, however, has declined markedly with the strengthening of trading houses. In addition, the rising importance of electronic exchange places reduced the visibility of "over-the-counter" trading operations and eliminated the need for intermediaries.²⁶¹

As outlined above, while a few state agencies retain control over the world wheat market, most of the relevant operators of the wheat trade are private.²⁶² Trading houses Cargill, ADM, Bunge and Louis-Dreyfus currently dominate business operations of wheat trade and with it, entire parts of the global food system, with Glencore and Marubeni on the rise. Termed so by the disciplines of microeconomics, these firms are vertically integrated, and own suppliers and/or distributing activities along the food chain (i.e. inputs, storage, transportation, processing). Through acquisitions, global commodity giants continue to broaden their footprint on international grain markets and extend their reach to include the handling of wheat and other staple crops, capitalizing on rising demand for food. The consequences of this hegemony are manifolds. Investigating on "the power and profits of the (...) giant companies at the center of the world's food supply," the financial journalist Dan Morgan quotes Berthold Brecht'

²⁵⁸ Gus Trompiz, "Global M.&A. Unsettles Deep-Rooted French Grain Trade," *Reuters*, July 17, 2012, <https://uk.reuters.com/article/grains-trading-france-idUKL6E8IC97G20120717>

²⁵⁹ Prudence Ho, "China Seeks to Invest in Dutch Grain Trader," *The Wall Street Journal*, no. Asian Business News, January 13, 2014, <https://www.wsj.com/articles/cofco-seeks-minority-stake-in-grain-trader-nidera-1389613903>

²⁶⁰ Emma Farge and Sarah McFarlane, "Vitol Plans Grain Market Debut, Hires Viterro Traders," *Reuters*, February 20, 2013, <https://www.reuters.com/article/vitol-grains-idUSL6N0BKF6S20130220>.

²⁶¹ Kneen, *Invisible Giant*, 71.

²⁶² Food and Agriculture Organization, *Financing Normal Levels of Commercial Imports of Basic Foodstuffs* (Rome: Food and Agriculture Organization), VI.

incendiary accusation to conclude his unsurpassed book *Merchants of Grain*: “Famines do not occur, they are organized by the grain trade.”²⁶³ More recently, the grain industry corporations faced criticism on how far-reaching their control was: “Through their roles in biofuels investment, large-scale land acquisition, and the financialization of agricultural commodity markets, the ABCDs are at the forefront of the transformation that is determining where money in agriculture is invested, where agricultural production is located, where the produce is shipped, and how the world’s population shares (or fails to share) the bounty of each harvest.”²⁶⁴ While considering such assessments cautiously, this charge is exposing the variety of spaces in which such agents may be involved, from the abstract spheres of economical sectors, to national territories, world regions, and more tangible spatial implications on land use, production areas, shipping routes, national infrastructures and the geographical distribution of the grain supply.

Transportation Agents: Logistics of Grain

It is no accident that U.K. –based Clarksons’ main overseas harbor office is in Alexandria, Egypt: the world’s biggest shipbroker agency is based in the harbor of the world’s top wheat importing country.²⁶⁵ Transportation agents are at the core of the grain trade. The commerce of wheat and the value generated by grain is attendant to its movement through space and time. Transport is crucial to grain because it is a perishable bulk commodity that can be accumulated and stored only for a limited time and must be moved from multi-source procurement sites to processing and final distribution. Transport costs and handling charges are important for food pricing, especially given that many transportation agents rely on fossil fuels, another commodity. Certain analysts consider transportation logistics no longer a separate service, but as fully integrated into the production and distribution processes of the entire supply chain.²⁶⁶ Because transport does not materially transform the commodity, its agents are considered secondary in the present analysis. As established in the Flows Of Grain section, grain is transported at all phases of the chain: between harvest, storage, elevators, shipping terminal, processing mill, retailers, and finally end-consumers. The logistics chain is a multi-scale geographic movement, mostly from rural production areas to urban consumers. It involves

²⁶³ Morgan, *Merchants of Grain*, 446.

²⁶⁴ Sophia Murphy, David Burch, and Jennifer Clapp, *Cereal Secrets: The World's Largest Grain Traders and Global Agriculture* (OXFAM, OXFAM Research Projects, 2012), 20.

²⁶⁵ Clarksons, "Clarkson Port Services", *Clarksons*, accessed February 5, 2014, <https://www.clarksons.com/>.

²⁶⁶ See Jean-Paul Rodrigue, Claude Comtois, and Brian Slack, *The Geography of Transport Systems* (London: Routledge, 2009).

several complementary transportation agents, the majority of which are private. Typically, the initial transportation agents at local and regional scales are producers who will move their grain in small quantities from harvesting sites to nearby storage that is rented, shared or owned. The work force required is low because most of this process is mechanized (i.e. self-discharging wagons, conveyors). In developing countries, farmers typically handle the manual loading and unloading of grain between farm and mill, as well as its transportation to primary markets with bullock carts, tractor trolleys or lorries.²⁶⁷ In this sense, production agents double as local transportations agents and are a preponderant force within the grain trade. At the national level, for inland transport of greater distance, and in developed countries, independent truckers (grain haulers) or trucking companies become involved, operating on rural roads and highways worldwide. Subsidiaries of major grain trading companies also run trucking services (e.g., Cargill Trucking Services, ADM Trucking).²⁶⁸ A modern large grain truck holds 900 bushels of grain (about 26 metric tons).²⁶⁹ Freight forwarders, small to medium companies providing logistics services, enter the supply chain to organize transfers (e.g. legal documents, customs) and help in the execution or implementation of transport contracts. In industrialized countries, trains and barges compete and complement one another in moving grain to successively larger elevators towards processing plants, mills or export harbor facilities. Barge grain transport is prevalent in North America, with the Mississippi River and the Illinois Waterway as principal channels. There are only a few operators of barge service for grain shippers, and the market could be classified as an oligopoly. Eight private agents manage 7000 covered barges, moving bulk grains and other commodities (oil, coal, fertilizers and chemicals). Shipments with 15 barges can move as much as 787,500 bushels of grain at once (22,000 tons). Unsurprisingly, the leader of the river grain transporters, American River Transportation Co, is a wholly owned subsidiary of ADM.²⁷⁰ Amid the other owners of barges (American Commercial Lines, Ingram Barge Lines, AEP River Operations, Alter Barge Line, Inc.), Cargill Marine and Terminal Inc. (Cargill) and Bunge North America (Bunge) are affiliates of major grain trading houses.²⁷¹ In

²⁶⁷ Baloch, *Wheat: Post-Harvest Operations*, 9.

²⁶⁸ ADM Logistics, "ADM Logistics Trucking Services", *Archer Daniels Midland Company*, accessed February 5, 2014, <https://www.adm.com/products-services/adm-logistics/trucking>

²⁶⁹ Peter Harriman, "Rail Bottleneck for Grain, Ethanol Shippers," *Argus Leader*, March 24, 2014, <https://www.argusleader.com/story/news/2014/03/27/rail-bottleneck-grain-ethanol-shippers/6946393/>.

²⁷⁰ ADM Logistics, "ADM River Transportation", *Archer Daniels Midland Company*, accessed February 5, 2014, <https://www.adm.com/products-services/adm-logistics/river-transportation>

²⁷¹ Nick Marathon, "Barge Transportation," in *Study of Rural Transportation Issues*, ed. Bruce Blanton (Washington: USDA, 2008).

Europe, grain transport by barge is mainly limited to the North West region (the Netherlands, Belgium, Germany and France) on the Rhine and along the Danube. In contrast to the consolidated inland waterways situation in the U.S., small and medium businesses dominate the European inland shipping sector, with 90 percent of all these transportations agents consisting of one-vessel-companies. In the Asian region, though 1 billion tons of cargo is moved by waterways (70 percent on China's 110.000 navigable kilometers), it is not know what percentage of this is wheat. In China, the Ministry of Transport is the main actor of the inland shipping sector.²⁷² Elsewhere in the world, grain freight transport via inland waterways is mostly underdeveloped.²⁷³

Part of an intermodal chain of grain transport, rail freight companies are essential to wheat producing and exporting countries, transporting grain from elevators to ports for international export, or from ports to a final inland destination in special cars allowing grain to be poured or dropped easily.²⁷⁴ In these countries, rail companies are key actors of transport; North America, Europe, the former Soviet-Union countries, and China have the broader networks. Servicing the world's largest wheat exporter, there are currently seven class-I rail freight companies in the U.S.A that have "annual carrier operating revenues of 250 million USD or more," a consolidation that followed a complete deregulation in 2001.²⁷⁵ The two most significant transportation agents are BNSF Railway (a Berkshire subsidiary) and CSX Transportation, both publicly traded at the New York Stock Exchange.²⁷⁶ Europe's rail freight network experienced an efficiency collapse in the 1990s, following economic restructuring, but remains substantial for wheat transport. The key actors of the rail freight business are Railion (Germany, the Netherlands, Denmark), SNCF (France), PKP (Poland) and Trenitalia (Italy).²⁷⁷ In South America, Argentina and Brazil (America Latina Logistica) are the only countries with a rail freight service for grain, though not significant. Globally, the use of rail freight routes for

²⁷² United Nations, Review of Developments in Transport in the ESCAP Region (New York: United Nations, 2003).

²⁷³ "The Power of Inland Navigation," in *The Future of Freight Transport and Inland Shipping in Europe 2010-2011*, ed. European Barge Union Expertise and Innovation Centre Inland Shipping (Dutch Inland Shipping Information Agency, 2011).

²⁷⁴ Prater Marvin et al., "Rail Market Share of Grain and Oilseed Transportation," *Journal of the Transportation Research Forum* 52, no. 2 (2013).

²⁷⁵ Code of Federal Regulations, Title 49, Transportation, PT. 1200-end, Revised and edited by Office of the Federal Register.

²⁷⁶ Kansas City Southern, Norfolk Southern Combined Railroad Subsidiaries and Union Pacific Railroad are publically traded holdings. Grand Trunk Corporation is a subsidiary of Canadian National, and Soo Line Corporation is a subsidiary of the Canadian Pacific Railway; both railways operate as transportation agents in America.

²⁷⁷ Organisation for Economic Co-operation Development, *Globalisation, Transport and the Environment*, ed. I. T. F. Global Forum on Transport (Paris: OECD, 2010).

grain is an increasing trend.²⁷⁸ Regarding the amount transported, an average train of 110-car unit holds 440,000 bushels of grain (11,000 metric tons).²⁷⁹

For international trade overseas shipping, maritime transport of bulk and containerized break-bulk cargo is the prevailing method, often the only one, for transporting large volumes of wheat. Grain is indeed among the five major bulks contents transported by Ocean-going vessels (with iron, coal, bauxite and phosphate). In this sector, the number of intermediary agents incorporated is large, with at times more than thirty participants per shipping operation. This is because in many countries, de-regulation of the grain trade and dismantlement of state-trading structures has resulted in smaller shipments of grain. This fragmentation caused an increase in the number of middlemen in export transport and in the maritime industry.²⁸⁰ Shipping brokers, ship owners, bulk handlers and loaders, port operators, pilots, dockers, towage operators, road and rail operators, depot operators, ship cleaners and fumigators, marine surveyors, and regulators are agents necessary for grain loads to move. Shipbrokers arrange the transport of wheat by sea and act as intermediaries between ship-owners and charterers (seller-buyers of grain). Mostly based in London, the top five brokerage companies involved in grain trade are Clarksons, Simpson Spence & Young, Braemar Shipping Services, Poten & Partners, and RS Platou.²⁸¹ There are countless other trading houses (over 600 companies worldwide) registered at the Baltic Exchange, the London-based century-old market place for ship freight transactions.²⁸² Established in 1744 as a grain exchange, the Baltic Exchange is a trading institution and an important provider of facilities for the fixing of cargo prices for merchant vessels. Its influence is declining, however, as shipping transactions are increasingly settled over telephone and Internet platforms.²⁸³ The Baltic Dry Index (BDI) provides daily pricing information on shipping various cargo types along different routes. It is a reference in the settlement of physical contracts relating to shipping and maritime transportation of wheat and other commodities. The BDI daily freight market rates reference the boats used in grain

²⁷⁸ "Freight Trains: Coming Round the Bend," *The Economist*, June 20, 2013.

²⁷⁹ Denver Tolliver, Alan Dybing, and Subhro Mitra, *Trip Generation Rates for Large Elevators: A North Dakota Case Study* (Fargo, ND: North Dakota State University, 2006), 3.

²⁸⁰ Kirk Vann, "Freight Trading: The Emerging Commodity Market," in *Energy Convergence. The Beginning of the Multi-Commodity Market*, ed. Peter Fusaro (New York: John Wiley & Sons, 2002).

²⁸¹ "Top 10 Shipbrokers," *Lloyd's List*, accessed January 24, 2014, <http://www.lloydslist.com/ll/news/top100/brokers/>.

²⁸² Baltic Exchange Information Services Ltd, "The Baltic Market", *The Baltic Exchange*, accessed February 5, 2014, <http://www.balticexchange.com/default.asp?action=article&ID=3>.

²⁸³ Jonathan Saul and Susan Thomas, "Suitors Circle Baltic Exchange Ship Futures Platform," *Reuters*, July 9, 2013, <https://uk.reuters.com/article/uk-baltic-platform-shipping-idUKBRE9680JW20130709>.

transport: Capesize, Panamax, Supramax and Handysize dry bulk vessels. The most common vessel classes used in the grain trade are Panamax and Handymax, each with a maximum capacity of respectively 80,000 tons and 35,000 metric tons. In addition to maintaining and navigating the ship, crews of these bulk carriers also participate in loading and unloading the grain cargo. A crew typically consists of 20 to 30 people. 40 percent of all Panamax cargo is grain, and there are nearly 7000 boats available for the ocean transport of grain.²⁸⁴ Other market indices for freight prices reveal the presence of alternative intermediaries (e.g., Lloyd's Shipping Economist, Maritime Research Inc.). By defining the ship type, size, contract and cargo type, duration and route, freight rates, the Baltic Exchange systematizes maritime freight transport rates. As an example of how the maritime transportation industry developed into a standardized market, in December 2012 the cost of transport per tone of heavy grain from the Mexican Gulf to Europe ("U.S. Gulf-E.U. lane") was USD 19.²⁸⁵ Additionally, a growing share of the traded grain is containerized.²⁸⁶ The freight futures market functions similarly as other commodities futures markets: it consists of the trading of contracts that promise to sell or buy a freighting service in the future. It is the only service market-traded as a commodity. But because contracts between buyers and sellers of grain are very variable, grain shippers rely nearly exclusively on spot chartering: A contract for a single voyage to carry a specific cargo from a load port to a discharge port for an agreed upon total amount. Thus long-term freighting arrangements (over 3 months ahead of shipment) are unusual in grain trading and forward freight agreements lie beyond the scope of this study.

Over 1,000 private and public companies undertake the transfer of grain by maritime shipping, which represent 14 percent of overall dry bulk shipments (after iron ore and coal). The international dry bulk shipping industry is highly fragmented and considered a volatile sub-industry of maritime transportation.²⁸⁷ It is divided among state controlled and independent dry bulk vessel owners. Among countries owning and operating their own bulk carrier fleet, the most notable is China with the state-agency China Ocean Shipping Company (COSCO), mentioned earlier as trading agent. Via subsidiaries, the Chinese government owns 485

²⁸⁴ Isaac Arnsdorf, "Money-Losing Panamax Owners Boosted by Brazilian Crop: Freight," *Bloomberg News*, August 26, 2013, <http://gcaptain.com/panamax-rates-rising-crop-cargoes/>.

²⁸⁵ Michael King, "2013 Shipping Outlook," *World Grain* (2013), accessed February 5, 2014, <http://www.world-grain.com/News/News-Home/Features/2013/3/2013-shipping-outlook.aspx>.

²⁸⁶ In 2007, 100 million tons of grain were carried on bulk ships while containers carried an additional 10 million tons.

²⁸⁷ "Drybulk Carrier Industry Overview," *GENCO Shipping & Trading Limited*, accessed January 24, 2014, <http://www.gencoshipping.com/industry.html>.

vessels.²⁸⁸ Iran (115 ocean-going vessels, Islamic Republic of Iran Shipping Lines), India (79 vessels, Shipping Corporation of India), Bangladesh (13 vessels, Bangladesh Shipping Corporation) and Pakistan (6 bulk carriers, Pakistan Merchant Navy) also operate government-owned shipping companies, both directly and via subsidiaries.²⁸⁹ ²⁹⁰ There are a considerable number of relevant private companies engaged in the ocean transportation services of dry bulk cargoes through the ownership and operation of dry bulk carrier vessels, only a few of which will be mentioned in detail (e.g. GIIC, Hanjin Shipping Corporation, Baosteel, Mansel Ltd, C.Transport, Lauritzen Bulkers, Dampskibsselskabet Norden).²⁹¹ Boat ownership, however, is not directly related to trading importance. Greece, for example, is one of the leading private ship -owning nations (16,25 percent of global fleet) and yet is not a major trading country.²⁹² Genco Shipping & Trading Limited (HQ in the Marshall Islands, with Baltic Trading Ltd.) is a significant shipping company with a fleet of 59 vessels that operates directly through charter-to-charter agreements (seller to buyer).²⁹³ DryShips Inc. and Diana Shipping Inc. (both located in Athina, Greece) are important global providers of shipping transportation services owning respectively 36 and 23 dry bulk carriers. Publicly listed Navios Maritime Holdings (HQ in Athens, Greece) is a paradigmatic case of a global, vertically integrated seaborne shipping and logistics company engaged in the transport and transshipment of dry bulk commodities. With two port storage and transfer facilities for grain commodities, and a core fleet of 50 vessels, the firm's customers are affiliates of ADM, Bunge, Cargill, Glencore, Louis Dreyfus, and Vitol. The firm employs third-party shipbrokers to solicit, research and propose charters for its vessels. As mentioned earlier, major grain trading agents operate their own transportation services to physically exchange grain from seller to buyer. Typically, these are separate entities not managed in the company's name. Among grain traders, Louis Dreyfus Armateurs has the largest grain transport-dedicated fleet; its subsidiary Cetrappa SNC manages 20 owned units ranging in size

²⁸⁸ Scott, Richard. "China-Owned Fleet's Brisk Growth." *Hellenic Shipping News* (2017). <https://www.hellenicshippingnews.com/china-owned-fleets-brisk-growth/>.

²⁸⁹ "Bangladesh Shipping Corporation Upgrades Fleet by Selling Older Ships," *Sea News*, August 26, 2013, <http://www.seanews.com.tr/bangladesh-shipping-corporation-upgrades-fleet-by-selling-older-ships/110363/>.

²⁹⁰ Jo Becker, "Web of Shell Companies Veils Trade by Iran's Ships," *The New York Times*, June 7, 2010, www.nytimes.com/2010/06/08/world/middleeast/08sanctions.html.

²⁹¹ "Fleet", Lauritzen Bulkers, accessed April 6, 2014, <http://www.j-l.com/lauritzen-bulkers/fleet>.

²⁹² Kevin Cullinane, *International Handbook of Maritime Economics* (Cheltenham: Edward Elgar, 2011), 36.

²⁹³ "Profile: Genco Shipping and Trading Ltd," *Reuters*, accessed April 6, 2014, <https://www.reuters.com/finance/stocks/company-profile/GNK.N>.

from 20,000 to 180,000 tons.²⁹⁴ Bunge is active in ocean freight via its Malta-based Augustea Bunge Maritime Limited, with an owned ocean-going fleet of 14 dry-bulk vessels.²⁹⁵ ADM's fleet of owned and chartered bulk vessels was previously controlled by its affiliate Toepffer, but the grain-shipping activities have been run by ADM Intermare since 2014 with a fleet of 11 vessels.²⁹⁶ Economists note that the ownership of boats is not a logistic need for big grain traders but relates to reducing freight risk, a major concern of the trade.²⁹⁷ Trading houses that do not own a fleet transport their grain using time chartering: the leasing of a boat to a third party for a specific period of time at a specified rate. A vessel may be leased for a single voyage ("spot chartering"), for consecutive voyages or for a specified period of time (from 45 days to three years).²⁹⁸ It is under such agreements that ST Shipping & Transport, the ship owning and chartering arm of Glencore International, operates a fleet of 200 boats.²⁹⁹ In fact, most companies engaged in grain trading such as Marubeni, Mitsui and Cargill are also chartering agents with logistics departments that represent a substantial part of their business. Both Japanese firms Marubeni Logistics Corporation and Mitsui O.S.K. Lines Ltd are involved in chartering of dry cargo ships (export, import, trilateral, inshore and open ocean). Mitsui operates the world's largest fleet of bulk carriers (more than 900 vessels). The company also holds stakes in finance and real estate businesses.³⁰⁰ Cargill Ocean Transportation, Cargill's physical freight department, is the world's second biggest charterer of ships (231 dry-bulk vessels chartered in 2012).³⁰¹ While the firm started acquiring bulk carriers in the mid 1960s, it

²⁹⁴ Louis Dreyfus Armateurs, "Fleet", *Louis Dreyfus Armateurs*, accessed February 5, 2014, <http://www.lda.fr/fleet-position-222>.

²⁹⁵ PR Newswire, "Augustea Atlantica S.P.A. And Bunge Limited Announce New Partnership with York Capital Management," *Reuters*, October 17, 2013, <https://www.prnewswire.com/news-releases/augustea-atlantica-spa-and-bunge-limited-announce-new-partnership-with-york-capital-management-228240311.html>.

²⁹⁶ ADM News, "ADM Orders Three New Oceangoing Vessels", *Archer Daniels Midland Company*, October 13, 2011, <https://www.adm.com/news/news-releases/adm-orders-three-new-oceangoing-vessels>.

²⁹⁷ Philippe Chalmin, *Traders and Merchants: Panorama of International Commodity Trading* (Chur, Switzerland: Harwood Academic Publishers, 1987), 141.

²⁹⁸ Lindsay R. Semple, Geoffrey I. Kirenga, "The International Grain Trade," in *Facilitating Regional Trade of Agricultural Commodities in Eastern, Central and Southern Africa* (Rome: Food and Agriculture Organization of the United Nations, 1994).

²⁹⁹ Eric Reguly, "Xstrata, Glencore Agree to Terms on Merger," *The Globe and Mail*, February 7, 2012, <https://www.theglobeandmail.com/report-on-business/international-business/xstrata-glencore-agree-to-terms-on-merger/article4171467/>.

³⁰⁰ "Company Profile for Mitsui Osk Lines Ltd.," *Bloomberg Markets* (2014), accessed January 24 2014, <http://www.bloomberg.com/quote/9104:JP/profile>.

³⁰¹ Michelle Wiese Bockmann, "German Freight Trader Tops Miners in 2013 Ship Charters," *Bloomberg*, January 11, 2013, <https://www.bloomberg.com/news/articles/2013-01-11/german-freight-trader-tops-miners-as-world-s-largest-ship-user>.

ended vessel ownership in 2001 to focus on chartering and trading. Chartering, as a business representing buyers and sellers of wheat, is a sub-system to the grain chain.

At both loading and unloading berths, there are several transportation agents whose significance is less obvious, yet significant. Logistics agents at the grain berths of destination harbors receive the grain from vessels. Port operators are public authorities or private companies responsible for the movement of all cargo in a harbor, including grain handling; they are indispensable transportation agents in the grain logistics chain because they control harbor infrastructures. It appears that as state-trading agencies importing and exporting grain worldwide have been slowly weakened or dismantled because of deregulation trade policies in the 1990s, so have national port authorities. Many countries have outsourced the handling of all their bulk dry terminals (grain but also coal, fertilizer, plastic pellets, wood chips and minerals) to private companies that operate transfer systems (grabbers, conveyor belt systems and screw-conveyors). This has led to a sector consolidation, a reduction of small port operating companies and the birth of the so-called Global Terminal Operators (GTO) involved mostly in container traffic. The principal GTOs are Hong-Kong's Hutchison Port Holdings (operates 257 berths in 45 countries), Singapore Port Authority-PSA (owns 25 ports in 15 countries), APM Terminals in The Hague (manages 40 ports, linked to container transporter Maersk) and Dubai Port Authority – P&O (42 terminals in 22 countries, fully owned by the state of Dubai).³⁰² In pursuit of these four groups, the Taiwan-based Evergreen Marine Corp, the German Eurogate and the Chinese government-owned COSCO are expanding.³⁰³

Although the transportation of goods by container and containerized special grain products has increased, grain is still transported for the most part in bulk. Between international or intercontinental transportation and inland or domestic transportation, about 1400 dry bulk terminals at harbors of various sizes exist worldwide, with the significance of each relating to the importance of its infrastructures, storage facilities and general capacity.³⁰⁴ A few of these facilities are “dedicated” loading terminals or grain berths that handle only that particular commodity. Weighting of cargo and inspection both on departure and arrival is performed by resident authorities or by private companies relying on industry standards, (e.g., in America,

³⁰² Zdravka Lyubomirova Traykova, "P.S.A. Intl, Hutchison Port, A.P.M. Terminals, D.P. World Remain Top 4 Container Port Operators in 2012," *Sea News Shipping*, August 28, 2013, <http://www.arabianindustry.com/supply-chain/news/2013/aug/28/drewrys-top-ten-global-terminal-operators-4425174/>

³⁰³ Drewry Shipping Consultants Limited, "Drewry's Top Ten Global Terminal Operators," in *Global Container Terminal Operators Annual Review and Forecast 2013* (London: Drewry, 2013).

³⁰⁴ Maritime Information Services Ltd, "Port Directory," (London, UK: Maritime Information Services Ltd, 2014).

USDA Grain Inspection, Packers and Stockyards Administration). A majority of transport terminals in developing countries are specialized in loading grain while those of developed countries are in unloading, often including transformation plants or mills next to port sites. Local harbor staff and dockers from the ship's stevedore using a crane equipped with a grab unload grain cargo. The grain is then placed along the jetty on a railway, transferred into a hopper on the berth, and finally onto a conveyor belt to the depot point or the silos. These unloading operations can be performed using pneumatic or compressed air systems.³⁰⁵ The grain that is not bagged but kept in bulk is taken to storage. Depot operators are in charge of stocking bulk wheat into large ideally covered warehouses. Agents similar to those involved during post-harvest transport further distribute wheat to wholesalers, retailers, and consumers; trucks and trains move the grain from bulk storage to local flourmills. Most developing countries importing wheat rely on roadways for transport, less on railways and waterways.

A multitude of structures, largely in the hands of private companies, form the core of transportation agents within the grain chain. Embedded in the politico-economic context of countries, this collection of grain transportation agents undertakes the moving of the commodity by means of public or private infrastructures. Each agent's efficiency, therefore, is highly dependent on local infrastructure quality: road networks, train freight tracks and equipment, capacity of export and import of harbor facilities, to name a few. This outline not only highlights the importance of the sequence that characterizes the grain chain, but also emphasizes the dense and complex interconnection between agents involved in the physical movements of grain and their interdependency. Finally, because of the prevalence of wheat in the human diet and the importance of grain trade, the networks formed by transport infrastructures and logistics of grain are globally extensive and affect the physical expression of territories in a manner detached from their initial function of grain processing, production or consuming.

Processing Agents: The Act of Milling

Grain flour is a consumer-oriented commodity and a major staple food. Because the bulk of wheat aimed at human consumption is processed into flour, semolina, wheat granules (couscous, bulgur) and pasta flour with the goal of improving its digestibility, mills are the main

³⁰⁵ Han Ligteringen and Hugo Velsink, "Dry Bulk Terminals," in *Ports and Terminals*, ed. Delft University of Technology Faculty of Civil Engineering and Geosciences (Delft: VSSD, 2012).

consumers of wheat.³⁰⁶ The provisioning of grain flour remains crucial to cities and populations in general, and a chief political concern to governments. Accordingly, millers and milling industries are the determining agents of the processing sector. Given their historically pivotal position, mill owners have enjoyed powerful social positions: landlords, religious leaders, nobles, brewers, lawyers or notables.³⁰⁷ The social role of millers declined with mechanization, yet their economic and strategic relevance remains. Blamed by French bakers of the fifteenth century “for the poor quality of the flour,” their “low reputation for honesty” has bled over into modern controversies over chemical additives to flour and the safety of food in general.³⁰⁸ ³⁰⁹ The questions relevant to this study pertain to ownership of milling infrastructures (public or private property) and the possible correlations between tools of food processing and politico-economic power. A global overview of the processing sector will lay the groundwork for further examination of the milling sector and its impacts on territory.

Modern milling involves a series of mechanical or chemical operations that convert grain into flour. The productivity of mills worldwide varies due to uneven levels of industrialization, wheat quality, type of equipment, technological processes used and experience of the flourmill staff.³¹⁰ The global milling industry, therefore, includes facilities ranging from small-sized mills to industrial milling factories. It appears that little literature informs a global overview of the wheat-milling sector, as most studies address milling activities at national level.

Generally, milling methods can be sorted into two types and sizes. On the one hand, small-scale firms use manually operated grinding systems (crude mortar and pestle, flat stones and rubbing stones). Simple hammer mills (hammers grind grains through impact), stone mills and plate mills (two plates shear the grain) driven by a diesel motor can accomplish the task.³¹¹ Such small milling systems and structures, either individually or communally owned, are common in the developing world. On the other hand, in most countries, multinational firms and large-scale mills supply flour to cities and food industry, requiring advanced forms of international milling

³⁰⁶ Martin Charumbira and Tafirenyika Sunde, "Seller Concentration in the Grain Milling Industry," *American Journal of Economics and Business Administration* 2, no. 3 (2010).

³⁰⁷ Sheila Pelizzon, "Grain Flour, 1590-1790," *Review (Fernand Braudel Center)* Vol. 23, 1, (2000), 126.

³⁰⁸ Sylvia Thrupp in Pelizzon, "Grain Flour, 1590-1790," 125.

³⁰⁹ See Elizabeth M. Williams and Stephanie Jane Carter, *The A-Z Encyclopedia of Food Controversies and the Law* (Santa Barbara, Calif.: Greenwood, 2011).

³¹⁰ Prikhodko and Rybchynsky, *Wheat Flour*, 25.

³¹¹ Brian Clarke and Alexandra Rottger, *Small Mills in Africa - Selection, Installation and Operation of Equipment* (Rome: Food and Agriculture Organization of the United Nations, 2006).

technology (i.e. roller milling). In the industrialized world, these facilities fit into larger companies, with operators purchasing grain from traders or directly from growers. Mostly powered by electricity, industrial flour milling is an energy-intensive industry.³¹² Grain processing on this scale has become a highly complex practice with advanced equipment at each step, requiring little human intervention. Modern plants produce a wide range of flours, including but not limited to whole wheat, standard patent and cake flour, and flour for pasta and biscuit production. These plants provide flour for industrial use, commercial bakeries and domestic use. Mills typically start by cleaning the received wheat, drawing from different silos to blend different types of wheat in order to achieve different end products. Flour types are defined by various extraction rates (what is removed from the whole grain to make flour): for instance, brown flour is 80 percent extraction and white flour is 70 percent extraction. With the help of a packing carousel, flour is bagged in bulk sacks of 25, 50 and 100 kg as well as 1-kg consumer packages. It is then sold to grocery wholesalers or other food-related industries, such as the baking sector. During this industrial processing, flour is treated with chemicals and additives. Bleaching agents are added to flour to improve its baking quality or color.³¹³ Flour improver, dough conditioner and dough-strengthening agents are also used.³¹⁴ Wheat flour is supplemented with specific nutrients to restore the loss of iron, thiamin and nicotinic acid that occurred during the industrial milling process. Globally, milling prices are derived from wheat future prices (grain is approximately 81 percent of the total cost of flour), electricity cost (6.5 percent), labor cost (4 percent), and other costs (8.5 percent). Understandably, wheat flour prices are higher than wheat grain prices and variable worldwide. Wheat millers depend on the cost of the raw material and on their consumers demand (bakeries, the confectionary industry, restaurants and other users of flour).³¹⁵ Because wheat price is globally quoted in US Dollars, the currency's fluctuations are of importance too. Experts suggest that a depreciation of the dollar during a surge in world cereal prices can mitigate if not neutralize an increase in world food prices.³¹⁶ Flour is largely traded on the spot market, however, and is mainly a market national in

³¹² See CheeWai Patrick Shi et al., "Carbon Footprint Analysis for Energy Improvement in Flour Milling Production," in *Globalized Solutions for Sustainability in Manufacturing*, eds. Jürgen Hesselbach and Christoph Herrmann (Berlin; Heidelberg: Springer-Verlag, 2011).

³¹³ "Regulation of the European Parliament and of the Council on Food Additives", in *Explanatory Memorandum*, Commission of the European Communities, Brussels (2006).

³¹⁴ Titus Msagati, *The Chemistry of Food Additives and Preservatives* (Oxford; Ames, Iowa: Wiley-Blackwell, 2012), 151.

³¹⁵ Prikhodko and Rybchynsky, *Wheat Flour*, 27.

³¹⁶ David Dawe, "Have Recent Increases in International Cereal Prices Been Transmitted to Domestic Economies?," in *The experience in seven large Asian countries* (Rome: The Food and Agriculture Organization of the United Nations, 2008).

scope.³¹⁷ For reference, the wholesale price of bakery flour was estimated to be USD 380 per metric ton in the U.S.A. in December 2013, while it was USD 280 in 2009.³¹⁸ Worldwide, following wheat production's increase, the average milling capacity of facilities expanded by 80 percent between the early 1970s and late 1990s. While no official global census exists on wheat mills, national figures for the largest industrialized wheat milling facilities can be examined to provide an overview of the relevant processing agents operating on the grain chain at a regional scale.

Corresponding to the position of the United States as one of the top wheat producers worldwide, milling firms of the U.S. are major agents of wheat processing. Though milling companies still have ownership interests in local grain elevators, the American milling industry has moved away from its traditional milling centers since the 1990s in favor of the expansion of facilities at export destination sites overseas and the integration of plants with increased milling capacity into food factories. Medium-size firms that were originally producers (e.g., Bay State Milling) and small millers with only one or two units are a shrinking category. William Wilson, author of *Structural Changes and Strategies in the North American Flour Milling Industry* identifies vertically integrated food processors (several companies with a common owner) and multi-unit flourmills diversified in other grain operations as the main actors of wheat processing.³¹⁹ Though American single mills used to be owned by families or by local elevator companies, today around 20 companies in the United States account for more than 90 percent of the country's flour milling capacity. Economic structural changes resulted in a concentration of fewer, larger firms and bigger plants.³²⁰ 336 wheat mills are currently operating in the United States, an amount in constant decline since the 1990s.³²¹ All mills are privately owned, with the notable exception of the North Dakota Mill and Elevator, which belong to the state of North Dakota and is the largest flour mill in the country. The North American Miller's Association

³¹⁷ Chris Klein, Edward J. Rifkin, and Noel D. Uri, "A Note on Defining Geographic Markets," *Regional Science and Urban Economics* 15, no. 1 (1985).

³¹⁸ Gary Vocke, "Data Products/Wheat Data," in *Table 32-Wheat and flour price relationships*, Kansas City, ed. Economic Research Service United States Department of Agriculture (Washington, 2014).

³¹⁹ William W. Wilson, *Structural Changes and Strategies in the North American Flour Milling Industry*, ed. International Agribusiness Management Association Meeting (Fargo, N.D.: Dept. of Agricultural Economics, Agricultural Experiment Station, North Dakota State University, 1993).

³²⁰ Arvin Donley, "Staying Strong in a Recession," in *World Grain September 2009* (Kansas, Sosland Publisher, 2009).

³²¹ Gregory Williams and Kurt Rosentrater, "Design Considerations for the Construction and Operation of Flour Milling Facilities. Part I: Planning, Structural, and Life Safety Considerations," 2008 American Society of Agricultural and Biological Engineers Annual International Meeting, (Providence, Rhode Island. 2007), 1.

(NAMA) lists 156 mills owned by its wheat milling members in the U.S. and Canada.³²² 37 percent of these mills are operated and owned by ADM, 34 percent by Horizon Milling LLC/ Cargill, and 32 percent by ConAgra Mills. The remainder is divided among General Mills, Cereal Foods Processors, Bunge Milling and a few others. Horizon Milling LLC/ Cargill is considered the top miller in terms of milling capacity, followed by ADM Milling and ConAgra.³²³ Horizon Milling (Headquarters in Minneapolis, Minnesota) is a joint venture formed in 2002 between Cargill and CHS, Inc. flour milling (farmers cooperatives) of whom Cargill is the majority owner and manager. Horizon Milling has 19 wheat-milling facilities in Northern America.³²⁴ ADM Milling Company, the milling department of Archer Daniels Midland, owns 46 wheat flourmills (23 in the U.S., 8 in Canada, 9 in the U.K. and 6 in the Caribbean region).³²⁵ Operating 14 mills, ConAgra Mills is the milling branch of ConAgra Foods Inc. (Headquarters in Omaha, Nebraska, 26.000 employees), a packaged food manufacturing company involved in consumer staples, frozen and commercial foods. In early 2014, ConAgra Foods Inc. merged its flour-milling business with Horizon Milling LLC/ Cargill, putting Ardent Mills, the new venture, above all its competitors with 40 mills and 4 industrial bakeries.³²⁶ ³²⁷ From this brief summary, it appears that selected agents of the grain trade, major agricultural trading houses such as Cargill, ADM and to a lesser extend Bunge Ltd., are also active agents of the wheat-processing sector. A few companies less involved in milling constitute minor agents of the wheat-processing sector, but remain notable because of their food producing business. This is the case for General Mills, Inc. (Headquarters in Minnesota, 35.000 employees), a processing agent involved both in milling and in further activities along the chain. A publicly traded company, General Mills owns 6 mills and 30 plants in North America and manufactures and markets branded and packaged consumer foods worldwide. Losing ground to companies like ConAgra in the milling sector in favor of food

³²² "Wheat Milling Companies", *North American Millers' Association*, accessed April 11, 2014, <http://www.namamillers.org/membership/wheat-milling-companies/>.

³²³ Carey Gillam, "3-Flour Power: Conagra, Cargill, Chs to Create Mega-Miller," *Reuters*, March 5, 2013, www.reuters.com/article/flour-milling-ardentmills-idUSL4N0BX5TX20130305.

³²⁴ "Horizon Milling Locations, a National Milling Network," Cargill Incorporated, accessed April 11, 2014, <http://www.cargillfoods.com/na/en/products/HorizonMilling/Locations/>.

³²⁵ "Milling Facilities," *Archer Daniels Midland Company*, accessed April 11, 2014, <http://www.adm.com/en-US/Milling/About/Pages/facilities.aspx>.

³²⁶ Reuters Staff, "Conagra Delaying Flour Mill Merger with Cargill, Chs-Sec Filing," *Reuters*, February 11, 2014, <https://www.reuters.com/article/idUSL2N0LF1RP20140210>.

³²⁷ Newswire, "Ardent Mills Begins Operations and a New Era in Grain," *Reuters*, May 29, 2014, <https://www.prnewswire.com/news-releases/ardent-mills-begins-operations-and-a-new-era-in-grain-261128941.html>.

processing, General Mills (Cheerios, Yoplait, Pillsbury) is yet an international player of the food industry market.³²⁸ General Mills competes with other companies in the food industry that are not vertically integrated in wheat flour processing such as Kellogg's, Associated British Foods (ABF), Coca Cola, Danone, Mars, Mondelez, Nestlé, PepsiCo and Unilever.³²⁹ Many of these companies own their own milling facility, often attached to food processing plants, such as Mondelez International Inc. that owns the second biggest wheat flour mill in the United States in Toledo, Ohio.³³⁰

In Canada, the milling industry follows a pattern similar to its neighboring country, although Canadian milling firms are more integrated into further processing and baking activities than their American counterparts. The Canadian flour milling industry is also more concentrated. Richardson Milling, the privately owned milling business of Canadian grain handler Richardson International (Headquarters in Winnipeg, 1500 employees) acquired former Viterra grain and milling assets from Glencore, and is the largest Canadian agribusiness and milling company. The company has also shipped wheat since 2012.³³¹ The two other important milling firms are Parrish & Heimbecker (P&H), and Paterson GlobalFoods. Several of the aforementioned American milling companies control an important part of the milling industry by owning mills in the wheat production regions of Canada and in Mexico. There are about 75 industrial wheat mills and plants managed by 33 companies in Mexico, 51 percent of which are located in or around Mexico City and urban centers.³³² The largest milling and baking company is Grupo Bimbo (Headquarters in Mexico D.F, 125,000 employees) that recently acquired Canada Bread Co., the main baking business in Canada.³³³ Grupo Altex's wheat mills in Mexico were acquired by Bunge North America, the North American operating arm of

³²⁸ "Profile: General Mills Inc (Gis.N)," *Reuters* (2014) accessed 11 April 2014, <https://www.reuters.com/finance/stocks/company-profile/GIS.N>.

³²⁹ Marion Nestle, *Food Politics: How the Food Industry Influences Nutrition and Health* (Berkeley, Calif.: University of California Press, 2013), 12.

³³⁰ Cynthia Osterman, "Mondelez Temporarily Closes 2nd-Biggest U.S. Flour Mill," *Reuters*, February 5, 2014, <https://www.reuters.com/article/kraft-mill/kraft-temporarily-closes-second-biggest-u-s-flour-mill-due-to-snow-sources-idUSL2N0LA1CM20140205>.

³³¹ Leo Quigley, "Milestone Year for Richardson International," *World Grain*, November 11, 2013.

³³² Benjamin Juarez, *Mexico 2014 Grain and Feed Annual* (Washington: USDA Foreign Agricultural Service, 2014).

³³³ Morton Sosland, "Extraordinary Time for This Industry," *World Grain*, March 27, 2014, <http://www.bakingbusiness.com/Opinion/Morton-Sosland/Extraordinary-time-for-this-industry.aspx>

Bunge Ltd. Within the North American Free Trade Agreement (NAFTA), the United States, Canada and Mexico produced 24 million tones of wheat flour in 2013.³³⁴

The European Union (E.U.) flour milling industry produces 35 million tons of wheat flour a year, sold in majority to small and industrial bakeries. A lesser portion goes to the food industry and to households.³³⁵ The structure and characteristics of each national milling industry differs from one European country to the other and is too extensive to be described here in detail, yet principal trends of the sector help identify the major processing agents. Consolidation trends of the European flour milling resulted in many smaller companies merging into larger ones. Current statistics reveal an estimated 3800 operating flourmills in the E.U. while there were 16.000 in the 1960s. Germany is the E.U.'s leading flour miller with 5,3 million tons of flour produced by 271 mills. The largest agent is VK Mühlen AG (Headquarters in Hamburg, 10 mills). Publicly traded on the Frankfurt stock exchange, the firm is privately owned by the Austrian GoodMills Group, a private holding with 19 other mills in Poland, Czech Republic, Hungary, Romania, Bulgaria and Austria.³³⁶ Werhahn Mühlen GmbH & Co. KG (Headquarters in Neues, 7 mills) is a milling firm operating as a subsidiary of the private holding Wilh. Werhahn KG.³³⁷ Finally, Grain Millers Group is a family union (4 mills) now partially owned by Agravis-Raiffaisen, a private agribusiness cooperative active mainly in biofuel and feed business.³³⁸

Producing 4,5 million tons of wheat flour a year with nearly double the amount of facilities as Germany (456 operating mills), France is the second wheat processing country in the E.U.³³⁹ There are four major milling companies that account for 57.9 percent of the total flour milling in France: Nutrixo, Ariane Meunerie, Moulins Soufflet, and Grands Moulins de Strasbourg.³⁴⁰ Privately owned Nutrixo is a subsidiary of Vivescia, France's largest grain cooperative (12,000 farmers). Through its sister firm Delifrance, Nutrixo (Headquarters in Ivry,

³³⁴ Morton Sosland, "Flour Output Rising in Developing Nations," *World Grain*, February 11, 2014, <http://www.world-grain.com/News/News-Home/Features/2014/2/Flour-output-rising-in-developing-nations.aspx>

³³⁵ See The European Flour Millers, *Facts & Figures* (Brussels: Floor Millers, 2012).

³³⁶ Arvin Donley, "A Dominant Force in European Milling," *World Grain*, November 1, 2009, <http://www.world-grain.com/News/Archive/A-dominant-force-in-European-milling.aspx>.

³³⁷ Dresdener Mühle, "Uebersicht", Dresdener Mühle, accessed April 11, 2014, <http://www.werhahn-muehlen.de/uebersicht.html>.

³³⁸ "Agravis Steigt Bei 'Grain Millers' Ein," *Agrarheute* (2013), <http://www.raiffeisen.com/Agrar-Info/news/artikel/30226899>.

³³⁹ The European Flour Millers, 47.

³⁴⁰ Chris Lyddon, "Focus on France," *World Grain*, June 19, 2013, <http://www.world-grain.com/Departments/Country-Focus/France/Focus-on-France.aspx>

23 mills) is also involved in baking and other food processing activities. Owned by a farmers cooperative, Ariane Meunerie (Headquarters in Orléans, 8 mills) is property of Axérial, a large vertically integrated structure operating in other sectors of the grain chain, from seed research to grain trade and food industry (Interra, Banette). Moulins Soufflet is a family-owned business (Headquarters in Nogent, 10 mills) also involved in grain trading. Among the big four, Grands Moulins de Strasbourg is the only firm to be publicly traded on the Paris Exchange. It operates 6 flourmill facilities and manufactures agricultural products, oils and malt products and exports to Europe, Africa, the Middle East, and Asia.³⁴¹ Both in Germany and in France, regulators for anti-trust practices have fined major milling groups.^{342 343} Italy is the third largest European producer with 3,8 million tones of wheat flour production annually. The national milling industry is composed of a few large industrial operations and several small mills. There are as much as 700 milling companies in operation in the country as well as a few major players. As Italy is the world leader of pasta fabrication and consumption, the main processing agents of the country are pasta-producing firms. The private company Barilla Group (Headquarters in Parma, 14.000 employees, 5 mills) is the international leader of the pasta market, and a vertically integrated firm engaged in milling, manufacturing and distribution of food products (pasta, readymade sauces, bread, biscuits, cookies, cakes) through its many subsidiaries (Molino Bianco, Barilla).³⁴⁴ Operating in the bread and grain industry, privately held Grandi Molini Italiani (GMI) claims to be the first milling group in Italy (Headquarters in Rovigo, 5 milling plants).³⁴⁵ In the United Kingdom, 59 mills produce 4,8 million tones of wheat yearly, owned by 31 companies. Following the European trend, the number of milling facilities declined steeply since the 1950s when 200 companies operated 250 mills.³⁴⁶ Currently, two milling firms control about 50 percent of the wheat flour output. Purchasing large miller RHM plc. (formerly Rank

³⁴¹ Bloomberg Businessweek, "Snapshot: Grands Moulins De Strasbourg (Gdms:En Paris)," *Bloomberg Markets* (2014) <http://www.investing.businessweek.wallst.com/research/stocks/snapshot/snapshot.asp?ticker=GDMS:FP>.

³⁴² "German Flour Mills Fined for Anti-Competitive Behavior," *World Grain*, February 9, 2013, http://www.world-grain.com/articles/news_home/World_Grain_News/2013/02/German_flour_mills_fined_for_a.aspx

³⁴³ Heather Smith, "Flour Millers Fined \$317 Million by French Antitrust Authority," *Bloomberg Markets*, March 13, 2012, <https://www.bloomberg.com/news/articles/2012-03-13/flour-millers-fined-317-million-by-french-antitrust-authority>.

³⁴⁴ A. Landi, "Durum Wheat, Semolina and Pasta Quality Characteristics for an Italian Food Company," in *Durum Wheat Quality in the Mediterranean Region*, ed. N. Di Fonzo, F. Kaan, and M. Nachit, Options Méditerranéennes : Série A. Séminaires Méditerranéens (Zaragoza: CIHEAM, 1995).

³⁴⁵ Grandi Molini Italiani, "A Practical Map of the Territory ," *Grandi Molini Italiani S.p.A.*, accessed April 16, 2014, <http://www.grandimolini.it/main-menu/contacts-2/>.

³⁴⁶ World Grain Staff, "Focus on United Kingdom," *World Grain*, March 1, 2007, <http://www.world-grain.com/Departments/Country-Focus/United-Kingdom/Focus-on-United-Kingdom.aspx>.

Hovis MacDougall) in 2007, Premier Foods, a large food manufacturer listed on the London Stock Exchange, became the largest U.K. miller and baker until early 2014, when it sold its entire milling estate (5 mills) and baking unit to American investment holding The Gores Group.³⁴⁷ The Gores Group is a Los-Angeles-based private equity firm that has no previous assets in the food industry, indicating the growing interests of financial investment firms in the food industry.³⁴⁸ The American ADM Milling (Headquarters in Decatur, Illinois, 9 mills in the UK) is now the largest flour miller in the UK. In other words, the UK wheat-milling sector is largely in the hands of foreign firms. With a highly automated yet corporately fragmented industry, the five major E.U. flour producers (with Spain) totaled 18,6 million tones a year in 2009, matching the amount produced by U.S. mills.³⁴⁹ Most of the largest flour milling companies in Europe remain under private ownership, having avoided diversification and maintaining a relatively strict adherence to milling activities, but for ties to major customers in baking.

Major grain producing areas in post-Soviet Russia and the Black Sea region are emerging as important agents of wheat processing. Russia's Federal State Statistics Service (ROSSTAT) asserts that there are 7,000 mills in the country, with a national flour production of 16 million tones, of which several large companies produce 25 percent.³⁵⁰ In the wake of the dissolving of the State Grain Inspection Service in 2005, quality control and transparency of the Russian milling industry has declined.³⁵¹ As a result of this, there are no unified statistic data on the industry. Limited available research shows that the Russian milling industry is territorially scattered and not economically consolidated. The Razgulay Group, one of the largest flour producers (Headquarters in Moscow, 6 flour-milling plants) declared bankruptcy in August 2017.³⁵² An agro-industrial holding involved in sugar production and active mainly in North and Central Russia, the Volga region, and the Ural, it also operated about 400,000 hectares of

³⁴⁷ Whitney McFerron, "U.K. Millers Poised to Buy British as Sun Boosts Wheat Quality," *Bloomberg*, September 19, 2013, <https://agroinsurance.com/en/24691/>.

³⁴⁸ Sherazade Daneshku, "Premier Foods Completes £1.1bn Refinancing Package," *Financial Times*, March 4, 2014, <https://www.ft.com/content/85602256-a382-11e3-aa85-00144feab7de>.

³⁴⁹ Morton Sosland, "Global Flour Output," *World Grain*, December 13, 2011, <http://www.world-grain.com/News/News-Home/Features/2011/12/Global-flour-output.aspx>.

³⁵⁰ Chris Lyddon, "Focus on Russia," *World Grain*, November 7, 2013, <http://www.world-grain.com/Departments/Country Focus/Country Focus Home/Focus on Russia.aspx>.

³⁵¹ Dorothy Adams and Yelena Vassilieva, *Demise of the State Grain Inspection Service* (Moscow: USDA, 2004), Voluntary Report.

³⁵² "Why Agroholdings Go Bankrupt. The Case of Razgulay," *Large Scale Agriculture* (2017). <https://www.largescaleagriculture.com/home/news-details/why-agroholdings-go-bankrupt-the-case-of-razgulay/> (accessed 2 February 2019).

farmland.³⁵³ ³⁵⁴ The Russian state owned up to 20 percent of its shares via the bank VEB, illuminating the state's links to the private sector.³⁵⁵ LLC Rusagro Group Of Companies (Headquarters in Tambov, Russia- a subsidiary of OJSC Rusagro Group) took over parts of the infrastructure. Another important wheat processing agent is PAVA (Headquarters in Barnaul, 3 flour production plants), largely based in Western Siberia, close to the Kazakh border, from where wheat supply is sourced. OJSC PAVA was quoted on the Russian Exchange until 2013 when backed by the Russian financial authorities, it pulled out from the exchange market due to lack of liquidity.³⁵⁶ PAVA, is one of the largest millers in the country, yet one of its branches filed for bankruptcy in 2015. Through its land-owning branch Russian Agricultural Division, the company controls more than 150,000 hectares of farmland.³⁵⁷ Russia is also home to Kirov's Mill, the largest flour milling plant in Europe (1,800 tones of flour daily). Other food-processing firms involved in food and meat production have invested in land property (e.g., Cherkizovo, Rusgrain Holding OAO, Agros), revealing the important vertical integration of Russian wheat milling firms into the sourcing of grain and landownership. With an output of 7,8 millions tones of flour per year, Turkey is also a substantial wheat processor of the region. 700 mills operate within the country, of which 50 are active in the export market, and 10 of which are large mills (Eriş Un Marmara Un, and Ulas Gıda, a subsidiary of the KAVUKCU Group).³⁵⁸ In 2012, the country was world leader of wheat flour exports, supplied by Russian and Kazakh wheat imports.³⁵⁹

In Africa, greater bread consumption has followed the development of private industrial mill operators, separately from the artisanal milling sector. Coastal regions in particular host large, modern mills while inland and central African regions rely on more traditional and smaller milling facilities. Port mills are often privately financed, supplied with U.S. and

³⁵³ Company Profile for Razgulay Group (Graz), *Bloomberg*, ed. Bloomberg Markets, accessed April 16, 2014, <http://www.bloomberg.com/quote/GRAZ:RM/profile>.

³⁵⁴ JSC Razgulay Group, "Index", *Razgulay Group*, accessed April 16, 2014, http://www.raz.ru/index_e.php.

³⁵⁵ Ilya Khrennikov, "Razgulay Advances as Vnesheconombank Boosts Stake: Moscow Mover" *Bloomberg*, January 9, 2013, <https://www.bloomberg.com/news/articles/2013-01-09/razgulay-gains-most-in-5-days-as-veb-boosts-stake-moscow-mover>.

³⁵⁶ Reuters Staff, "Pava says its shareholders approved company's liquidation" *Reuters*, 28 January, 2015, <https://af.reuters.com/article/commoditiesNews/idAFFWN0V700120150128>

³⁵⁷ "Grain Company Talking with Foreign Investors," *The Moscow Times*, March 30, 2009, <http://www.themoscowtimes.com/article/1009/42/375754.htm>

³⁵⁸ Meyer Sosland, "Focus on Turkey," *World Grain*, April 11, 2006, <http://www.world-grain.com/Departments/Country-Focus/Turkey/Focus-on-Turkey.aspx>.

³⁵⁹ Samet Serttas, *Grain and Feed Annual Report-Turkey* (Washington: USDA, 2012).

Australian wheat, and have European mill management or maintenance supervision. Many have their own wharfs and deep-water berths alongside their facilities.³⁶⁰ Logically, the most significant wheat importing country of Africa is also Africa's top flour producer: Egypt. Ranking for decades as the world top wheat importer with an estimated 10 million tons in 2013, Egypt has an important flour-milling sector. While the government (GASC, see *Trading Agents*) imports wheat into the country to sustain the subsidized bread program, private trading has been allowed since 1993, and Egyptian private-sector millers can purchase wheat directly on the foreign market. Volumes of wheat flour production are not officially available, yet estimated to be around 5 million tones yearly.³⁶¹ The Egyptian wheat-processing sector is divided into public (52 percent of the total milling capacity) and private sectors (48 percent): public mills managed by the government and small private mills (contracted private mills and industrial mills). In 2012, there were 126 wheat-milling facilities in public holdings, 105 private sector commercial mills, and 5000 village mills.³⁶² The case of Egypt will be discussed further in the chapter 2. EGYPTIAN TERRITORIES.

In the Asian region, the major wheat producers are India and China, with the latter listed as top wheat importer along with Indonesia and Japan, establishing these four countries as likely relevant agents of wheat processing. If India is an important wheat producer, yet the vast majority of wheat processing agents in the country are small, local stone mills and individuals practicing home wheat grinding, custom-milling *atta* flour (whole wheat flour); 40 to 45 million tones are produced yearly in this manner. There are about 1,000 medium to large flourmills in India as well as numerous small ones.³⁶³ Though large food companies selling branded and packaged wheat are gaining importance in urban areas, the commercial milling industry still uses far less wheat than domestic processing activities, and India's commercial production represents only 2 percent of the total *atta* flour market with 2,3 million tones produced in 2009, a number down by 4.2 percent from 2000.³⁶⁴ Domestic consumer goods giant ITC, a diversified conglomerate (Headquarters in Kolkata, 10 mills) involved in the tobacco industry, food

³⁶⁰ Jonathan Bradshaw, "Milling in Africa," *World Grain*, May 1, 2006, <http://www.world-grain.com/News/Archive/Milling-in-Africa.aspx>.

³⁶¹ Chris Lyddon, "Focus on Egypt," *World Grain*, December 5, 2013, <http://www.world-grain.com/Departments/Country-Focus/Country-Focus-Home/Focus-on-Egypt.aspx>

³⁶² Salah Mansour, *Grain and Feed Annual Report-Egypt* (Washington: USDA, 2012), Required Report.

³⁶³ Chris Lyddon, "Focus on India," *World Grain*, April 29, 2013, <http://www.world-grain.com/Departments/Country-Focus/Country-Focus-Home/Focus-on-India-1.aspx>

³⁶⁴ Santosh Kumar Singh, *Grain and Feed Annual Report-India* (Washington: USDA, 2013), IN3012.

processing and distribution, packaging and real estate, appears to be the largest commercial wheat flour processing agent by far.

Recent data on the wheat milling sectors of the Asian region is scarce. The last available figure for China, the world's largest domestic flour miller, dates from 2008: an output of 79 million tons of wheat flour, a number up by 18.5 percent from 2000.³⁶⁵ China's wheat milling industry has experienced a transformation from a myriad of small local mills under communist rule to newly built commercial milling facilities catering to food processing companies that target the country's burgeoning urban population. In 2005, there were 2,815 active flour millers, according to China National Association of Grain Sector.³⁶⁶ There are three key agents of the milling industry in China. The first wheat flour producer in the country is Wudeli Group (Headquarters in Shijiazhuang) with five massive mills located close to Beijing, in China's most important wheat-growing provinces (Hebei, Henan and Shandong). Wudeli Group is privately held and not traded on the stock exchange. China's largest domestic food importer and second wheat processor is the state-owned company China National Cereals, Oils and Foodstuffs Corporation (COFCO, Headquarters in Beijing) that operates 10 mills in six provinces (Henan, Jiangsu, Shanghai). Finally, Asia's largest agribusiness group, Singapore-based Wilmar Industries (11 mills), has aggressively developed in China over the past decade by buying large mills in China's highly urbanized Guangdong province and building new plants in the wheat-growing zones. These companies are only the most significant in terms of processed wheat volumes, as there are 100 other companies processing over 100,000 tones of wheat per year, a growing number compared to the 40 companies in 2005.³⁶⁷

After China, Indonesia ranks as the most important wheat importer of the region, with 7 million tons of wheat grain imported yearly. There are 10 industrial milling facilities in the Indonesian archipelago. The country claims to hold the world's largest flourmill in the port of Jakarta, owned by Bogasari Flour Mills. Bogasari Flour Mills, a national company privatized in the 1990s, (Headquarters in Jakarta, 2 mills) is the major national wheat processor and a subsidiary of Indofood Sukses Makmur, a food processing company. Sriboga Raturay is the

³⁶⁵ "Flour Output Rises in Developing Nations," *Food Business News*, November 19, 2013, <http://www.foodbusinessnews.net>.

³⁶⁶ World Grain Staff, "Focus on China," *World Grain*, November 1, 2008, <http://www.world-grain.com/Departments/Country-Focus/China/Focus-on-China.aspx>.

³⁶⁷ David McKee, "Sub-Saharan Surge," *World Grain*, November 1, 2010, <http://www.world-grain.com/news/newshome/features/2010/11/sub-saharansurge.aspx>.

second largest wheat miller (one mill, Java).³⁶⁸ Behind China and Indonesia, Japan is Asia's third-biggest wheat importer. Because the country's agriculture ministry controls overseas wheat purchases and domestic sales, flour millers purchase wheat from the Japan Food Agency, process it, and sell the wheat flour on the domestic market to food processing companies and households. There are 96 companies in the flour-milling sector, operating 119 mills that produce 4.82 million tonnes yearly. Four companies produce 80 percent of this wheat flour production. Nisshin Flour Milling Inc., listed in the Tokyo Exchange, is a subsidiary of Nisshin Seifun Group Inc. (Headquarters in Tokyo, 7 mills), a private company that produces and sells flour, fodder, processed foods, and medicines, building up an international flour-milling network.³⁶⁹ Also listed in the Nikkei, the second miller is Nippon Flour Mills Co. (Headquarters in Shibuya, Tokyo, 2 mills), a subsidiary of the large conglomerate Mitsui Group, an industrial food processor and grain trader involved in many other sectors (e.g. banking).³⁷⁰ Showa Sangyo Co. and Nitto-Fuji are the two other important millers, quoted on the Tokyo Exchange as well.³⁷¹

As bread, pasta and cakes are the most consumed forms of wheat, baking and pasta making are thus regarded as activities within the wheat-processing sector. Further processing includes utilization of flour by the food industry. Because most agro-business companies are not involved in the direct processing of wheat into flour and are consumers of flour as an end product, they are considered in the present analysis as secondary agents, and the processing of bread and other by-products is considered a sub-system of the grain chain. It is worth mentioning, however, that among the international leaders of the agro-food business (Nestlé, ADM, Altria-Philip Morris-Kraft Foods, Pepsico, Unilever, Tyson Foods, Cargill, CocaCola, Mars, Groupe Danone, ConAgra, Anheuser-Busch, Sara Lee, General Mills, Dean Foods), grain traders and millers feature prominently.³⁷²

³⁶⁸ Teresa Acklin, "Corporate Profile: Bogasari Flour Mills: Massive Flour Milling Expansion in Indonesia," *World Grain*, January 1, 1996, <http://www.world-grain.com/News/Archive/Corporate-Profile-Bogasari-Flour-Mills-Massive-flour-milling-expansion-in-Indonesia.aspx>.

³⁶⁹ With bases already operating in New Zealand, China (Shin Nisshin Seifun Foods), Thailand (Nisshin-STC Flour Milling Co.), Canada and U.S.A. (Miller Milling).

³⁷⁰ Bloomberg Businessweek, "Company Profile Nippon Flour Mills Co Ltd," *Markets* (2014) (accessed 28 April 2014), <https://www.bloomberg.com/quote/2001:JP>.

³⁷¹ Chris Lyddon, "Focus on Japan," *World Grain*, February 5, 2013, <http://www.world-grain.com/Departments/Country-Focus/Country-Focus-Home/Focus-on-Japan-1.aspx>.

³⁷² Anthony Weis, *The Global Food Economy: The Battle for the Future of Farming* (New York: Palgrave Macmillan, 2007), 80.

The preeminence of supra-national corporations, the significance of wheat in the modern food system and the integration of trading and processing agents are only a few of the several key points illustrated by such a rapid outline. This overview offers a summary of the most relevant agents in the flour-milling sector, as an attempt to uncovering their economic characteristics, their role within the grain chain, and their position in global food system mechanisms. It can be asserted that the milling of wheat is largely a private sector affair. A few governments, however, directly or indirectly control their national milling industry by actions such as adjusting the wheat supply and the prices of the flour leaving the domestic flour mills or requiring millers to sell their flour to registered customers. It also appears that close commercial links exist between wheat-trading interests, flour production and the food industry. For instance, the development of the flour milling industry in developing countries is tightly related to the economic interests of developed countries firms (grain-trading, milling technologies). Furthermore, several of the largest milling facilities of the world are located in countries that produce little wheat. Many such mills are property of grain traders from wheat exporting regions.³⁷³ In this sense, because mills institutionalize local demand for bread and wheat products, their physical presence underlines the prominence of grain imports. In a political economic framework, processing agents and their related facilities function as symbolic yet spatial frontlines of wheat consumption.

Distribution Agents: Public Agencies, Food Retailers

With one hand stabilizing racks of loaves on his head, with the other maneuvering his bicycle in Cairo's extreme traffic, the *agalati* —bread carrier— making his way from the bakery towards home and restaurant deliveries materializes the activity of one of many agents involved in the distribution of food worldwide.³⁷⁴ Unlike other comparatively opaque sectors of the chain, food distribution is, if not transparent, a visible segment of the food system, and in this respect, politically sensitive. Bread, pasta, and cakes: these are the main food commodities produced from wheat flour. Among these products, bread is a staple food for a large portion of the world population, a fact that substantiates an examination of its distribution agents.³⁷⁵ In fact, the supply and distribution of bread and flour is a matter of intense concern to state authorities

³⁷³ Byerlee, "The Political Economy of Third World Food Imports: The Case of Wheat," 320.

³⁷⁴ Lorena Rios, "Delivering Bread in Cairo Is a Balance of Life and Death," *Vice*, April 4, 2015, https://munchies.vice.com/en_us/article/xy73eq/delivering-bread-in-cairo-is-a-balance-of-life-and-death.

³⁷⁵ FAO/WHO Expert Consultation, *Carbohydrates in Human Nutrition* (Rome: FAO, 1997).

worldwide, and has prompted the development of rules and procedures to control weight, pricing, marketing and allocation of the staple food.³⁷⁶ Both public institutions (city and local governments, state agencies, aid institutions) and private structures (retailing firms, wholesalers, retailers, NGO's) are distribution agents that undertake the task of bringing the commodity to consumers.

Public distribution structures and schemes are largely beholden to the food policies determined by national governmental entities. Such governmental interventions achieve social purposes by manipulating the prices of the staple food, forming the legal framework of public distribution agents. Through these, the professed aim of authorities is to offer food security through guaranteed access to a given quantity of sustenance to poorer populations. Explicit government-financed transfers are allocated either by reducing the price of food below market prices or by subsidy programs (e.g. school lunches, food stamps, and coupons).³⁷⁷ While there is no estimated percent of the world population benefiting from these programs, these safety nets constitute an important characteristic of the current world food system, both in developed and developing economies.³⁷⁸ The subsidization of bread and wheat flour appears to be more frequent in the developing countries of the Southern hemisphere.³⁷⁹ Because public food distribution predominantly targets city dwellers, most recipients of public food supply are low-income urban groups.³⁸⁰ This fact has urbanization implications that will be subsequently addressed in this work. It should be noted that national programs of food subsidies are not considered as food aid.³⁸¹ Food aid is an “instrument of domestic agricultural policy, development assistance, and foreign and trade policies, managed though both bilateral and multilateral agencies with heavy involvement from the private non-profit sector as well as profit seeking agribusiness and maritime interests.”³⁸² The characteristics of food aid are its

³⁷⁶ Pelizzon, "Grain Flour, 1590-1790," 87.

³⁷⁷ Per Pinstrup-Andersen, *Food Subsidies in Developing Countries: Costs, Benefits, and Policy Options*, ed. International Food Policy Research Institute (Baltimore: Johns Hopkins University Press, 1988), 21.

³⁷⁸ Lauren Power, "Food and Farm Subsidies in the Global Food System," *Future Directions*, October 3, 2013, <http://www.futuredirections.org.au/publication/food-and-farm-subsidies-in-the-global-food-system/>.

³⁷⁹ Byerlee, "The Political Economy of Third World Food Imports: The Case of Wheat," 323.

³⁸⁰ Harold Alderman and Joachim von Braun, *The Effects of the Egyptian Food Ration and Subsidy System on Income Distribution and Consumption* (Washington: International Food Policy Research Institute (IFPRI), 2002).

³⁸¹ Christopher Barrett and Daniel Maxwell, *Food Aid After Fifty Years: Recasting Its Role* (London: Routledge, 2005), 5.

³⁸² *Ibid.*, 1.

international sourcing, its donation component, and the fact that it is specifically given in the form of food or aimed at the provision of food (see Food Regimes).

Of the countries running extensive state-sponsored food assistance programs, many eliminated direct food subsidies during the 1990s on favor of cash transfers; only a few administrations maintain direct public spending on bread and wheat flour subsidies.³⁸³ The World Bank determines seven categories of such national food-based programs. Broad-spectrum subsidies including wheat flour and bread amongst other foods come in the form of food stamps allowances (Honduras, Jamaica, Sri Lanka, U.S.A.), ration programs (Egypt, India, Indonesia, Mexico, the Philippines), take-home food allowances (Bangladesh, Ethiopia), supplementary feeding programs (Bangladesh, Chile, Peru), school feeding programs (Bangladesh, Costa Rica), universal subsidies (Indonesia, Pakistan, South Africa) and direct subsidy programs.³⁸⁴ In 2014, direct subsidized programs of wheat flour and bread were ongoing in Algeria, Bangladesh, Egypt, Iran, Jordan, Morocco, Tunisia and Yemen, countries largely dependent on foreign imports of grain.³⁸⁵ Public agencies control the variables of public distribution: ration (quality, quantity, quota, price), procurement (purchased amount, origin) and allocation method (location, type of retail).³⁸⁶ The food is distributed via a network of cooperative shops or ration shops; state-controlled outlets located in villages and cities that are open during specified days and times where a given quantity of food is provided at below market price.³⁸⁷ ³⁸⁸ The ration-shops may be located in private groceries that sell both subsidized consumer goods supplied by the state and non-subsidized consumer goods. If national trading authorities purchase grain directly, the subsidized wheat is sold to private bakeries that produce and sell the bread at a lower price.

Food subsidies are a controversial topic. While in developed countries, feeding programs are largely provisioned through surplus food generated by farm programs, in emerging countries, these programs often rely on imports and the financing costs are a strain on national

³⁸³ Farrukh Iqbal, *Sustaining Gains in Poverty Reduction and Human Development in the Middle East and North Africa* (Washington, D.C.: The World Bank, 2006), 62.

³⁸⁴ Margaret E. Grosh, *For Protection and Promotion: The Design and Implementation of Effective Safety Nets* (Washington, D.C.: World Bank, 2008), 482.

³⁸⁵ Food and Agriculture Organization, *Country Brief on Algeria* (Rome: FAO, 2014).

³⁸⁶ Raisuddin Ahmed, *Food Grain Supply, Distribution and Consumption Policies within a Dual Pricing Mechanism. A Case Study of Bangladesh* (Washington: International Food Policy Research Institute, 1979), 15.

³⁸⁷ Alderman and von Braun, *The Effects of the Egyptian Food Ration and Subsidy System on Income Distribution and Consumption*, 17.

³⁸⁸ Timothy Besley and Ravi Kanbur, "Food Subsidies and Poverty Alleviation," *The Economic Journal* 98, no. 392 (1988): 712.

economies. These costs increase over time, and once implemented, these programs are difficult to eliminate due to their inherent political risks. The diversion of funds into food subsidies also bears implications for local production, depressing prices and discouraging rural agricultural investments.³⁸⁹ But precisely because many countries are not self-sufficient and depend on imports, food subsidies offer a social protection and a safety net against rising food prices for their poorer populations. While pricey, safety nets have proven to significantly impact the cost of living of the poor and middle classes by redistributing income. By supporting primarily urban populations, social protection programs are often associated with urbanization, national development and industrialization, and considered as redistributive welfare. Subsidies therefore play an essential role in political stabilization. Many governments “regulate indirectly the entire food cycle - inputs and outputs, domestic sales, exports, public procurement, storage and distribution, price controls and subsidies” via their public distribution agents.³⁹⁰

Distribution agents of the private sector are responsible for the sale of food for personal or household consumption. In recent decades, food transactions have increased alongside world population growth and expanding global demand. With food retailing accounting for 40 percent of all retail sales worldwide, the considerable leverage of the retail sector over the world food system is evident.³⁹¹ ³⁹² The private distribution system of basic foodstuffs including wheat and bread consist of formal and informal, traditional and modern structures involved in supply (intra-urban transport, wholesale and retail markets, planned or spontaneous markets; commercial agents such as shops, supermarkets, hypermarkets, shopping centers; restaurants, snack bars and street vendors).³⁹³ Private distribution agents of bread and wheat can be differentiated and categorized according to their size and economic structure.

At the smallest scale, within the informal food sector, street vendors are the most prevalent and visible agents of distribution (e.g., bread vendors operating mobile carts), representing small units of retail typical of public spaces in cities of developing countries. Their bread supply can be home-baked bread or purchased from larger retailers. Similarly, hole-in-

³⁸⁹ Richard Pearce, *Safety Nets to Protect Consumers from Possible Adverse Effects* (Rome: Food and Agriculture Organization of the United Nations, 2000).

³⁹⁰ Report of the World Commission on Environment and Development: *Our Common Future* (New York: The United Nations, 1987), 45.

³⁹¹ FAO, “Food Retail” in *Agribusiness Handbook* (Rome: Food and Agriculture Organization, 2009), 7.

³⁹² Joachim Von Braun, *The World Food Situation: New Driving Forces and Required Actions* (Washington, D.C.: International Food Policy Research Institute, 2007), 5.

³⁹³ Olivio Argenti and Cecilia Marocchino, *Urban Food Supply and Distribution in Developing Countries and Countries in Transition* (Rome: Food and Agriculture Organization of the United Nations, 2005), 7.

the-wall bakeries, tiny retailing environments and family-run shops (from 4 to 100 m²) sell bread and baked products. Acknowledged by the Food and Agriculture Organization as “micro entrepreneurs,” small vendors are only partially recognized legally, sometimes as members of trading organizations, cooperatives and unions. Although mostly unrecorded and unregulated small-scale activities, these enterprises function via hired workers, family labor and self-employment.³⁹⁴

At a medium scale, independent grocers, convenience stores, wholesale and retail markets sell local and imported grain, flour and bread, in intermediate size premises (below 400 m²). Retail markets may be larger, formal or informal, and their internal organization, structure, size and layout vary. In many countries, because the bulk of wheat-based products are manufactured at specialized factories and bakeries, bread is sold in conventional medium-size shops and bakeries or food stores that have in-store bakeries and small processing facilities.

At a large scale, supermarkets and hypermarkets are sizeable stores (400 to 2,500 m²) with at least 70 percent of selling space dedicated to food and very large areas for access and parking. Bread is only one of many items provided in these shops. Supermarkets mostly belong to a greater retail firm, linked to the food industry and distribution centers. Large retail firms are usually fully integrated into grocery wholesaling, meaning the firms control and own their distribution warehouses. Chains account for an important share of sales in most developed and many developing countries, and further consolidation among food retail operations has accompanied the steady replacement of traditional, small-scale family owned food stores by supermarkets. Globally, among the 100 firms listed on the international stock exchange as food-retailers, the five retail leaders holding 13 percent of global food sales are identified by scholars as Transnational Supermarket Chains: Walmart (Headquarters in Bentonville, U.S.A., 2 million employees), Carrefour (Headquarters in Boulogne-Billancourt, France, 350.000 employees), Tesco (Headquarters in Chestnut, U.K., 470.000 employees), Metro (Headquarters in Dusseldorf, Germany, 280.000 employees) and Kroger (Headquarters in Cincinnati, U.S.A., 330.000 employees).^{395 396} In industrialized countries, the consolidation of the retail sector via the rise of supermarket chains has been ongoing for the past fifty to eighty years. In developing

³⁹⁴ Gisèle Yasmeen, *Workers in the Urban "Informal" Food Sector: Innovative Organizing Strategies* (Rome: Food and Agriculture Organization of the United Nations, 2001).

³⁹⁵ Jason Konefal, Michael Mascarenhas, and Maki Hatanaka, "Governance in the Global Agro-Food System: Backlighting the Role of Transnational Supermarket Chains," *Agriculture and Human Values* 22, no. 3 (2005).

³⁹⁶ Jim Bertram, *Food for Thought. Overview, Analysis, and Trends in the Food and Food Retailing Industries* (Chicago: William Blair Investment Banking, 2014).

countries where food retailing is dominated by the traditional form, the emergence of this type of food procurement has been particularly pervasive. Large international food retailers moved into emerging economies in Asia, South America, Eastern Europe, and the Middle East with mitigated success rates.³⁹⁷ Researchers claim that the global importance of large world retailers, the influence of Transnational Supermarket Chains, and the sort of private governance these brings along are restructuring the whole food system in a way that raises social and environmental issues and that might “further exacerbate inequalities in health, social welfare, and ecological conditions.”³⁹⁸

Lastly, Non-Governmental Organizations (NGOs) function as private agents of food distribution, albeit secondarily because their operations are contingent on local governments’ approval and their structures depend on private findings, both for cash donations from businesses and individuals and for commodities from food producers, processors, wholesalers, and retailers. Established as responses to emergency situations that became long-lasting institutions, NGOs are indirectly involved at the wholesale level (food banks, food rescue programs) and at the retail level (food pantries and soup kitchens). There are a myriad of NGOs engaged in food assistance worldwide, and the total amount of emergency food programs operated is not known (more than 150,000 in the United States alone). About 1,400 partners in the network of civil society organizations collaborate with the World Food Program (WFP) of the United Nations including international and local NGOs, as well as community-based organizations. They distributed a total of approximately 2.3 million metric tons, or 74 percent of WFP food in 2013.³⁹⁹ The WFP food ration is adapted to the benefiting populations, but always contains 400g of cereal flour, rice or bulgur. The most important NGOs in terms of volume distributed are World Vision International (based in the U.S.A., Christian organization), CARE International (international, non-sectarian) and Save the Children International (based in London, non-sectarian).⁴⁰⁰

³⁹⁷ Arieh Goldman, S. Ramaswami, and Robert E. Krider, "Barriers to the Advancement of Modern Food Retail Formats: Theory and Measurement," *Journal of Retailing* 78, no. 4 (2002).

³⁹⁸ Konefal, Mascarenhas, and Hatanaka, "Governance in the Global Agro-Food System: Backlighting the Role of Transnational Supermarket Chains," 300.

³⁹⁹ W.F.P. Partnership with N.G.O.s and National Red Cross and Red Crescent Societies, *2012 Facts and Figures* (Rome: The World Food Program, 2012), <http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp264309.pdf>

⁴⁰⁰ Lynn Frandsen Lawry, *Guide to Nongovernmental Organizations for the Military*, ed. University of the Health Sciences ([Bethesda, MD]: International Health Division, Center for Disaster and Humanitarian Assistance Medicine, U.S. Dept. of Defense, 2009), 122.

From government agencies to private global retailers and NGOs, from hole-in-the-wall public bakeries, shops, street sellers, to corporate distribution industries and supermarkets, this overview of the private and public agents of the food distribution sector involved in the supply, wholesaling and retailing of food attests to their economic and political relevance as well as their imperative role in food security and enabling populations to meet their food requirements.

One of the crucial matters that arise from the study of agents within the food distribution system worldwide regards equity of physical and financial access to means of subsistence, of which distributive systems appear as the material manifestation. This pertains to broader issues of power allocation, public governance and corporate control which translate in several spatial scales: globally with the geographical disparities observed in food distribution flows between areas of production and consumption; nationally with the influence of food accessibility on population migrations' incentives towards cities, and locally with the territorial distribution of food outlets in urban and rural areas. These are spatialities of food distribution circuits that address the correlation of territorial ordering with the management of population, which Michel Foucault refers to as "apparatuses of security" in *Security, Territory, Population*.⁴⁰¹ Food distribution thus emerges as a particularly illuminating section of the food chain in which biological, political and economic contingencies deploy space and territory at the nexus of nutrition, population and power.

Consumption Agents: Humanity

End-consumers: the entire food and grain chain converges towards them. In fact, domestic consumers are the principal agents of wheat and bread consumption at the end of the food chain.⁴⁰² Food is literally a matter of life or death for us all, and human sustenance relies greatly on wheat, as the crop contributes 41 percent of the total dietary calories and proteins consumed globally and 699 million tones were consumed for food in 2013.⁴⁰³ Current dynamics of wheat consumption as well as behaviors of end-consumers of the commodity are well documented, especially the agency of consumers in social and economic structures.⁴⁰⁴ In the

⁴⁰¹ Foucault, *Discipline and Punish*, 30.

⁴⁰² Food and Agriculture Organization, *FAO Cereal Supply and Demand Brief* (Rome: FAO, 2014).

⁴⁰³ Bekele Shiferaw et al., "Crops That Feed the World. Past Successes and Future Challenges to the Role Played by Wheat in Global Food Security," *Food Security* 5, no. 3 (2013).

⁴⁰⁴ Atkins and Bowler, *Food in Society*, 117.

extensive existing literature about human nutrition, most studies and official reports divide consumption tendencies according to economic criteria of developed and developing nations, also establishing a spatial distinction between urban and rural areas. Yet, since 1960, the change from a rural, food-productive world population to a more urban, non-agricultural one has affected diets and food consumption beyond territorial boundaries. On a global scale, wheat is a commodity predominantly used for food (71 percent), with less than 20 percent being used for animal feed (indirect meat and milk production, poultry, fish farms) and 0.9 percent for biofuels.⁴⁰⁵ In higher income countries, average consumption is 190 kg of wheat per capita/year, 50 percent directly and 38 percent as feed. In developing countries, only 70 kg of wheat is consumed per capita/year of which 84 percent is consumed directly as food and 6 percent as feed (in 2005–2009 period). Keeping pace with population growth, food, feed and biofuel use of wheat are expected to increase.⁴⁰⁶

Regarding current patterns of consumption, identifiable global trends emerge. On the one hand, domestic wheat consumption and per capita use of cereals and grain-based products of middle and high-income populations in developed countries decreased with changing consumer preferences and the greater availability and choice of meat, vegetables and fruits. This trend is largely related to the way diets evolve with higher revenues: from more rice and wheat to more vegetables and a general dropping in portion sizes as incomes rose.⁴⁰⁷ Geographers like David Harvey yet emphasizes that food accessibility and choice is illusory as food industrialists rather than consumers direct the type of food products sold on the market, and that the disintegration of constraints related to supply—famine, seasonality—is the result of capitalism trends towards a more flexible production.⁴⁰⁸ On the other hand, in developing countries, wheat consumption and trade have risen (4.4 percent annually). This growth is also attributed to lifestyles changes and economic improvements of an increasingly urbanized population. In emerging economies too, consumers are diversifying their diets as income and urbanization grow. Traditional root vegetables and coarse grains are replaced by rice and wheat, which are in turn supplemented by meat and milk products, fresh vegetables, and fruit. Studies underline

⁴⁰⁵ Organisation for Economic Co-operation Development and Food Agriculture Organization of the United Nations, *OECD-FAO Agricultural Outlook 2011–2020* (Paris: OECD, 2011)..

⁴⁰⁶ Department of Agriculture Economic Research Service United States, *Changing Structure of Global Food Consumption and Trade: Income, Demographic Shifts, and Consumer Perceptions Change Global Food Consumption Patterns and Trade* (Washington, D.C.: USDA Economic Research Service, 2001).

⁴⁰⁷ Adam Drewnowski and Barry M Popkin, "The Nutrition Transition: New Trends in the Global Diet," *Nutrition reviews* 55, no. 2 (1997): 37.

⁴⁰⁸ Harvey, *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change*, 347.

“the tendencies of low-income families to spend more of their additional income on food and rural-to-urban migration resulting in changes in diets towards higher-protein grains and livestock products” as causes for the increase in food and feed consumption.⁴⁰⁹ While diet differences persist between rural and urban areas, with rural populations consuming more cereals, roots and grain, and urban populations consuming more meat, vegetables and fruits, the general trend of rice and wheat supplanting these roots and grains (corn, sorghum, barley, millet) is noticeable everywhere. Wealthier urban populations also consume more animal products and prefer easy-to-prepare wheat products to traditional staples and rural migrants tend to adopt these urban dietary patterns, reinforcing the trend. Furthermore, the increased presence of meat and bread in diets of developing and emerging economies are factors that have steadily pushed wheat consumption up. In countries where meat and bread were inherited as colonial preferences and are not part of traditional diets, these are often viewed as desirable items associated with luxury. Yet in several developing countries, bread has become a staple food and a readily accessible processed item. In “The Wheat Trap,” Gunilla Andrae and Björn Beckman argue that the penetration of wheat into local markets and consumption patterns is primarily responsible for making bread attractive. They maintain that this effect is exacerbated by relatively cheap prices compared to domestic food items, prices that are supported by subsidies to farmers in producing countries.⁴¹⁰ Wheat dissemination has been observed throughout Asia, North Africa and Latin America. While diet changes are related to lifestyle and habit modifications, there are underlying structural economic and political transformations related to the consumption of wheat and the world market for it as a commodity. Experts suggest that wheat consumption and imports in the developing world have been intentionally driven through lobbying and policy interventions by influential interest groups. The weight of the wheat-processing sector in particular, in conjunction with exporting interests of producing countries, the milling industry, grain exporters and shipping industries, have shaped national policies towards wheat exports: “To a large extent, all of these interest groups reinforce each other in promoting wheat consumption.”⁴¹¹ Consistent with the rising significance of the milling sector, the growth rates of per capita wheat consumption have increased, especially in Africa, Eastern Europe and the former Soviet Union, and to a minor extent in Southeast Asia

⁴⁰⁹ Commodities trade division, *Agricultural Commodities: Profiles and Relevant W.T.O. Negotiating Issues* (Rome: Food and Agriculture Organization of the United Nations, 2003).

⁴¹⁰ Andrae and Beckman, *The Wheat Trap*.

⁴¹¹ Byerlee, “The Political Economy of Third World Food Imports: The Case of Wheat,” 312.

and the Pacific, Mexico, Central America and the Caribbean (from 1996 to 2005). The countries that currently consume the most wheat are China, India, Russia, the U.S.A., Pakistan, Turkey, Iran, Egypt, Brazil and Ukraine. Among these, Asian and Middle-Eastern nations have been undergoing rapid urban growth.

In conjunction with social, political and economic factors, urbanization is recognized as one of the most influential determinants of life style and diet changes, resulting in major shifts in fertility and mortality patterns, physical activity, and body composition.⁴¹²In fact, urbanization and wheat consumption have followed similarly increasing curves in the developing world. There are other occurrences potentially correlated to spatial aspects. For instance, the geographical unevenness of food flows in relation to economic power and globalization, the regulation of urban food consumption by distribution agents (e.g. state, firms, NGOs), or the relationship between changes in food consumption patterns and agricultural land requirements are only a few of these factors identified along the commodity chain. Although behavioral and nutritional shifts associated with urbanization are well known, the spatial component of the underlying relationships between the grain chain and the built environment is little studied. Because the conjunction of the political economy of grain, wheat consumption, and its effects on the organization of space are the primary interest of this study, consumption agents and trends offer a much-needed outline to pursue the examination of the physical effects of food consumption on the built environment.

Food Regimes

Critical analyses of the political economy of food bluntly define the current world food system as one ruled by rich industrialized countries that thrust poorer nations into dependency and debt.⁴¹³ In their important work "Agriculture and the State System" Harriet Friedmann and Philip McMichael formulate a pivotal world-historical perspective on the strategic use of agriculture and food, and the concept of food regimes.⁴¹⁴ Taking into account the roles of financial capital, labor and industrialization of agriculture, and modes of capital accumulation at the global scale, these political economists identify food regimes as "shifts in the patterns of international trade that have evolved from mercantile and colonial structures to an increasing

⁴¹² Barry M. Popkin, "Urbanization, Lifestyle Changes and the Nutrition Transition," *World Development* 27, no. 11 (1999).

⁴¹³ Tansey and Worsley, *The Food System - a Guide*, 6.

⁴¹⁴ Harriet Friedmann and Philip McMichael, "Agriculture and the State System: The Rise and Decline of National Agricultures, 1870 to the Present," *Sociologia Ruralis* 29, no. 2 (1989).

domination by the purchasing and organizational power of Transnational Corporations and by the regulatory systems of the World Trade Organization” and other institutions.⁴¹⁵ Friedmann and McMichael argue that the role and the activities of international financial agents (e.g. International Monetary Fund, World Trade Organization) have been central to the emergence of current food regimes, a perspective that overlaps with the commodity chain analysis methodology, as it identifies precisely the financial and governmental actors and their role within the food regimes. Providing a structured interpretation of global food trends since 1870, a chronological examination of the political economy of food through food regimes illuminates present-day mechanisms, preceding and contextualizing the investigation of financial, governmental and institutional agents involved in the international relations of food in general and for wheat production, processing and consumption in particular.

The first food regime (1870–1930s) was based on colonial grain imports to Europe to feed a growing industrial middle-class (e.g., colonial Britain outsourced its food production, forcing monocultures upon its colonies while compromising their local food supply).⁴¹⁶ Africa, South America and Asia supplied unprocessed foods and materials to North America and Western Europe. The growing European demand for wheat also fostered grain production in the U.S.A., Canada, Australia, and Argentina, a legacy that endures today.⁴¹⁷ This regime collapsed with the recession of the 1930s, though it established the culture of large-scale farmed land and monoculture, with capital-intensive farms, hired local workers and expatriates management, a model replicated by contemporary agribusiness corporations.

The second food regime (1950–70s) saw the rise of a post-WWII international food order originated in the U.S. New Deal commodity programs, and chronic grain surpluses re-routed in the form of subsidized exports into the world economy. These exports circulated through the U.S. realm of postcolonial states to formerly self-sufficient agrarian societies. The specific mechanisms of these distributions were designed for the first time in the Marshall plan for foreign aid to Europe, later adjusted to the Third World, and then consolidated by international agreements into the world food order.⁴¹⁸ In the run for increased crops productivity, agriculture became gradually specialized and standardized, solidifying the

⁴¹⁵ Atkins and Bowler, *Food in Society*, 20.

⁴¹⁶ See McMichael, "A Food Regime Genealogy."

⁴¹⁷ Harriet Friedmann, "The Political Economy of Food: The Rise and Fall of the Postwar International Food Order," *The American Journal of Sociology* 88, (1982): 257.

⁴¹⁸ Harriet Friedmann, "The Origins of Third World Food Dependence," in *The Food Question: Profits Versus People*, ed. H. Bernstein et al. (London: Earthscan, 1990), 13-31.

intertwined relationship between national food producers and global industrial corporations. The resilience of the food order after the rebuilding of Europe lies in the innovative design of food aid, both as a solution for surpluses and as a tool for leverage on the international stage.⁴¹⁹ Reconstruction of European agriculture incorporated the promotion of meat diets and livestock wheat consumption, leading to a constant demand for cereal imports, a strategy later replicated in developing countries. Also dubbed “Food for Peace,” the U.S. Public Law PL480 has been the legal instrument for food aid through surplus clearance since 1958, operating alongside an agenda to create new markets for North American wheat and promote capitalist development in agrarian countries during the construction of the free world. By the 1970s, the European Common Agricultural Policy had replicated the American system in its own agriculture policies, and the EU then shifted from importing to exporting cereals, marking the decline in the geopolitical hegemony of America. What Friedmann terms the “wheat complex” is one of the key segments of the post-war world food regime with political origins and spatial consequences that reorganized relations between poor and wealthy national economies and institutionalized grain dependency of Southern countries.⁴²⁰

The oil crises of the early 1970s, with a global recession, the termination of the Bretton Woods monetary convertibility, rising grain prices, excessive costs of farm subsidies, and the clash between state-regulated agriculture and corporate pressure ended the second food regime and initiated the third food regime (1980s–present).⁴²¹ While the termination of certain EU import policies (e.g. the Common Agriculture Policy) led the main players of the food trade (U.S.A., EU, Japan) to the verge of a trade war in 1992, it also redirected export channels towards the developing world. At the time, poorer countries hoping to drive domestic industrialization absorbed 78 percent of all American wheat exports. Today, if America is no longer the main exporter of food aid, decades of heavy debt service, structural adjustment, global market integration, and an increasing influence of the main financial organizations and other international institutions intensified developing countries’ dependence on cheap food imports.⁴²² There are several interpretations of the nature of a third food regime. One of the prevailing

⁴¹⁹ Harriet Friedmann, “The Political Economy of Food: A Global Crisis,” *New Left Review* 1/197, (1993): 29–57.

⁴²⁰ Harriet Friedmann, “Distance and Durability: Shaky Foundations of the World Food Economy,” *Third World Quarterly* 132, (1992).

⁴²¹ The Bretton Woods System, through the IMF, set the international monetary system based upon the US dollar, which was pegged to gold. On August 15, 1971, the United States unilaterally terminated monetary convertibility.

⁴²² Anthony Weis, “The Perilous Dependence on Cheap Food Imports - Food and Market Approaches,” Discussion paper, ed. Transnational Institute (Amsterdam: The Transnational Institute, 2012), 1–7.

tentative analyses characterizes the current food regime as an increased global trading of food, the consolidation of capital in food manufacturing, the rise of biotechnology, consumer fragmentation and diet changes, all on the backdrop of declining farm subsidies, state deregulation and urbanization.⁴²³ Richard Le Huron in *Globalized Agriculture : Political Choice* debates how policies, political choices and economic regulatory processes intersecting with contemporary agriculture have resulted in today's global food order and the globalization of the agro-food system. Recent research concluded that the third food regime is governed by a neoliberal mode and that "financial sector and private capital markets have become a major source of influence (...) over the global food system."⁴²⁴ Based on this interpretation, the correlated role of financial and institutional agents, while predominantly constrained to economic programs that do not appear directly related to food matters, is in fact pivotal.

Economic And Governance Agents

Some sixty years ago, the first Director-General of the Food and Agriculture Organization of the United Nations (FAO), Sir John Boyd Orr, adopted a head of wheat with the Latin maxim *Fiat Panis*, "Let there be bread," as the emblem for the international agency. While such a piece of trivia may seem irrelevant to a world food system analysis, this symbol highlights manifest power dynamics of the current food regime.⁴²⁵ To select wheat and bread as insignias can be primarily interpreted as a natural expression of the FAO forefathers' western food culture, in which these elements are basics of human nutrition. Yet the specific choice of that cereal and the authoritative form of the motto identify production and trade of wheat as the solution to eradicating global hunger and poverty, the organization's chief missions.⁴²⁶ ⁴²⁷ Today, imported wheat is integrated into ordinary dietary staples worldwide, and the emblems of an agency that was the first of a post-war generation of international governance organizations influencing and influenced by economic, political, and ideological factors hardly appear arbitrary in retrospect. In the historical context of today's food regime and the strategic role of agriculture

⁴²³ Richard B. Le Heron, *Globalized Agriculture: Political Choice* (Oxford: Pergamon Press, 1993).

⁴²⁴ Burch and Lawrence, "Towards a Third Food Regime: Behind the Transformation," 268.

⁴²⁵ Lucy Jarosz, "Defining World Hunger: Scale and Neoliberal Ideology in International Food Security Policy Discourse," *Food, Culture and Society* 14, no. 1 (2011).

⁴²⁶ The United Nations Conference on Food and Agriculture took place on the initiative of the United States' President Franklin D. Roosevelt at the Homestead Hotel, Hot Springs, Virginia, from May 18 to June 3, 1943. It is considered as the founding event of the FAO.

⁴²⁷ Food and Agriculture Organization, *F.A.O., the First 40 Years* (Rome: Food and Agriculture Organization of the United Nations, 1985), 10.

and food in the world capitalist economy, the present section identifies the economic and governance powers—as enacted through state agricultural and trade policies—operating within the world food order. Examining the interplay of economic and political forces in international food regime arrangements, the section seeks to establish a comprehensive approach to the political economy of food and grain through *Financial* and *Institutional agents*, and develop a preliminary understanding of their material repercussions on the built environment.

Financial Agents: from Bretton Woods to Wall Street

In the present work, financial agents are understood as structures that dispose of financial capital they control through loans, futures markets, buy-outs, derivatives and other economic instruments with which they influence directly or indirectly the food system and the grain chain. This term encloses major international financial operators (IMF, World Bank) as well as financial agencies (banks, funds, credit agencies, hedge funds, private equity consortia, finance houses, insurance companies, sovereign wealth funds, and superannuation funds) that steer policy making and development aid allocations, guide economic trends and follow investment strategies underwriting the corporate control of food resources (e.g., land, labor force, production infrastructures, processing facilities) by private companies in the food chain.⁴²⁸ Two of the most influential financial agents in the current food regime are the International Monetary Fund (IMF or Fund), and the World Bank, created in 1945 during the international Monetary Conference of the United and Associated Nations in Bretton Woods (New Hampshire, U.S.A.), both with headquarters in Washington, D.C. A public institution financed by the quota subscriptions of its 182 members, the IMF's original task was to monitor and maintain exchange rates between Western European countries and the U.S.A., with economic stability as a goal. Today, the Fund is an international credit institution controlled by developed countries, with voting shares proportional to their economic power (2,300 employees, 3 main offices). Though the IMF is not a bank, it disposes from significant resources (over USD 215 billion). The Fund reports to its financing countries, represented by “the minister of finance or the governor of the central bank.”⁴²⁹ Its “lending arrangements (...) are similar to a line of credit, are approved by the IMF Executive Board to support a country's adjustment program. The arrangement requires the member to observe specific terms in order to be eligible

⁴²⁸ Burch and Lawrence, "Towards a Third Food Regime: Behind the Transformation."

⁴²⁹ "IMF Lending Arrangements as of May 31, 2014", International Monetary Fund, accessed July 8, 2014, <http://www.imf.org>.

to receive a disbursement.”⁴³⁰ Through these “specific terms” or conditionality, the IMF imposes governments to follow guidelines and policies that affect segments of the food system. In particular, resulting on the liberal influences of the 1980s, the IMF adopted a neoliberal economic stance increasingly targeting the role of the state and social welfare, in favor of market liberalization and privatization of public enterprises. The resulting interference of the Fund against policies with social objectives as the subsidization of food or other essential consumption goods for the protection of low-income groups became embedded in its conditionality.⁴³¹ Experts have criticized the adverse effects of IMF programs on income distribution directly related to access to food. The links between social discontents, urban food riots and IMF programs are acknowledged by several studies, and the economist Joseph Stiglitz, in *Globalization and its Discontents*, phrases this connection plainly: “(...) the IMF has inspired riots when its policies cut off food subsidies.”⁴³² The worsening living conditions of countries that entered IMF programs (“debt crisis”) in the 1980s even compelled UN agencies such as UNICEF (United Nations International Children's Emergency Fund) to argue for “adjustment with a human face.”⁴³³ In his contested work *Planet of Slums*, the urban theorist Mike Davis formulates an even more direct connection between IMF-mandated programs and the built environment, and holds the Fund accountable for fueling poverty, urban food riots, and the shantytowns of the developing world.⁴³⁴

Though the IMF did not imposed directly austerity programs on countries, it is true that the external debt of developing nations led to the renegotiating of loans terms and private-capital pressures on domestic economic policies, which translates in subsidy cuts, wage declines, and price increases hurting urban poor, working and middle classes of debtors nations. Following heavy criticism and controversies, the institution updated its conditionality requirements, but its programs still largely contain measures to reduce or eliminate public subsidies and the removal of price controls.⁴³⁵ It can thus be argued that through global economic mechanisms, the IMF is a financial agent impacting food systems locally, with

⁴³⁰ Ibid.

⁴³¹ Ariel Buira, “An Analysis of IMF Conditionality,” in *United Nations Conference on Trade Development*, ed. Harvard University Center for International Development (New York United Nations, 2003).

⁴³² Joseph E. Stiglitz, *Globalization and Its Discontents* (New York: W.W. Norton, 2002), 119.

⁴³³ Walton and Seddon, *Free Markets & Food Riots*, 19.

⁴³⁴ Mike Davis, *Planet of Slums* (London: Verso, 2006), 152.

⁴³⁵ Tony Killick, *IMF Programmes in Developing Countries: Design and Impact* (New York: Routledge, 1995), 25.

implicit spatial repercussions. It stands as an organism of influence and a pervasive presence in developing countries, not the least because of its tight collaboration with the World Bank. In fact, as the World Bank embarked in structural adjustment loans in the 1980s too, it did so with the support of the IMF, which imposed its conditions on how loan recipients were to craft macroeconomic policies.⁴³⁶ Certain scholars simply refer to the loans as “World Bank/IMF programs.”⁴³⁷ In 2014, there were 34 countries beholden to the International Monetary Fund. Its sister institution, the World Bank, was created to promote economic development in post-war Europe.

Known today for economic programs to developing countries, the initial missions of the World Bank were to provide international aid and loans, to collect and provide data, and to deliver technical assistance to member countries towards “the fundamental unity of the global, capitalist economy” beyond national boundaries.⁴³⁸ Much as the IMF, the World Bank (7,000 employees, 40 offices worldwide) is governed through its 180 members and an Executive Board. The World Bank is an investment bank (USD 176 billion) intermediating between creditors and receivers, borrowing from the one and lending to the other. The financing organ grants loans to developing countries through Structural Adjustment Programs (SAPs), towards the structural adjustment of their national economies to promote market competition as part of a neoliberal agenda. Food security is central to the Bank’s policies: “Investment in agriculture and rural development to boost food production and nutrition is a priority for the World Bank Group, which works through several partnerships to improve food security, from encouraging climate-smart farming techniques and restoring degraded farmland to breeding more resilient and nutritious crops to improving storage and supply chains for less food loss. In fiscal year 2013, new World Bank Group commitments to agriculture and related sectors reached \$8.1 billion.”⁴³⁹ Within the Group, the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA) are acquiring funds to finance projects, by borrowing on world's capital markets through the issue of bonds or by grants from donor nations. The International Finance Corporation (IFC) is a private investment subsidiary of the Bank, which invests in private projects and private equity for profit, and recently

⁴³⁶ Stiglitz, *Globalization and Its Discontents*, 14.

⁴³⁷ Friedmann, "Distance and Durability: Shaky Foundations of the World Food Economy," 381.

⁴³⁸ Eugene Black, "Black Address to Southern Industrial Editors Institute," Black Papers (box 3, folder 1, University of Georgia Archives: 1949).

⁴³⁹ David D. Driscoll, "The IMF and the World Bank. How Do They Differ?", Publication Services, *International Monetary Fund*, accessed July 10, 2014, <https://www.imf.org/external/pubs/ft/exrp/differ/differ.htm>.

undertook investments in transnational acquisition of vast tracts of agrarian land from developing countries (with hedge fund Altima Partners, see Production Agents).⁴⁴⁰ These investments, identified by scholars as land-grabs, must be signaled as territorial manifestations of economical ideologies, through the establishing of corporate control over food resources.⁴⁴¹ Such ventures are consistent with the Bank advocated Structural Adjustment Programs focused on rural economic activities. According to the financial institution, liberalized agricultural economies, foreign direct investment, land reform and technological development are key factors for the success of its strategies in a context of inevitable economic globalization, and “using agriculture as the basis for economic growth in the agriculture-based countries requires a productivity revolution in small holder farming.”⁴⁴² For instance, the Bank recommended governments to shift from the production of traditional food crops to high-value agricultural goods such as cut flowers and luxury vegetables for export to western markets, and to encourage foreign investors to participate in establishing larger farms with tax incentives (e.g. Kenya, Zimbabwe). But this contract-farming strategy has been decried, because demand for horticultural and luxury products is volatile, and though lucrative, luxury crops’ production take up land from sustenance food supply in areas with few land available.⁴⁴³ This forms an illustrative case of the interconnected effects of the competitive logic of global financial markets onto space via agricultural reform.

In the 1980s, development scholars argued that the Bank’s focus on agriculture and rural development was partially related to a view developed by its experts on the negative effects of developing countries policies, suspected of favoring their industrial and urban sectors rather than rural areas (“urban bias”). The Bank’s policy-makers believed that most government subsidies privileged investment projects in urban areas and comparatively few supported agriculture development—imported chemical, fertilizers—and that by lowering “artificially (...) the costs of urban life through the provision of subsidies, especially for basic foods,” it

⁴⁴⁰ The Multilateral Investment Guarantee Agency (MIGA) promotes foreign direct investment and political risk insurance in developing countries. The International Centre for Settlement of Investment Disputes (ICSID) provides international facilities for conciliation and arbitration of investment disputes.

⁴⁴¹ Shepard Daniel, "Land Grabbing and Potential Implications for World Food Security," in *Sustainable Agricultural Development*, eds. Mohamed Behnassi, Shabbir A. Shahid, and Joyce D'Silva (Dordrecht: Springer Netherlands, 2011).

⁴⁴² The World Bank, World Development Report 2008: Agriculture for Development, 12.

⁴⁴³ David Glover, "Contract Farming and Commercialization of Agriculture in Developing Countries," in *Agricultural Commercialization, Economic Development, and Nutrition*, eds. Joachim Von Braun and Eileen Kennedy (Baltimore: Johns Hopkins University Press, 1994).

encouraged rural migration to urban areas and urbanization.⁴⁴⁴ In that sense, the slowing down of urbanization via rural development as a possible solution against poverty appeared as one goal of the institution.⁴⁴⁵ No longer a prominent concern of development aid agencies, in recent years the focus of programs shifted away from the agricultural sector towards poverty and sustainability of rural livelihoods, albeit 75 percent of the Bank's lending is still applied to agricultural-related infrastructures and technology projects: farm-to-market roads, dams, channels, power stations.⁴⁴⁶ In that regard, the institution's effect on space via segments and agents of the food system appears tangible and of material nature.⁴⁴⁷ However, while the pursued goal of the World Bank towards agricultural trade liberalization and rural development seem to have known implications, the spatial repercussions of its policies are little studied.

In line with the World Bank's economic ideology, regional financial banks are minor agents active in mechanisms of development aid, officially promoting economic growth and development, with a possible impact on food production structures. In particular, the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, and the Inter-American Development Bank, of which the United States is a major donor, illustrate the significant role of economic, political, and strategic interests of donors on aid allocation and regulation of macro-economic conditions locally.⁴⁴⁸ Originated in the 1960s as alternative yet affiliates of the World Bank, these financial agents undertake comparable tasks at a local level, financing projects towards economic integration using donor capitals for loans, albeit without a local governmental repayment engagement. These structures are entitled to enter the capital of local companies in the member countries, and some are engaged in agriculture and food-related projects, with an emphasis on infrastructure support. If shortcomings have been recorded (i.e. governance and accountability problems, limited transparency, coordination difficulties, lack of funding), "the questionable efficacy of monitoring

⁴⁴⁴ David Cowan, "The World Bank: Urban Bias and Structural Adjustment," (University College, London, Development Planning Unit, 1994).

⁴⁴⁵ Gareth A. Jones and Stuart Corbridge, "The Continuing Debate About Urban Bias: The Thesis, Its Critics, Its Influence and Its Implications for Poverty-Reduction Strategies," *Progress in Development Studies* 10, (2010).

⁴⁴⁶ Carlos Oya, "Agriculture in the World Bank: Blighted Harvest Persists," in *The Political Economy of Development: The World Bank, Neoliberalism and Development Research*, eds. Kate Bayliss, Elisa Waeyenberge, and Ben Van Fine (London; New York: Pluto Press ; Palgrave Macmillan, 2011).

⁴⁴⁷ Stiglitz, *Globalization and Its Discontents*, 8.

⁴⁴⁸ Rebecca M. Nelson, *Multilateral Development Banks: Overview and Issues for Congress* (Washington D.C.: Congressional Research Service, 2013).

programs on the impact of the banks' projects" implies that the actual results of allocated funds to agricultural and rural development, and their spatial effects are not well known.⁴⁴⁹

A subsidiary of the United Nations, the International Fund for Agricultural Development (IFAD) is an international financial organ created at the 1974 World Food Conference (Headquarters in Rome, 538 employees, USD 1.06 billion budget in 2013) in response to the food crises of the 1970s affecting Sub-Saharan countries, with the goal to develop greater food production among the world's poorest farmers: "investing in rural people."

⁴⁵⁰ The Fund is governed through a council of 173 member-states and funded by their governments and other sources. Based on the belief that food insecurity and famine are caused by poverty rather than by failure of food production systems, the Fund dispenses loans and grants to poor rural people with the help of governments and NGOs. Due to the fact that the majority of the developing world's poor populations are concentrated in rural areas, the IFAD targets specifically populations engaged in agriculture, via access to natural resources, agricultural technologies, financial services, micro-financing programs, and competitive markets. The IFAD is working on the transition from a traditional agriculture to the integration of small-scale farmers into larger economic realms. One of the fund's specific focuses is set on climate adaptation projects, and programs on land degradation prevention. An agency of a reduced size with a relatively limited amount of available resources, the direct impact of the Fund as a financial agent of the food system and of the grain chain appears mitigated.

Concomitant to the development aid business and acceptant to economic neoliberal concepts of competition, efficiency and profiteering, which liberalization policies failed to alleviate poverty despite the substantial amount of financial aid invested, the agency's efficiency is debated.⁴⁵¹ Therefore, if its influence on the ground remains minor, the IFAD contributes to the global strategies of international institutions and major financial agents, and to power structures of the current food regime.⁴⁵²

Operating in food commodities' physical markets or capitalizing in commodity markets through investment in land, farming, and associated activities related to the physical

⁴⁴⁹ Enrique Carrasco, Wesley Carrington, and Lee HeeJin, "Governance and Accountability: The Regional Development Banks," *Boston University International Law Journal* 27, no. 1 (2009).

⁴⁵⁰ "Who We Are", *International Fund for Agricultural Development*, accessed May 8, 2018, <http://www.ifad.org/governance/>.

⁴⁵¹ See Arturo Escobar, *Encountering Development: The Making and Unmaking of the Third World* (Princeton: Princeton University Press, 1995).

⁴⁵² William D. Schanbacher, *The Politics of Food. The Global Conflict between Food Security and Food Sovereignty* (Westport, CT: Praeger Security International, 2010), 19.

commodities business, private financial agents have significant effects on entire segments of the food system. At the macro level of the national and international economy, the role of banking capital in general, the “fixed and liquid assets of the banking sector (...), as well as their institutional organisation” in the food system, particularly in the agricultural sector, has been recognized and demonstrated by both economy and geography scholars since the early 1990s.⁴⁵³ For instance, the patterns of concentration identified in various sectors of the food system and the large incidence of mergers and takeovers among agro-input firms, grain-trading houses, milling businesses, distributors, and the food industry in general are based on high levels of credit dependence, supported by merchant banks. Because of the growing internationalization of securitized financial systems allowing flexible movements of capital and lending, interlinkages between banking agencies and credit institutions and the food industry have increased the control and ownership of the means of food production by financial capital. The leverage of bank lending in agriculture is a key factor in the economic involvement of financial agents in food production, with land and building assets of farms used as security for extra credit as debt liabilities, particularly in developed economies.⁴⁵⁴ With points of credit linked to specific purchases (manufactured items and agro-inputs), leasing companies owned by agro-input manufacturers tied to banking capital also illustrate the dynamics of the integration of financial agents in food production and the penetration of capital forces in the agricultural sector. If it is true that “land-based agriculture becomes increasingly one other sector to which the exploitative synergies of industrial and finance capital are directed,” as development scholars Terry Marsden and Sarah Whatmore claim in “Finance Capital and Food System Restructuring”, then financial agents and banking capital can be recognized as tangible factors shaping the food system and its concomitant space.⁴⁵⁵ Already present on future markets, large non-traditional investors like pension-funds, hedge funds, and sovereign wealth funds moved from other markets less safe towards food commodities in 2001. As a consequence, experts recorded price behavior of food commodities comparable to that of refuge values such as gold: largely stable previously, the prices began to rise slowly in 2005, and accelerated sharply in August 2007, when the subprime

⁴⁵³ Terry Marsden and Sarah Whatmore, "Finance Capital and Food System Restructuring: National Incorporation of Global Dynamics," in *The Global Restructuring of Agro-Food Systems*, ed. Philip McMichael (Ithaca, London: Cornell University Press, 1994), 108.

⁴⁵⁴ In the UK, 95% of total bank lending in agriculture is handled by a few clearing banks (Lloyds, Barclays, Midlands, National Westminster, and Agricultural Mortgage Corporation). In France, one major financial agent, Crédit Agricole, maintained a monopoly on farming credit until the mid-1990s via state-supported loans, but the agriculture credit market is now open to a few other banks (Société Générale, Crédit Mutuel, and Banque Populaire).

⁴⁵⁵ Marsden and Whatmore, "Finance Capital and Food System Restructuring: National Incorporation of Global Dynamics," 124.

crisis hit. The United Nations Special Rapporteur on the Right to Food Olivier De Schutter claims the 2008 food price crisis was partially caused by “a deeply flawed global financial system [that] exacerbated the impacts of supply and demand movements in food commodities.”⁴⁵⁶ Despite the fact that 90 percent of all food does not enter international food markets, the speculative behaviors of international investors influencing metal and fuel prices (e.g. fuel costs, fertilizer costs, biofuel production) are seen as a cause of high food prices.⁴⁵⁷ One mitigating factor is related to the fact that private investors and financial structures are reactive to market movements, and these agents engage and exit investment schemes following economic imperatives. For instance, in 2014, several of the largest investment banks (e.g., Goldman Sachs, JPMorgan, Credit Suisse) reduced their physical commodities-trading activities or even shuttered their natural resources-trading arms due to higher regulatory scrutiny and tighter margins.⁴⁵⁸ If the actual impact of speculative forces on basic commodities remains a debated theme among economists, an indisputable spatial consequence of the price spikes of food commodities is related to the triggering of contentious investment strategies towards the corporate control of agricultural production resources. Financial agents like private equity banks (Morgan Stanley), hedge funds (BlackRock, Inc.) and investment groups (Black Earth Farming, Alpcot-Agro, Al Qudra) have been acquiring large tracts of farmland in developing countries.⁴⁵⁹ A few public-private structures are operating on behalf of food-importing countries as a strategy to secure food supplies at affordable prices, with food security a key driver of government-backed investment (from countries in Europe, Africa, the Gulf and South-East Asia). Studies diverge on the amplitude of land acquisition, and the material impact of such transformations at global and local levels. Conjuring again the Neo-Malthusian theme of scarcity in a resource-constrained world, farmland acquisitions form a well-defined interconnection between financing agents, food security and spatial consequences that will be investigated further.

In the context of the current food regime and the sub-system of the grain chain, the role of financial agents (international financial operators, transnational corporations, banking

⁴⁵⁶ Olivier De Schutter, *Food Commodities Speculation and Food Price Crises* (Rome: United Nations Special Rapporteur On The Right To Food, 2010), 6.

⁴⁵⁷ See Robert L. Paarlberg, *Food Politics: What Everyone Needs to Know* (Oxford: Oxford University Press, 2013).

⁴⁵⁸ Katharina Bart, "Credit Suisse Posts Big Loss after U.S. Tax Settlement," *Reuters*, July 22, 2014, <https://www.reuters.com/article/us-credit-suisse-results/credit-suisse-posts-big-loss-after-u-s-tax-settlement-idUSKBN0FR0AV20140722> .

⁴⁵⁹ Daniel, "Land Grabbing and Potential Implications for World Food Security," 28.

agencies, credit establishments) appear fundamental to accelerating the commodification of food and grain, and the economic changes within all sectors of the grain chain that are instrumental in generating spatial changes. Yet this must be contemplated concomitantly to the active part played by institutional agents, and the deployment of regulatory bodies and policy-making institutions.

Institutional Agents

Institutional agents are global or national governmental structures that exert a form of authority or governance on the food system by way of policies, assistance, regulation, recommendation, or production of knowledge. Among these, the Food and Agriculture Organization (FAO) and the World Food Program (WFP) are two major international agencies, both under the authority of the United Nations.

Overseeing global food, development, and agriculture frameworks, the FAO was officially established in October 1945 by 34 countries at a meeting in Canada with the intent to tackle poverty, develop a more equal global distribution of food, and support world peace and higher global standards of living.⁴⁶⁰ The FAO is an influential research and development agency funded through the contributions of its 194 nations-members and is governed by a council (Headquarters in Rome, 10,907 employees). The FAO shares with other agents the belief that economic growth and market liberalization are solutions to poverty and hunger. Although the organization tends towards the integration of agriculture in global-market systems and a more industrialized form of food production in developing countries, it also recognizes that “gains from trade liberalization are neither automatic nor universal,” a more restrained standpoint than the IMF and its co-operators.⁴⁶¹ Because the FAO’s principal assignment is to achieve food security in crisis situations, it predominantly targets food production agents in its activities, thus playing a direct role in that segment of the world food system. The Organization gathers and processes data on the food situation worldwide and provides policy analysis and assistance to developing countries. However, the FAO primarily influences agriculture and food production through initiatives and development projects such as improving production (access to seed, fertilizer, tools) and irrigation infrastructures, developing agricultural markets, and reducing

⁴⁶⁰ Food and Agriculture Organization, *F.A.O., the First 40 Years*, 11.

⁴⁶¹ Jakob Skoet and Kostas G. Stamoulis, *The State of Food Insecurity in the World, 2006: Eradicating World Hunger: Taking Stock Ten Years after the World Food Summit* (Rome: Food and Agriculture Organization of the United Nations, 2006), 29.

crop losses.⁴⁶² Although the FAO has been recognized for the quality of its data-compiling activities, its reputation on executive action and realized projects is less solid and the organization has been “routinely criticized”.⁴⁶³

The World Food Program (WFP) is the food assistance branch of the United Nations and as the main humanitarian agency fighting hunger; it is a significant, multilateral, institutional agent of the food system (Headquarters in Rome, over 14,500 employees worldwide). Established in December 1961 by the Food and Agriculture Organization and the UN General Assembly as a temporary structure, the WFP’s formation was motivated by the accumulation of post-war food stocks and focused on “the mobilization of available surplus foodstuffs and their distribution in areas of greatest needs”.⁴⁶⁴ Initially dependent on in-kind donations and food surplus availability from several major donors (the U.S.A., European countries, Australia and Canada), the WFP now relies on direct financial support, with the U.S.A. as its main benefactor, largely via the Food for Peace Program (PL 480).⁴⁶⁵ Following the 1995-grain price spike, the EU funded its own humanitarian office (ECHO) and other donors reassessed their food aid, extending support to affected countries directly and indirectly through NGOs, thus cutting back their regular support to the WFP. Development scholar Edward Clay argues in “Responding to Change: WFP and the Global Food Aid System” that, based on the geographical distribution and types of activity run by the agency, it is partially shaped by American foreign policy priorities.⁴⁶⁶ Cereals (rice, wheat and maize) account for 90 percent of WFP shipments. The Program has been severely criticized by health and environmental specialists for sending U.S. GM maize to Zambia as emergency aid in 2002. With NGOs and Red Cross associations playing an increasing role in post-disaster relief, and given that the WFP is tied to the type and source of food it delivers and contingent to commodity prices, considered inflexible and slow to respond to sudden humanitarian crisis, and

⁴⁶² IFAD Executive Board, *Ifad's 2014 Results - Based Programme of Work and Regular and Capital Budgets* (Rome: International Fund for Agricultural Development, 2013).

⁴⁶³ Paarlberg, *Food Politics*, 213.

⁴⁶⁴ "Provision of Food Surpluses to Food-Deficient Peoples through the United Nations System," in *General Assembly*, The United Nations (1960).

⁴⁶⁵ "Food Aid. Food for Peace," *Alliance for Global Food Security*, accessed December 8, 2014, <http://foodaid.org/food-aid-programs/food-for-peace/>.

⁴⁶⁶ Edward J. Clay, "Responding to Change: WFP and the Global Food Aid System," *Development Policy Review* 21, no. 5-6 (2003): 10.

⁴⁶⁷ In the 1990s, the U.S.A. donated 3 million metric tons of grain to Russia to strengthen strategic ties with its leadership. See Barrett and Maxwell, *Food Aid After Fifty Years: Recasting Its Role*.

relying on donor' support that has proven largely inadequate, the WFP's ongoing purpose is debated. Because of its declining influence, the impact of the contested agency is difficult to measure. The WFP's distinctive problems relate to general issues affecting the gamut of food aid governance institutions tarnished by concerns over "overlapping mandates, differing degrees of authority and legitimacy, varied levels of transparency in decision-making, and problematic representation of the major stakeholders."⁴⁶⁸ Donors of food aid, however, have largely remained the same since the end of WWII, with the largest cereal producing and exporting countries as main contributors.⁴⁶⁹ The United States Agency for International Development (USAID, headquarters in Washington, D.C., 2000 employees) is an enduring example of a national state structure undertaking food-related programs, with extra-national impacts. The institutional agent USAID has operated unchangingly since 1970. Grain is produced and purchased in the U.S., then shipped to foreign countries on U.S.-flag boats through a costly procedure known as "cargo preference" which costs 46 percent more than usual freight costs (USD 140 million in 2006).⁴⁷⁰ Thus, public policies directly benefit local companies who carry out these transactions. Attempts by American administrations to alter food aid policies have been met with strong resistance in Congress and remain unsuccessful to this day. In 2013, President Barack Obama's call for a revision of the food aid policy and the Food for Peace program was opposed by "60 domestic organizations, led by farm lobby and maritime lobby groups".⁴⁷¹ Yet, in addition to domestic complications, the adverse extra-territorial consequences of such policies are well known.⁴⁷² The dumping of food aid into poor countries also has admittedly devastating effects, depressing local food prices and discouraging local food production; policy responsible for wheat-dependency has affected many developing countries, as evidenced by the fact that 7 out of the 10 leading importers of U.S. food are former Food for Peace beneficiaries.⁴⁷³ Several countries followed the fundamental rationales of America's foreign policy and duplicated foreign assistance and food aid procedures to serve a myriad of political agendas that go beyond humanitarian concerns. The European Union is the second

⁴⁶⁸ See John Hoddinott and Cohen Marc, *Renegotiating the Food Aid Convention* (Washington, D.C.: International Food Policy Research Institute, 2007).

⁴⁶⁹ Barrett and Maxwell, *Food Aid After Fifty Years: Recasting Its Role*, 11.

⁴⁷⁰ Elizabeth R. Bageant, Christopher Barrett, and Eric Lentz, "Food Aid and Agricultural Cargo Preference," *Applied Economic Perspectives and Policy* 32, no. 4 (2010).

⁴⁷¹ Paarlberg, *Food Politics* 53.

⁴⁷² Sanjaya Lall, "Structural Adjustment and African Industry," *World Development* 23, no. 12 (1995).

⁴⁷³ Schanbacher, *The Politics of Food*, 33.

largest donor of food aid, giving half the amount of US donations. Its minimum contribution of food aid is of 1.67 million tones of cereals a year, distributed through the Programme Food Aid (PFA) under the authority of the European Community Humanitarian Office (ECHO, Headquarters in Brussels) and the European Commission's Directorate General for Development, both of which undertake the supply of commodities directly to a recipient government or its agent for sale on local markets.⁴⁷⁴ Evidence suggests, however, that food aid has become a relatively marginal form of aid (e.g. only 25 percent of U.S. foreign total aid in 2009), replaced by cash transfers, agricultural development aid and commercial food trade.⁴⁷⁵

Initiated in 1947 during the Bretton Woods Conference, the General Agreement on Tariffs and Trade (GATT) is often grouped with the World Bank and the IMF as one of the most influential global governance bodies and it served as a significant tool for establishing guidelines to reform and liberalize world trade. The World Trade Organization (WTO) replaced it when agriculture and food were included in the Uruguay Round of negotiations in 1995. This round was largely influenced by the United States and the European Union, which managed to authorize the European Common Agricultural Policy (CAP) and a USD 182 billion package in U.S. agricultural subsidies, while governmental subsidies on agricultural production and exports eroded for all other countries. The WTO is an official institution with 160 members (Headquarters in Geneva, 640 employees), which settle trade disputes inherent in the process of liberalizing world trade. Because trade arrangements affect agricultural policies, the organization's impact on global production and distribution of food is substantial, although largely indirect.⁴⁷⁶ In line with the economic integration goals of the IMF and the World Bank, the WTO focuses on the opening of domestic markets and the elimination of "trade-distorting" subsidies. These policies have been criticized as being asymmetrical because developed countries appear to circumvent WTO trade regulations. Developing countries have opened up their domestic markets to industrialized nations that have in turn "dumped" exported food and grain at lower than local prices, harming small-scale farmers. Therefore, trade policies, a known component of migration and urbanization, lead to the intensification of rural poverty, marking an indirect spatial impact of the WTO. In addition, the organization's supports of copyrighting and legal patents on living resources have been show to convey damaging effects on food

⁴⁷⁴ Edward Clay, Sanjay Dhiri, and Charlotte Benson, *Joint Evaluation of European Union Programme Food Aid: Summary of Synthesis Report, October 1996* (London: Overseas Development Institute, 1996).

⁴⁷⁵ Curt Tarnoff and Marian L. Lawson, *Foreign Aid: An Introduction to U.S. Programs and Policy* (Washington, D.C.: Congressional Research Service, the Library of Congress, 2009).

⁴⁷⁶ Schanbacher, *The Politics of Food*, 10.

producing agents.⁴⁷⁷ The Trade-Related Intellectual Property Rights agreement (TRIPS), crafted during the Uruguay Round by the Intellectual Property Committee, listed among its members biotechnology-agribusiness input agents (e.g. DuPont, Monsanto) and has been associated with intensified agriculture as well as the destruction of bio-diversity, local food production systems, and rural livelihoods.⁴⁷⁸ If the WTO does not operate directly via financial means, it exerts an influence over the entire food system by managing the global economy and treating food as capital that can be controlled through regulatory and economic instruments. The Organization exemplifies how global governance structures are tools of transnational capital “to implement market rule globally (...), to facilitate corporate access to markets and raw materials, (...) and to recalibrate the ideology of development as a global project”.⁴⁷⁹ Given that institutional agents such as the WTO partake in mechanisms and politics of market rule, the underlying challenge here is in determining their spatial consequences.

Regulatory structures are institutional agents that impact segments of the food system through standards and rules. The International Standards Organization (ISO) is a global regulatory body (Headquarters in Geneva, 150 employees) that sets technical standards of several food products (i.e. eco-labeling, environmental controlling). The Codex Alimentarius Commission (CAC, Headquarters in Geneva, 186 Members, 225 Observers) created by the FAO and the World Health Organization in 1962 to regulate international standards for healthy food with the added incentive of facilitating international trade, is the scientific authority of “sanitary and phytosanitary measures” and a “central reference point for the elaboration of international food standards” endorsed by the WTO.⁴⁸⁰ ⁴⁸¹ In addition to these two important agents, there are private regulatory institutions set by retailers, food services, manufacturers, and agro-food industries, establishing their own standards and undertaking auditing and controls (e.g., for supermarkets chains, third party certification, traceability

⁴⁷⁷ Carlos Maria Correa, *Intellectual Property Rights, the WTO, and Developing Countries: The Trips Agreement and Policy Options* (New York: Zed Books, 1999).

⁴⁷⁸ Susan Sell, "Multinational Corporations as Agents of Change: The Globalization of Intellectual Property Rights," in *Private Power, Public Law: The Globalization of Intellectual Property Rights* (Cambridge: Cambridge Univ. Press, 2003), 96.

⁴⁷⁹ Philip McMichael, "Sleepless since Seattle: What Is the WTO About?" *Review of International Political Economy* 7, no. 3 (2000).

⁴⁸⁰ Spencer Henson and Rupert Loader, "Barriers to Agricultural Exports from Developing Countries: The Role of Sanitary and Phytosanitary Requirements," *World Development* 29, no. 1 (2001).

⁴⁸¹ Frode Veggeland and Svein Ole Borgen, "Negotiating International Food Standards: The World Trade Organization's Impact on the Codex Alimentarius Commission," *Governance* 18, no. 4 (2005).

controls).⁴⁸² The growing importance of such mechanisms of international governance is partly related to the rise of global trade of tropical products, a phenomenon triggered by the Structural Adjustment Programs of the World Bank, and its policies to stimulate developing countries to export cash crops. Regulatory structures impact international food trade flow by setting trade barriers (via strict sanitary regulation, technical exigencies and standardization of products), notably between developing countries exporting and high-income countries importing food. For developing countries, a further trade difficulty linked to ISO and CAC quality requirements concerns their poor leverage capacity on the decision-making processes of regulatory institutions. This is why the impartiality of the Codex Alimentarius Commission is debated. Despite being an intergovernmental institution dedicated to food safety through standards, its activities are managed by corporate interests and food industries from high-income countries. The structure of the Codex allows for any organisation (NGOs, industry and corporate associations) to be represented, thus providing “a direct channel for corporate influence over the development of international standards”.⁴⁸³ Spatially, the impacts of standards and regulations on the food chain of standards and regulations seem relatively direct: “The standard addresses how to harvest, how to transport (...), how to store (...) and all of that. And so the standard speaks to the whole process: production, packing and transport”.⁴⁸⁴ Increasingly specialized cereal farms are compelling spatial outcomes of the standardization of grain as a mass-produced and mass-traded commodity.⁴⁸⁵ Though the long history of grain standardization is beyond the scope of this study, it is important to associate criteria with trade, as the establishment of grades and standards derives from the needs of traders to control the quality of grain and determine its value.⁴⁸⁶ This connection sheds light on how regulatory structures can affect food production, trade and consumption. In the context of the political economy, institutional agents involved in regulatory mechanisms of food appear to mirror two aspects of the current food regime: the preponderance of developed countries over developing ones in regulatory bodies’

⁴⁸² Harriet Friedmann and Amber Mcnair, "Whose Rules Rule? Contested Projects to Certify Local Production for Distant Consumers," *Journal of Agrarian Change* 8, no. 2-3 (2008).

⁴⁸³ Elizabeth Smythe, "In Whose Interests? Transparency and Accountability in the Global Governance of Food: Agribusiness, the Codex Alimentarius, and the World Trade Organization," in *Corporate Power in Global Agrifood Governance*, ed. Jennifer Clapp and Doris A. Fuchs (Cambridge: MIT Press, 2009), 97.

⁴⁸⁴ Friedmann and Mcnair, "Whose Rules Rule? Contested Projects to Certify Local Production for Distant Consumers," 420.

⁴⁸⁵ See Lowell D. Hill, *Grain Grades and Standards: Historical Issues Shaping the Future* (Urbana: University of Illinois Press, 1990).

⁴⁸⁶ William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton, 1991), 116.

decision-making positions, and the interference of private actors with economic and institutional incentives to set food standards that will benefit them.

Often overlooked, institutional agents such as research institutions, philanthropic organizations and think-tanks play an important role in the production of knowledge on food. Their expertise is translated into projects by policymakers that indirectly affect food systems via policies and funding allocations. Strong ties between major financial agents and research institutes reveal that their agricultural and scientific work largely serves global economic and political agendas.

The International Food Policy Research Institute (IFPRI) is one of the most influential agricultural research institutional agents today. A center formed in 1975 by governments, private companies and foundations, and the World Bank, the IFPRI (Headquarters in Washington D.C., about 1000 employees) examines topics including food subsidy programs, nutrition, health, gender, and related policies. With the mission to “[produce] high quality research that can shape policies, investments, and programs, contributing to a productive, sustainable and resilient agricultural and food system,” the IFPRI advocates for the legacy of the Green Revolution and the adoption of innovations in agricultural technology.⁴⁸⁷ In this sense, the research institution is largely in line with the World Bank, its largest financing contributor.⁴⁸⁸ ⁴⁸⁹ Arguing that urbanization and world population increase will put a strain on current food systems, the institute has been instrumental in framing biotechnology as a solution to world hunger, providing arguments for policy makers and agri-business engaged in the licensed seed business.⁴⁹⁰ The IFPRI is one of the 15 research centers in the Consultative Group on International Agricultural Research (CGIAR) network, of which Robert McNamara, just retired after 13 years as the president of the World Bank, was one of the founders.⁴⁹¹ Part of the CGIAR too, the International Rice Research Institute (IRRI, Headquarters in the Philippines, 1350 employees) is the initiating example of the influence of philanthropic structures over the

⁴⁸⁷ "IFPRI's Mission," *International Food Policy Research Institute*, accessed November 21, 2014, <http://www.ifpri.org/ourwork/about>.

⁴⁸⁸ Paarlberg, *Food Politics*, 211.

⁴⁸⁹ The Bill & Melinda Gates Foundation, a private philanthropic institution, is another financial supporter of the IFPRI.

⁴⁹⁰ Marc Williams, "Feeding the World? Transnational Corporations and the Promotion of Genetically Modified Food," in *Corporate Power in Global Agrifood Governance*, eds. Jennifer Clapp and Doris Fuchs (Cambridge: MIT Press, 2009), 170.

⁴⁹¹ The two other consultants hired for this task were “Perry Adkisson, then Deputy Chancellor for Agriculture at Texas A&M University (a US land-grant agricultural research university) and a 1997 World Food Prize winner for his contribution to the set of agricultural crop techniques known collectively as integrated pest management; and Bryant Kearl, a former agricultural journalist and academic who headed the Asia Office of the Agricultural Development Council from 1970 to 1974, and who was at that time the Vice Chancellor for Academic Affairs at the University of Wisconsin (a place where both molecular biology and agricultural research have been prominent areas of study).” in Elta Smith, "Imaginariness of Development: The Rockefeller Foundation and Rice Research," *Science as Culture* 18, no. 4 (2009), Notes.

food system through research. Invested in scientific investigation of rice since the 1930's, and in cooperation with the Philippino government, the Rockefeller Foundation and the Ford Foundation established the International Rice Research Institute in 1959. Steering food production policies by determining agricultural research programs, the Rockefeller Foundation has been instrumental in enforcing the Green Revolution of the 1960s and 1970s in Asia, and the production and transfer of high yielding plant varieties along with a “package of complementary inputs—fertilizers, pesticides, credit, land-reform, seed, agricultural extension, and (...) irrigation”.⁴⁹² Engaged in GM rice research and promotion since the 1980s through the IRRI, the involvement of the Rockefeller Foundation in agricultural modernization projects is viewed as “a sociopolitical project that extends particular modes of governance through homogenization and paternalism” by development scholars.⁴⁹³ Elta Smith in “Imaginarities of Development: The Rockefeller Foundation and Rice Research” notes that this influence in setting global agendas for agricultural research is not unique to the Rockefeller Foundation, and that the approach is representative of other CGIAR institutes’ stance on food research, considering plants as “objects of knowledge” and poor countries as “deficient in the materials, knowledge, and practices that supposedly made ‘Western’ agriculture uniquely scientific and successful”.⁴⁹⁴ The influence of private sector agents in shaping scientific and socio-political agendas appears significant, as philanthropic institutions such as the Rockefeller Foundation are often in command of considerable financial means, suspected to originate from US government agencies.⁴⁹⁵ The annual donations of one of the financial supporters of the IFPRI, the Bill and Melinda Gates Foundation, amount to USD 3,635 billion in 2013.⁴⁹⁶ Not accountable to the electorate or to any political group, these institutions operate autonomously “playing an undefined and politically unsanctioned role in an international environment”.⁴⁹⁷ Among the other institutes established following the creation of the IRRI in the 1960s (the International Centre for Maize and Wheat Improvement –CIMMYT- in Mexico, the International Institute for Tropical Agriculture –IITA- in Nigeria, the International Centre for Tropical Agriculture –CIAT- in Colombia), many have engaged in public-private partnerships (e.g., CIMMYT with

⁴⁹² See Stanley Johnson, *The Green Revolution* (London: Hamilton, 1972).

⁴⁹³ Smith, "Imaginarities of Development: The Rockefeller Foundation and Rice Research," 461.

⁴⁹⁴ *Ibid.*, 463.

⁴⁹⁵ See Frances Stonor Saunders, *Who Paid the Piper?: The Cia and the Cultural Cold War* (London: Granta Books, 1999).

⁴⁹⁶ Bill & Melinda Gates Foundation, *2013 Annual Report* (Washington, 2013).

⁴⁹⁷ Smith, "Imaginarities of Development: The Rockefeller Foundation and Rice Research," 476.

DuPont Pioneer, IITA with Dow Chemical Company).^{498 499} Further ties with private corporations are exposed by CGIAR's partnerships with input agents BASF and Monsanto, arrangements that may form long-term dependencies.^{500 501}

In brief, while the research efforts of agro-science structures claims to be geared at the reduction of hunger, framed "under the guise of neutrality, objectivity, and commitment for sustainable development and social justice," the knowledge on food produced by the IRRI, the IFPRI and other CGIAR affiliates appears biased because it serves long-standing interests and investments and pursue research practices negotiated within the framework of its founders and donor interests.⁵⁰² Although it is difficult to be precise on the exact manner of how, through research, discursive power and economic ideology impacts implemented food and agriculture policies, development scholars have pointed at the ideological underpinnings of research centers within CGIAR as "consistent with the neoliberalism of the World Bank and its goals to link micro and macro domains of global economy".⁵⁰³ Ideological convergence between CGIAR and the World Bank raises questions concerning the conflict of interest between food research and sustainable food production, and the association between knowledge and governance formed by such partnerships. In fact, Michael Goldman claims in *Imperial Nature* that the CGIAR, through World Bank-funded research campuses, has supported 50,000 agricultural scientists, forming a global research enterprise, a "science-industry-government network" that promoted the Green Revolution then and biotechnology now, via the production of technocratic expertise on food.⁵⁰⁴

Also instrumental to the production of knowledge on agriculture, food and biotechnology, universities are prominent institutional agents, among which Wageningen University (The Netherlands), University of California – Davis, and Cornell University (U.S.A.)

⁴⁹⁸ "Board of Trustees," *International Maize and Wheat Improvement Center*, accessed December 7, 2014, <https://www.cimmyt.org/board-of-trustees/>

⁴⁹⁹ Maya Rajasekharan, *Catalyzing Public-Private Partnerships to Heighten the Impact of Agricultural Research* (Cali, Colombia: International Center for Tropical Agriculture, 2014).

⁵⁰⁰ Rick Weiss, "Firms Seek Patents on 'Climate Ready' Altered Crops," *The Washington Post*, May 13, 2008, <http://www.washingtonpost.com/wp-dyn/content/article/2008/05/12/AR2008051202919.html>.

⁵⁰¹ Susan Sell, "Corporations, Seeds, and Intellectual Property Rights Governance," in *Corporate Power in Global Agrifood Governance*, eds. Jennifer Clapp and Doris A. Fuchs (Cambridge: MIT Press, 2009).

⁵⁰² Jude L. Fernando, "Culture in Agriculture Versus Capital in Agriculture: A Response to the Crisis of Social Science Research in Cgiar," *Culture & Agriculture* 29, no. 1 (2007), 16.

⁵⁰³ Ibid.

⁵⁰⁴ Michael Goldman, *Imperial Nature: The World Bank and Struggles for Social Justice in the Age of Globalization* (New Haven, Conn.; London: Yale University Press, 2005), 86.

are the most significant for food research.⁵⁰⁵ Funding systems of universities differ from one country to another, as does their contribution to national economies and their links with private industry. Nevertheless, on the global backdrop of shrinking public funding for agricultural research, many educational research institutions tend to rely increasingly on private donations (a quarter of the funding for agricultural research at U.S. state universities.)⁵⁰⁶ Independent auditors argue that such funding steer research towards the interest of the donors, which are principally firms from agribusiness and food industries in developed countries. The research needs of smallholders' farmers in developing countries related to questions of biodiversity, rural employment and the non-profit sector tend to be excluded from these programs. The presence of corporate representatives on university boards corroborates the instrumental power of biotechnology-agribusiness input agents. With regard to wheat-related research, trading agents such as Cargill, ConAgra and General Mills have members in the Center for Food Safety of the University of Georgia, while input agents Monsanto and Pioneer Hi-Bred sit on the Board of the Plant Sciences Institute of Iowa State University, as well as at the Center for Produce Safety of the University of California.⁵⁰⁷ A representative of global agrochemical and seed company Syngenta holds a seat at the Research Board of the University of California. In 2010, Syngenta funded a 10 Million-CHF grant for a Chair of Sustainable Agriculture at the Swiss Institute of Technology (ETHZ).⁵⁰⁸ This indicates how non-state actors can impose agendas on modern agriculture practices (e.g., Green Revolution, biotechnology, plant breeding, fertilizers). The involvement of private capital in various forms—philanthropic organizations, financial contributions—exposes the multiple facets of power exercised over the food system, with relevant social, political, economic and spatial effects. Prior to isolating their spatial impact, this examination is an attempt to recognize how authoritative structures apply a complex, economically and politically contingent pressure on sectors of food systems through indirect and/or non-financial means.

⁵⁰⁵ National Taiwan University Ranking, *Performance Ranking of Scientific Papers for World Universities* (Taipei, Taiwan: NTU, 2013).

⁵⁰⁶ Roger L. Geiger, *Knowledge and Money. Research Universities and the Paradox of the Marketplace* (Stanford, Calif.: Stanford University Press, 2004).

⁵⁰⁷ Anna Ghosh, *Public Research, Private Gain: Corporate Influence over University Agricultural Research* (Washington: Food & Water Watch, 2012).

⁵⁰⁸ Jennifer Gough, "Syngenta and ETH Zurich Launch Sustainable Agroecosystems Professorship," *News Center Syngenta*, November 10, 2010, <http://www.foodingredientsfirst.com/news/syngenta-and-eth-zurich-launch-sustainable-agroecosystems-professorship.html>.

Of the large number of institutional agents engaged in the food system, not all have been mentioned; however this work addresses the most spatially significant fraction.⁵⁰⁹ Their influence is not homogeneous. The impact of major international agencies assigned to tackle world hunger and food crisis (FAO, WFP) lies primarily in supporting the discursive framing on grain, biotechnology and liberal economy as solutions to end hunger and poverty, which appears to be mitigated on the ground. Contrastingly, national agencies related to long-term, country-specific, food-related programs with political agendas (USAID, Food for Peace, ECHO) are tangibly impactful both in local and global spheres. Tightly linked to financial mechanisms of control such as international trade arrangements, international regulatory and governance agencies (GATT/WTO, ISO, Codex) reflect the instrumental power of private firms and their strong political role in global governance. This form of “private authority” translates notably on standardization of food production. Finally, policy-making structures, agriculture and food research institutions (i.e. CGIAR, IFRPR, IRRI, Universities) appear to be partially under the indirect control of philanthropic institutions (i.e. Rockefeller Foundation, Ford Foundation, Gates Foundation) and of private firms. This suggests a power shift away from national public forces and towards private corporate structures in food research, a power struggle in which corporations have the upper hand.⁵¹⁰ Thus, the role taken by institutional agents emerge as nearly equally significant to that of financial actors because through governance, regulation and research agendas, they exercise influence over the food system on a global scale, the spatial consequences of which the present study attempts to identify.

This section, on THE POLITICAL ECONOMY OF GRAIN, seeks to uncover the ‘mystery’ of grain as commodity by outlining its flows. Drawing from the Global Commodity Chain, this reconstructed order of physical actions helps identify the key agents involved in the wheat chain, grouped by stages from production to consumption. Subsequently, the economic and social attributes of agents along the chain are contextualized within the broader mechanisms of the political economy of grain and food and critically assessed as for today’s world food order. The uncovering of the economic ideologies and financial instruments operating within the commodity chain is accompanied by primary observations on the physical implications of the allocation of financial, material and human resources in the chain.

⁵⁰⁹ For instance, UNICEF, the UN Development and the UN Environment Programs, or the World Health Organization are institutional agents connected to food in a more distant manner.

⁵¹⁰ Sell, "Corporations, Seeds, and Intellectual Property Rights Governance," 187.

The identifications of these actors and forces unveils how the political economy of food and wheat in particular covers a broad array of interests, with groups competing for finite resources and power with a backdrop of political and economic ideologies. In general, it appears from this overview that, with declining national regulations and state involvement, an immense majority of the agents engaged in the grain chain are private. A substantial part of these private agents is constituted of large corporate firms. Furthermore, the financial, governmental, and institutional agents that steer policy making, guide economic trends, and follow investment strategies underwrite this corporate control of food resources (e.g., land, labor force, production infrastructures, processing facilities) by private companies. Among the diversity, complexity and universality of the grain chain, three themes offer strong lines of enquiry to reflect on the effects of the political economy of grain upon space: firstly, food policies in relation to food distribution, because they act as a political framework for economic guidelines, are instrumental to address the correspondence between territorial ordering and the management of population, and points to the questions of biopolitics that Michel Foucault refers to as “apparatuses of security.”⁵¹¹ Of particular interest is the role of the agents involved in food assistance plans as the translation of economic ideologies, domestic policies and state-measures in which biological, political and economic contingencies deploy space with global, national or local consequences. Secondly, food production in relation to rural migration and urbanization forms another dominant theme, in particular with regard to land use changes, food production, and the ensuing competition between urban and agricultural space. Finally, food security represents a sensitive yet essential political topic that crystalizes national policies. An examination of how the pursuit of national food self-sufficiency results in large-scale territorial transformations involving complex arrangements of foreign investments and expertise seems essential. These three interconnected themes could offer a fruitful glimpse on the effects of the political economy of grain upon space and territory, as part of the larger enquiry developed in the following segment on Geography of the Grain Chain.

⁵¹¹ Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. Alan Sheridan (Harmondsworth: Penguin, 1975/ 1979), 26.

Geography of the Grain Chain.

In the popular book *Window Seat: Reading the Landscape from the Air*, the author deciphers patterns viewed from the sky and marvels over the "mysterious big round green circles in the middle of [North America]." ⁵¹² Despite their enigmatic appearance, there is nothing incidental about these configurations repetitively imprinted in the landscape; they are central pivot irrigators for crops: the topographical expression of one of the food system's pervasive political and economic effect. Invented in the 1940s and massively introduced after WWII in the U.S., a 500 meter-long pipe traces a watery circle around a well in the middle of a field. Center pivot irrigation accounts for a significant portion of increased wheat and corn yields achieved during the Green Revolution, with greater inputs of fertilizer and pesticides, new crop strains, and other technologies. ⁵¹³ In the U.S.A., irrigators are located in the areas over the High Plains aquifer system, one of the most crop productive territories in the world. The "emerald circles of cropland familiar to anyone flying over the region" are a paradigmatic and spectacular spatial outcome of the food system via its inputs and production practices. ⁵¹⁴ They serve as markers of a heavily mechanized food production practice based on low labor and maintenance requirements, intensive use of underground water resources, reduced crop production costs, and high yields for net return. The forms thus generated are physically illustrative of the correlation between space, land, labor and capital. A geographical form, central pivot irrigation patterns offer a quintessential example of the material reality the present research segment attempts to tackle by investigating the physical outcomes of current structural, political and economic agencies of global systems of wheat supply.

From the global production of wheat seed to the consumption of bread globally, the preceding chapter THE POLITICAL ECONOMY OF GRAIN sequentially defined the grain supply chain's materiality and its operative procedures, drawing from a Global Commodity Chain analysis. Examining the interactions among the agents and the contours of the current political economy of food and of wheat, this part of the work sets the structural framework with which to evaluate the spatial manifestations of the food system and the grain chain. In an inventory-like approach, this section Geography of the Grain Chain conducts a systematic examination of the apparent impacts of these agencies, and of the actions of agents at each stage of the grain chain.

⁵¹² See Gregory Dicum, *Window Seat: Reading the Landscape from the Air* (San Francisco: Chronicle Books, 2004).

⁵¹³ David Tilman et al., "Agricultural Sustainability and Intensive Production Practices," *Nature* 418, no. 6898 (2002).

⁵¹⁴ Michael Wines, "Wells Dry, Fertile Plains Steadily Turn to Dust," *The New York Times*, May 20, 2013, <https://www.nytimes.com/2013/05/.../high-plains-aquifer-dwindles-hurting-farmers.html>.

The analytical effort of this research section partly follows the Global Commodity Chain method, in particular its spatially rooted approach, investigating “where the global commodity chain “touch [es] down” geographically, why, and with what implications (...).”⁵¹⁵ Furthermore, as the lack of a critical outcome has often been a limitation to GCC methods—substantiated by the fact that international institutions such as the World Bank have integrated the approach as a plain appraisal device without analytical conclusions—the present investigation intends on the contrary to expand the approach as a tool for critical commentary. For this, the work of geographer Neil Smith’s is essential. In *Uneven Development*, Smith argues that the spatial divergences that emerge from the geographical dimension of capital take place at various scales that he refers to as “spatial scales of capital”.⁵¹⁶ This concept helps to establish the outline that allows for a grounded investigation presented in the case studies on Egypt.

Before embarking on an examination of the geographical space of the grain chain, some terms must be defined. “Grain chain” refers to the actions and actors that pertain to the production of wheat till its consumption worldwide. Geographical space is interpreted by Neil Smith in *Uneven Development* as the “totality of spatial relations organized to a great or lesser extent into identifiable patterns, which are themselves the expression of the structure and development of the mode of production, (...) an expression of the relation between capital and labor.”⁵¹⁷ This definition is closely tied to an understanding of geographical space as the “product of social forces,” yet it focused specifically on the “physical space of cities, fields, roads, hurricanes and factories.”⁵¹⁸ As noted earlier, existing lines of research pertaining to geographical contingencies of food often consider the final stretch of a commodity chain, but do not target the spatial manifestation of the physical processes all along the chain. In contrast, the geographical expression of activities related to grain worldwide is presently explored as “a territoriality that identifies the geographical dispersion or concentration of raw material, production, export, and marketing network.”⁵¹⁹

⁵¹⁵ Richard Appelbaum and Gary Gereffi, "Power and Profits in the Apparel Commodity Chain," in *Global Production: The Apparel Industry in the Pacific Rim*, (Philadelphia: Temple University Press, 1994), 43.

⁵¹⁶ Neil Smith, *Uneven Development: Nature, Capital, and the Production of Space* (New York: Blackwell, 1984), 135.

⁵¹⁷ *Ibid.*, 83.

⁵¹⁸ *Ibid.*, 75.

⁵¹⁹ Richard Appelbaum, "Commodity Chains and Economic Development: One and a Half Proposals for Spatially-Oriented Research," in *Globalization in the World System: Mapping Change Over Time*, Session 1: Commodity Chains and Labor in the Global Economy (CSISS/IROWS Specialist Meeting: University of California 2004), 1.

The current arrangements of the world food system are primarily identifiable by locating where agents of input, production, trade, processing, transportation, consumption, financing and governance perform their activities and how they physically relate to one another. The recognizable patterns of these relations embody what David Harvey refers to in *The Limits to Capital* as “spatial integration – the linking of commodity production in different locations through exchange” and chart a distinguished territory that will inform smaller scales of spaces.⁵²⁰ It is undeniable that the consequences of the operations undertaken by each agent along the grain chain stretch far beyond the sole site of their physical presence (firms headquarters, plants, mines, fields), yet a straightforward identification of the agents initial *locus* determines the primary tangible link between each agent and its space. Inspired by the traditional regional science view, this approach builds upon the legacy of location theory and the study of geographic locations of economic activity.⁵²¹

The geographical assessment of input agents reveals that the largest companies producing fertilizers and pesticides used in the culture of wheat are overwhelmingly based in the industrial or/and wheat-growing regions of the Northern Hemisphere (U.S.A, Canada, Europe, Russia, Belorussia), with the exception of rock phosphate and potassium salt extraction areas situated in the Middle East-North Africa region (MENA). Fertilizer use varies from one region to another because cropping patterns differ between regions, and input practices inherited from the Green Revolution are not homogeneously implemented. Worldwide, Asia is the largest consumer of fertilizers.⁵²² This is largely due to the successful introduction of Green Revolution methods in South and Southeast Asia since the 1970s and the use of crossbreed wheat and rice seeds coupled with chemical inputs. As a counterexample, fertilizer use on the African continent where wheat and rice are not largely cultivated and where the Green Revolution had little impact is negligible. This might change with the engagement of philanthropic agents (Rockefeller Foundation, Bill and Melinda Gates Foundation and the “Alliance for a Green Revolution in Africa”).⁵²³ Worldwide, the quantity of nutrients (nitrogenous, potash, and phosphate fertilizers) used per unit of arable land increased 20 percent since 2002.⁵²⁴

⁵²⁰ David Harvey, *The Limits to Capital* (Chicago: University of Chicago Press, 1982), 375.

⁵²¹ See Walter Isard, *Location and Space-Economy* (Cambridge: MIT Press, 1956).

⁵²² Food and Agriculture Organization, *Current World Fertilizer Trends and Outlook to 2016*, 23.

⁵²³ Paarlberg, *Food Politics*, 66.

⁵²⁴ Food and Agriculture Organization, *Current World Fertilizer Trends and Outlook to 2018* (Rome: Food and Agriculture Organization, 2015), ix.

Headquarters of major companies on the global market of licensed seed are established in the wheat production zones of North America (Monsanto, DuPont Pioneer, Dow Agrosiences) and of Europe (Syngenta, Bayer Crop Science, BASF), but they operate branches in other wheat production areas (India, China).⁵²⁵ More precisely, these areas are located in the temperate zones of the Northern hemisphere between the 30th and 60th latitude (North America, Europe, Asia and North Africa) and in the Southern hemisphere between the 27th and 40th latitude (Australia, Argentina, Brazil, and South Africa), corresponding to the *locus* of production agents. Ten countries harvest 75 percent of the world's total production.⁵²⁶ Worldwide, 249 million hectares of land are currently under wheat cultivation, of which China has the largest share, followed by the U.S.A., India and Russia. Additionally, environmental studies attest that where food production agents practice large-scale intensive agriculture, spatial effects ensue: i.e. forest clearing, soil degradation, modification of geomorphic processes, changes in natural waterways.⁵²⁷

Among the myriad of small trading agents sourcing the commodity, many are logically located along zones of wheat production. In contrast, major agents trading wheat globally (state-enterprises, private traders and international trading houses) display a greater geographical diversity. The distinction between exporting and importing trading agents must be emphasized, because their geographical locations reveal a critical discrepancy within the grain chain. In fact, the principal grain-importing agents of state-structures undertaking a government role of importing wheat are based solely in Asian countries (Pakistan, China, Japan) and the MENA region (Syria, Algeria, Egypt), while major private trading houses operate largely from North America and Europe's exporting areas. Among the "ABCD," grain trader Cargill is located in the US wheat-belt, at the source of the commodity (Minneapolis, Minnesota). Formerly located in rural Illinois, ADM moved its headquarters in 2014 to the epicenter of grain trade, Chicago.⁵²⁸ Bunge's headquarters are located in New York, a world relevant trading center of commodities. North America is also home to smaller competitors

⁵²⁵ Monsanto, Saint-Louis, Missouri; DuPont Pioneer, Des Moines, Iowa ; Dow Agro Science, Indianapolis, Indiana; Syngenta, Basel, CH; Bayer Crop Science, Leverkusen, Germany; and BASF, Ludwigshafen, Germany.

⁵²⁶ E.U., China, India, U.S.A., Russia, Canada, Australia, Pakistan, Ukraine, and Turkey were the leading wheat producers worldwide in 2013/2014. Food and Agriculture Organization, "FAOstat Database."

⁵²⁷ Billie Leff, Navin Ramankutty, and Jonathan A. Foley, "Geographic Distribution of Major Crops across the World," *Global Biogeochemical Cycles* 18, no. 1 (2004).

⁵²⁸ Archer Daniels Midland Company, "ADM Opens Global Headquarters and Customer Center in Chicago," ed. Jackie Anderson, August 25, 2014, <https://www.adm.com/news/news-releases/adm-opens-global-headquarters-and-customer-center-in-chicago>

(The Andersons, CHS Inc., Canadian Wheat Board, Paterson Global Foods, Richardson International, P&H, to name a few.). Australia, an important wheat-producing country, is similarly the base for important trading houses close to the source of the commodity (GrainCorp, CBH). On European ground, the largest trading house Louis Dreyfus is set close to the maritime transportation hub Rotterdam, along with smaller traders (Nidera, Vitol), disclosing its vertical integration within the transportation business (Louis Dreyfus Armateurs). Other companies of importance are located close to major grain-producing areas (e.g. French grain-trading houses Union InVivo, Axereal, Lecureur and Soufflet). A major importer of wheat, Japan is unsurprisingly the base for key grain-traders of the Asian region (Marubeni, Mitsubishi, Mitsui). A divergent pattern appears with Swiss-based Solaris Commodities and Glencore Grain, a subsidiary of energy-focused trader Glencore Xstrata, both exemplary of the commodification of grain. These trading agents are geographically detached from major areas of production or consumption, but close to Geneva, the largest exchange hub for grains and oil seeds, handling 75 million tons of the global free trade in these commodities.⁵²⁹ Similarly, the financial hub Singapore, competitor to Geneva, is home to medium-size agencies (Singapore-based “NOW,” Noble, Olam and Wilmar).⁵³⁰ Trading companies operate in other parts of the globe and the full spatial impact of their grain-related activities will be addressed later in this section.

Geographically, the transportation agents of the grain chain mark the movement of grain from local production zones to regional processing and storage facilities, and to global consumption areas. The geography of the transportation industry embodies the physical momentum between grain chain agents, “a spatial change, a change of place” productive of value.⁵³¹ Activities of transportations agents are geographically indissociable from the mobility infrastructures and transport systems necessary to bridge the large distances between areas of wheat-production and consumption (highways, railways, ports and waterways). To move grain from harvested fields to storage, transportation agents operate on roads and highway networks with animal-powered or motorized vehicles affiliated with farmers, production agents, and major grain-trading houses (e.g. Cargill Trucking Services, ADM Trucking). Freight trains

⁵²⁹ Emma Farge and Florence Tan, "Trafigura Shifts Trading Centre to Singapore," *Reuters*, May 23, 2012, <https://www.reuters.com/article/trafigura-trading-move/trafigura-shifts-trading-centre-to-singapore-idUSL5E8GN3U820120523>.

⁵³⁰ Emiko Terazono and Javier Blas, "Swiss Commodities Traders Feel Singapore Heat," *The Financial Times*, March 14, 2013, <https://www.ft.com/content/2f50579e-8c79-11e2-8ee0-00144feabdc0>.

⁵³¹ Karl Marx, *Grundrisse. Foundations of the Critique of Political Economy*, trans. S.W. Ryazanskaya (New York: Vintage Books, 1973), 533.

tracks (in North America, Europe, the former Soviet-Union countries, and China), and inland navigable routes (Mississippi River, Illinois Waterway, Rhine, Danube, Mekong, Yangtze) used for mass transport of grain also serve this purpose in wheat-producing countries of the Northern Hemisphere.⁵³² It is significant that two headquarters of the main train freight companies in the U.S.A. are located at transportation hubs linking highway routes, waterways and train tracks (CSX Transportation in the major deep-water harbor of Jacksonville, Florida, and Union Pacific in Omaha, on the Missouri River). In comparison, maritime transport of grain displays curious geographical discrepancies between sites of grain harbor-terminals, cargo routes, boat companies addresses, and brokers' offices, for instance. This is because maritime freight is one of the most globalized industries in terms of ownership and operations, thus the administrative seats of transportation agents, the infrastructures network within which they operate, and the place of brokerage agents in charge of the logistics are geographically dispersed. For instance, transportation agents responsible for the logistics of grain are geographically detached from grain shipping infrastructures. Shipbrokers that arrange the transport of wheat by sea and act as intermediaries between ship-owners and charterers (seller-buyers of grain) are registered at the Baltic Exchange, and mostly based in the century-old market place for ship freight transactions in London. While this situation is historically grounded, one would have to examine in depth the much-debated historical geography of the mechanization of land and maritime transport systems linking markets of Europe and North America to fully capture the mutual development of such networks. What the geography of major seaports worldwide unmistakably mirrors is the political economy of food and the current food order, disclosed by the volume of wheat exports and imports transiting through maritime networks. The major harbors exporting grain internationally are in the U.S.A. and Canada, with the port sites located along the Colombia River (Vancouver, Portland, Tacoma) and the Great Lakes' harbors (Duluth, Thunder Bay, Quebec City), serving northeast of US production areas, Saskatchewan and Alberta. The Central Gulf Coast (South Louisiana, Brunswick, Houston, Corpus Cristi) serves the southern end of the US grain belt.

Similarly, all major European seaports exporting wheat are located on the North Sea (Amsterdam, Rotterdam, Antwerp, Ghent, Rostock, Hamburg, Rouen) with the exception of the harbor of Novorossiysk, on the Black Sea. The significance of Australia on the market is manifested by its six grain-exporting harbors. On the receiving end of maritime transport lines,

⁵³² The World Bank, "World Development Indicators," ed. World Road Statistics and electronic files, International Road Federation (Washington: The World Bank Group, 2010-2014).

the most active grain-importing seaports are in the MENA region (Damietta, Alexandria in Egypt, Aden, Yemen), in Asia (Dalian, Huangpu, Qingdao, Shijiazhuang, Nongpo, Nanjing, Shenzhen in China, Taichung and Kaohsiung in Taiwan, Kashima, Chiba, Nagoya, Yokohama, Shimizu, Kobe and Hakata in Japan) and in South America (Santos and Salvador in Brazil).⁵³³ Main maritime routes (or sea lanes), water corridors of a few kilometers in width, connect major grain market ports. The geography of these routes is the result of “obligatory points of passage, which are strategic places, of physical constraints (coasts, winds, marine currents, depth, reefs, ice) and of political borders.”⁵³⁴ The most important trading routes for grain are from North America to Asia, from the EU to Africa, from North America to South America, and from South America to Europe and intra-Asia. This geography of transportation epitomizes the current food regime with the supremacy of North America, Russia and Europe as top producers and exporters of wheat and with the food dependency of importing countries such as Egypt. While it is challenging to sample the geographical location of the over 1,000 private and public companies that undertake the transfer of grain by maritime shipping, patterns can be discerned. Public agencies owning fleets are largely part of grain importing countries of the developing world (China, Iran, India, Bangladesh, Pakistan), with the exception of Russia (Sovcomflot/SCF).⁵³⁵ The tremendous amount of private agents engaged in the ocean transportation services of grain cargoes allows only a partial identification of a geographical pattern. If Northern Europe (Denmark), Greece and Asia (China, Korea) are home to important shippers, many companies’ headquarters are located in tax havens (Marshall Islands, Bermuda, Monaco). There, ships are registered under flags of convenience, permitting ship-owners to be legally anonymous and immune to civil and criminal actions. Malta is home to the chartering fleet of grain-trader Louis Dreyfus. Japanese Marubeni Logistics Corp. and Mitsui O.S.K. Lines Ltd. operate from their archipelago. This heterogeneous distribution reveals such activities are not related to natural favorable conditions of trade routes but rather economic motives, a commercial geography of sort.

The geography of processing agents parallels that of millers and milling industries. Physically grounded to infrastructures requiring energy-power, the global milling industry includes facilities ranging from small-sized mills to industrial milling factories. Prior to 1950,

⁵³³ Chris Lyddon, "Global Grain Trade Review," *World Grain* 29, no. 11 (2011).

⁵³⁴ See Rodrigue, Comtois, and Slack, *The Geography of Transport Systems*, Chapter 3.

⁵³⁵ Profile: Sovcom (SCF Group)," *Bloomberg*, accessed May 4, 2018, <https://www.bloomberg.com/profiles/companies/1559031D:ID-sovcom-capital-designated-activity-co>.

mills were frequently built close to wheat production areas, but after 1960, a decrease in grain shipping costs (via trains and barges) and higher sanitation standards for flour shipment led to the construction of new mills in close proximity to end markets and transportation hubs. The geography of milling is thus attendant to wheat production and consumption areas and importing facilities. Though there is no known international survey on the location of flourmills, an inquiry into the French processing agent Moulins Soufflet reveals mills countrywide, with a predilection for the periphery of large urban areas. Similarly, a map survey of the major milling facilities in Canada and the U.S.A. shows that they are still predominantly located in wheat-cultivation zones, close to major transportation hubs (Portland, Seattle) or to major urban centers (Los Angeles, New York). In the U.S.A., Kansas is the largest wheat producer and also the first state in flour millings, with North Dakota a close second (home to the largest flour mill in the country, publicly owned). Located amidst the wheat belt of the U.S.A. and home to processing agent General Mills, Minneapolis gained the nickname “Flour Milling Capital of the World”. Both in Europe and in Northern America, large grain-trading houses often double as milling agents (Horizon Milling LLC/ Cargill, ADM Milling, Ariane Meunerie/Axéreal, Moulins Soufflet), thus facilitating the supply of grain to their facilities. With the exception of South Korea and Japan, the largest wheat importers are developing countries. Material infrastructures related to the import (unloading machines, port facilities) and to the processing of grain (feed mills, integrated livestock operations, flourmills) are manufactured in the developed world, which then produces and provides the necessary substructure to exporting markets. Furthermore, with many flourmills of importing countries under foreign control, the geography of milling indicates a large integration process, with international grain-traders controlling the grain chain from local production to processing (e.g. Cargill in Nigeria). Thus, while creating an illusion of self-sufficiency, many flourmills in the developing world are relying on great volumes of foreign wheat to supply urban populations, an element underlined by their location near import facilities or cities. This is the case, among others, in China where many foreign wheat mills are located on the periphery of Shanghai and Beijing or in the wheat-producing areas (Singaporean firm Wilmar in the Guangdong Province). Thus, the geography of processing is tightly related to that of distribution.

Distribution agents, as previously mentioned, are responsible for the supply of the staple food to consumers. Systems of distribution are the physical manifestation of governance policies, supply and demand market economies, and other processes (e.g. reciprocity, non-

market food exchanges).⁵³⁶ The two main types of distribution undertaken by public agents are local food assistance programs and international food aid. Firstly, the geography of governmental institutions running state-sponsored food assistance programs in various forms suggests that such a food allocation mode is associated to political systems of autocracies of bread of the MENA region and beyond (Algeria, Morocco, Tunisia, Egypt, Jordan, Yemen, Iran), along with the Ethiopian and South African governments. In Asia, all countries of the sub-continent employ this system as poverty alleviation programs (Pakistan, India, Bangladesh, Sri-Lanka) along with two Southeast Asian countries (Indonesia, Philippines). India runs the largest food safety net program in the world, part of its national strategy to reduce poverty and hunger.⁵³⁷ A small number of Caribbean, Central and South American countries also run a comparable system (Jamaica, Mexico, Costa Rica, Honduras, Chile, Peru). The American government operates an extensive domestic food stamps allowance program (Supplemental Nutrition Assistance Program formerly Food Stamp program), tapping into its farm surpluses to alleviate food insecurity and feed populations unable to purchase food.⁵³⁸ Secondly, the geography of international food aid donors in kind (94 percent of food aid is cereal) reveals that while UN agencies are the main providers (i.e. World Food Program), the United States of America, Japan, and the European Union donated the largest share of direct food transfers to Sub-Saharan Africa (Ethiopia, Sudan, Kenya), Asia (Pakistan, Bangladesh, Afghanistan), Middle East & North Africa (Occupied Palestinian Territory, Yemen, the Syrian Arab Republic), Latin America & the Caribbean (Haiti, Guatemala, the Dominican Republic), and Eastern Europe (Kyrgyzstan, Tajikistan, Armenia- Russia being the main donor). The geographic overview of direct international food aid discloses that receivers are principally developing countries located in conflicts zones or victims of natural catastrophes. Despite the shift from food aid to grain trade and the US exports decline formulated by Harriet Friedmann in "The Origins of Third World Food Dependence," the food aid map mirrors persistent patterns of influence of the current food regime.⁵³⁹ Among donors, the United States of America and the European Union are indeed both large wheat producers that still export their

⁵³⁶ Pelizzon, "Grain Flour, 1590-1790," 87.

⁵³⁷ Sukhadeo Thorat and Nidhi Sabharwal, "Food Security for India's Poorest of the Poor," in *2013 Global Food Policy Report*, ed. Avinash Kishore (New Delhi: International Food Policy Research Institute, 2013).

⁵³⁸ Feeding America, "Supplemental Nutrition Assistance Program (Snap)", accessed 4 May, 2018, <http://www.feedingamerica.org/take-action/advocate/federal-hunger-relief-programs/supplemental-nutrition-assistance-program.html>.

⁵³⁹ Friedmann, "The Origins of Third World Food Dependence."

wheat surpluses as aid, with political motives that have been previously discussed. Japan, on the other hand, is a donor country without surpluses. Japan's donations are not motivated by humanitarian concerns but are concurrent to the country's trade policy. Using food aid to meet food import obligations under WTO agreements (member countries must allow 5 percent of food consumed to be imported tariff-free from the world market), Japan allots this so-required minimum level of food imports for procuring food-aid.⁵⁴⁰ In short, the geography of food aid appears a territorial manifestation of donor's agricultural, foreign and trade policies and their targets, and its shifting location over the years illustrate as much immediate urgencies as fluctuating interests in geopolitical spheres. But while the flow of food aid constantly decreases over the years and the recipients list changes, the triumvirate of donor countries persists, marking a consolidated geography of power, with the main food agencies obeying the priorities of US foreign policy with regards to areas of intervention, volume of food aid and modalities of assistance.⁵⁴¹ Evidently, Non-Governmental Organizations are intrinsically part of such power structures as they rely on the same donors for their direct food distribution activities. However, because of the increasing practice of food aid monetization (the sale of food shipped from the US or EU, sold for local currency in a recipient country), fewer NGOs undertake direct food aid programs. Among the large US-funded NGOs active throughout the globe, the activities of CARE display a clear geographic bias towards the developing countries of the Southern hemisphere (Africa and Southeast Asia), and direct food aid emergency programs in international conflicts and crisis zones (e.g. Darfur refugee camps).⁵⁴² The sites of the HQs of the three major NGOs involved in food aid—in terms of volume distributed—mirrors these pattern of donors with World Vision International based in Monrovia, California, U.S.A., CARE International based in the second largest commodity trading hub Geneva, and Save the Children International operating from London, a food trading and logistic hub. To complete this outline of the geography of food distribution, it is worth mentioning how the prevailing ties between maritime interests, domestic food processors and charitable sustain current food aid mechanisms.

⁵⁴⁰ Barrett and Maxwell, *Food Aid After Fifty Years: Recasting Its Role*, 61.

⁵⁴¹ In addition to food aid in emergencies, charitable "groups also sell about \$180 million worth of often highly subsidized American farm goods in poor countries to generate revenues for their long-term antipoverty programs. These sales are known as the "monetization" of food aid." in Celia Dugger, "As U.S. Food Dollars Buy Less, International Agencies Differ over How to Use Aid," *The New York Times* (2007), <https://www.nytimes.com/2007/10/03/washington/03food.html>.

⁵⁴² CARE, "Countries in Crisis", accessed May 4, 2018, <http://www.care.org/emergencies/crisis-map>.

Distinct from food aid structures embedded in market systems of supply and demand, distribution agents of the private sector sell food (wheat and all its derivative products) for household consumption. Determining a complete global geography of private distribution agents (shops of any size selling bread and baked products) would be an unreasonable task, but spatial patterns of systems of food provision have been identified, notably within the discipline of retail geography, a sub-theme of economic and urban geography. While a multitude of effects might be traced, three phenomena are hereafter underlined as most relevant to space. The first consists of the known geographic distinction between developed and developing countries. In rich economies, formal markets, shops and supermarkets are the main suppliers of domestic food; in lower-income countries, populations mainly rely on informal retailing for the provision of bread and wheat products. A second spatial observation signals that actors of the food industry are operating both as processing and distribution agents connecting rural agricultural spaces of food production to industrial spaces of processing, from there on to global networks and urban-centered food complexes. Marking an increased corporate control over food retailing, large wholesale corporations have been expanding globally, although they all originate from, and are based in the Northern Hemisphere. Among the largest retailers, North American firms lead (Walmart, Kroger, Costco, Target), followed by British (Tesco), French (Carrefour, Auchan), German (Metro, Lidl, Aldi) and Japanese companies (7/11, Aeon). One indicator of the correlation between food retail firms and geographical space rests in the argument that their global growth is partially fueled by urbanization and raising income levels of developing countries.⁵⁴³ It has also been suggested that retail infrastructures are implanted “with the hope that the city will follow,” thus possibly triggering urban expansion.⁵⁴⁴ Finally, a third relevant geographical pattern concerns the food access discrepancy between urban and rural areas. In developed countries, these are called “food deserts,” usually peri-urban or rural low-income neighborhoods associated with racial residential segregation and poverty with no or a limited number of retail supermarkets and poor access to affordable and healthy foods.⁵⁴⁵ Worldwide, rural populations also appear not to get full access to food aid, a spatial distinction suggesting that both market and state entities have an urban bias. These observations establish a preliminary link between the spatial aspect of food accessibility to larger theoretical realms,

⁵⁴³ Marsden et al., "Finance Capital and Food System Restructuring: National Incorporation of Global Dynamics."

⁵⁴⁴ Jesse LeCavalier, "Empire of Efficiency: The Urban Impact of Retail Logistics Using Walmart Stores, Inc. As a Case Study" PhD diss. (ETHZ, 2011), 137.

⁵⁴⁵ Lois Wright Morton et al., "Accessing Food Resources: Rural and Urban Patterns of Giving and Getting Food," *Agriculture and Human Values* no. 25 (2007).

namely to Michel Foucault's concepts of governmentality and biopolitics, and the modern concern for populations' health as technology of power, themes that are explored further in this work.⁵⁴⁶

Finally, we, the domestic consumption agents, are at the end of the food chain. As it has been established earlier in this work, the principal agents of wheat and bread consumption are domestic consumers.⁵⁴⁷ In fact, 71 percent of the 708 million tones representing the world's wheat production in a year were consumed for food, with the rest employed as animal feed and a small part as biofuels.⁵⁴⁸

A global geography of wheat consumption reveals China, India, Russia, the U.S.A., Pakistan, Turkey, Iran, Egypt, Brazil, and Ukraine as the world's primary consumers. In developing countries, increased urbanization—most clearly seen in sub-Saharan Africa and China—and a shift in preference to wheat over rice and coarse grains pushed the adoption of wheat as a food in countries that had consumed little in the past. Per capita meat demand is also a major driver of trade in grain, particularly in the Middle East, North Africa, and Asia, while in high-income countries, wheat consumption has decreased due to changing dietary preferences. Such trends exacerbate the spatial separation between high-income, wheat-producing countries with declining local demand and emerging, production-deficient countries with growing wheat demand.

This geography of consumption cannot be considered without being juxtaposed with a global geography of hunger to disclose the dysfunctions of the world food system and link it to its political economy. According to the FAO 2014 report "The State of Food Insecurity in the World," 805 million people are estimated to have been chronically undernourished in 2012–14. The vast majority of these people live in developing countries (791 million).⁵⁴⁹ The Organization, while stressing that considerable efforts have been made since the 1990s to reduce hunger, indicated that the 2015 Millennium Development Goal (MDG) hunger target of halving the number of undernourished people was not met. Africa (226.7 million) and Asia

⁵⁴⁶ See Michel Foucault, *The Birth of Biopolitics. Lectures at the Collège De France*, ed. Michel Senellart (Basingstoke: Palgrave Macmillan, 2008).

⁵⁴⁷ Food and Agriculture Organization, *FAO Cereal Supply and Demand Brief*.

⁵⁴⁸ Shiferaw et al., "Crops That Feed the World. Past Successes and Future Challenges to the Role Played by Wheat in Global Food Security," 4.

⁵⁴⁹ Food and Agriculture Organization, *State of Food Insecurity in the World 2014: Strengthening the Enabling Environment for Food Security and Nutrition* (Rome: Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, World Food Programme, 2014), 10.

(525.6 million) are the regions where undernourishment is the most widespread.⁵⁵⁰

Undernourishment is strongly connected to the value of food as a commodity because if not self-produced, it must be purchased. Thus, food insecurity and malnutrition are often the result of poverty and are therefore exacerbated by high food prices, creating fertile grounds for social unrest (see Urban Food Riots). In this sense, it is not undernourishment that causes popular dissent but rather hikes in food prices, and governmental shortcomings. The greatest territorial impacts of high food prices are large investments by private firms and governments in agricultural production worldwide, including the purchase or lease of farmland, considered a lingering effect of the food price crisis of 2007–08. This phenomenon must, however, be considered to have been generated by financial forces involved in the grain chain and thus will be addressed within the geography of financing agents.

Studies on the geography of finance abound, with geographers and political economists influenced by the Marxist theory of David Harvey centering research on issues of financial globalization and state sovereignty, the global and local connectivity of financial flows and networks, the spatial patterns of financial services, uneven development and financial exclusion, and the creation of new financial spaces (world cities and financial centers) shaped by the de- and re-territorialization of global economic space wrought by the growing power of finance.⁵⁵¹

In *The Limits to Capital*, Harvey provides the essential theoretical political economy framework for mapping out the spatial facets of money and finance.⁵⁵² International financial institutions are known to “coordinate economic inputs across a (...) spatial division of economic activity in the world, while at the same time being embedded in local social, cultural and institutional structures.”⁵⁵³ A brief outline of the geography of international financing agents engaged in the food regime seem to strengthen previous arguments on uneven growth and financial exclusion, as well as the dominance of western countries over developing ones. Both the headquarters of the International Monetary Fund and the World Bank are based in Washington, D.C. Other headquarters of lateral entities within the World Bank Group, such as the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA) or the Inter-American Development Bank (IADB) are

⁵⁵⁰ India, China, Bangladesh, the Democratic Republic of Congo, Pakistan, Ethiopia, Tanzania, the Philippines, Brazil, and Indonesia are the countries where undernourishment is the most rampant.

⁵⁵¹ Jayson J. Funke, "Geography of Finance," *Geography*, (2013), Introduction.

⁵⁵² See Harvey, *The Limits to Capital*.

⁵⁵³ Martin Müller, "Geography of Organization," in *International Encyclopedia of the Social and Behavioral Sciences*, ed. James D. Wright (Amsterdam: Elsevier, 2015), 6.

likewise located in Washington, D.C., which emerges as a major decision-making center in regard to financial food matters (e.g. agriculture and rural development funds, farm policies). Regional banks affiliated with the World Bank and operating in specific areas are located in capitals of developing countries of the Southern hemisphere. For instance, the African Development Bank (AfDB) headquarters is officially in Abidjan, Côte d'Ivoire. The Asian Development Bank (ADB) is based in Manila, Philippines, one of the closest U.S. allies in Asia. The European Bank for Reconstruction and Development (EBRD) has its headquarters in the City of London, UK. This geography only confirms the system of global financial centers as nodes in the global economy formulated by Saskia Sassen in *The Global City: New York, London, Tokyo*, which asserts that “new forms of territorial centralization of top-level management and control functions (...) tend to locate in cities.”^{554 555} Pursuing the location survey of the main private financial agents, specifically those involved in the food system through acquiring large tracts of farmland in developing countries, a spatial pattern coherent with financial flows emerge. Private equity banks such as Morgan Stanley and Goldman Sachs, hedge funds like BlackRock, and investment firms focused on Africa Jarch Capital or Lonrho operate from major financial centers in the US or Europe (HQs in New York or London). Japan, South Korea and Gulf-based countries invest via large semi-private conglomerates such as Daewoo and Hyundai (Seoul), Mitsui (Tokyo), Al Qudra (Abu Dhabi – UAE), joint-venture Al Rajhi Group- Jenat (Saudi Arabia), Dubai World Trading Company (UAE), for instance. Investment groups specialized in agriculture offer a more diverse geography, showing a proximity to prime wheat production zones in Ukraine and Russia: Black Earth Farming (HQ in Moscow, Russia, and a registered office in Jersey), Alpcot-Agro (HQ in Moscow), Landkom (HQ in Douglas, Isle of Man, UK, with subsidiaries in Ukraine and Cyprus), Trigon Agri Group (Denmark-based with operations in Ukraine, Russia, and Estonia). Agriculture investment funds bringing together assets of multiple investors in a collective investment scheme chart a more complex geography. For instance, Agri-Vie is a fund based in South Africa that counts among its financiers private entities such as the W.K. Kellogg Foundation (HQ Battle Creek, Michigan). As financial agents produce a parallel and complementary geography of financial flows, it is necessary to extend the survey beyond financial centers, to their resulting spatial outcomes. All the entities previously listed have been involved in the phenomenon called ‘land grabbing’ by researchers referring to the large-scale acquisition of land to develop commercial investment in agriculture,

⁵⁵⁴ See Saskia Sassen, *The Global City: New York, London, Tokyo* (Princeton: Princeton University Press, 1991).

⁵⁵⁵ Saskia Sassen, "The Global City: Introducing a Concept," *Brown Journal of World Affairs* 11, no.2 (2005): 32.

mostly in developing countries of the Southern hemisphere. Activists argue that such investments have severe impacts on poverty and food security in affected populations, straining water and land resources and causing loss of land for local food production. In 2010, the World Bank report on so-called “agricultural investments” estimated this global phenomenon at 45 million hectares.⁵⁵⁶ The geography of land grabs indicates that these are tightly related both to economical influence and to socio-political aspirations of food security.

Clear geographical patterns of investment are identifiable:

Food-importing countries with land and water constraints but rich in capital such as the Gulf States are at the forefront of new investments in farmland abroad. In addition, countries with large populations and food security concerns such as China, South Korea, and India are seeking opportunities to produce food overseas. These investments are targeted towards developing countries where production costs are much lower and where land and water are more abundant.⁵⁵⁷

The Gulf States provide a paradigmatic case because of their low availability in arable land and water. After failed attempts of self-sustenance and with raising restrictions on grain exports on global markets, they have turned to overseas investments dedicated to food security in Asia and Africa. Though in earlier deals—between 2005 and 2010, only developing countries were solely targeted (i.e. Sudan by South Korea and United Arab Emirates, Tanzania by China and Saudi Arabia, Cambodia by Kuwait and Vietnam, Indonesia by Saudi Arabia, Pakistan by UAE, Philippines and Turkey by Bahrain), institutional investors of the developed world have now started to purchase agricultural land in their own countries. Recently, the North American pension fund TIAA-CREF committed billions to buying US agricultural land, indicating a change in the economic value of land and water, with high food prices triggering high farmland prices.⁵⁵⁸

When assessing the geography of institutional agents involved by means of authority or governance on the food system, Rome (Italy) surfaces as a major pole for international organizations involved with food: The headquarters of the International Fund for Agricultural Development (IFAD), the World Food Program (WFP), and the Food and Agriculture

⁵⁵⁶ Joachim von Braun and Ruth Suseela Meinzen-Dick, “Land Grabbing” by Foreign Investors in Developing Countries” *International Food Policy Research Institute (IFPRI)* 13 (2009).

⁵⁵⁷ *Ibid.*, 1.

⁵⁵⁸ Lukas Ross, *Down on the Farm. Wall Street: America's New Farmer* (Oakland: The Oakland Institute, 2014).

Organization's HQ are based there. This is largely related to the historical legacy of the International Institute of Agriculture (IIA) founded in 1905 by the King of Italy, and supported by agriculturalist David Lubin. National agents of food aid are logically located contiguously to corresponding patrons. The United States Agency for International Development (USAID) is in Washington, D.C. and the Programme Food Aid (PFA) and the European Community Humanitarian Office (ECHO) are both based in Brussels. The major grain trade hub of Geneva (Switzerland) marks another post of power, as it is also home to regulatory structures that influence the food system by ways of trade rules and standards: the World Trade Organization (WTO), the Codex Alimentarius Commission (CAC) and the International Standards Organization (ISO).

Finally, the site location of research institutions, philanthropic organizations, and think tanks relevant to the production of knowledge on food reflects their link with major financial agents. Both the Rockefeller Foundation and the Ford Foundation are based in New York. The International Food Policy Research Institute (IFPRI) is established in Washington D.C. If the 14 other research centers that form the Consultative Group on International Agricultural Research (CGIAR) network are distributed around the world, it is because, in addition to the need to research local crops on site, their mission is of commanding nature: advocating Green Revolution practices in the developing world. Locally influential at decision-making levels, the International Rice Research Institute (IRRI) is based in the Filipino capital, Manila. Other centers are scattered all over developing countries of the Southern hemisphere.⁵⁵⁹ The locale of universities relevant to food might be less revealing, as the production of knowledge does not require a physical proximity to be influential. However, an overview of sites outlines a polarized geography of knowledge, with major universities undertaking research on food and agricultural science concentrated in developed countries: Wageningen University in the Netherlands, the Institut National de Recherche Agronomique (INRA) in Montpellier (France), the Swiss Institute of Technology in Zurich (Switzerland), and a multitude of academic research centers in the U.S.A. including the Center for Food Safety of the University of Georgia, the Plant

⁵⁵⁹ All centers are located in developing countries of the Southern hemisphere: in Mexico D.F. (International Maize and Wheat Improvement Center), Cotonou, Benin (AfricaRice), Bogor, Indonesia (Center for International Forestry Research), Beirut, Lebanon (International Center for Agricultural Research in the Dry Areas), Cali, Colombia (International Center for Tropical Agriculture), Patancheru, India (International Crops Research Institute for the Semi-Arid Tropics), Ibadan, Nigeria (International Institute of Tropical Agriculture), Nairobi, Kenya (World Agroforestry Centre, International Livestock Research Institute), Lima, Peru (International Potato Center), Colombo, Sri Lanka (International Water Management Institute), and Penang, Malaysia (WorldFish), with the notable exception of Biodiversity International based in Rome.

Sciences Institute of Iowa State University, the University of California – Davis, and Cornell University.

In conclusion to this overview of a possible geography of the world food system, if to track down the positions of agents through a site-focused approach may appear simplistic, locations constitute a quantitative indicator offering a useful insight into the concentration and interconnectedness among agents and their sites. The most striking geographical pattern of the grain chain is the enduringly dominant position of North American firms in wheat production, transportation, and trading. The world's exporter of wheat is also prevailing over the future markets (CBOT, Kansas City) with Chicago establishing prices for the world. This is partly because it has sufficient storage facilities and uses these volumes as buffers, but also because the subsidy system supports its farming industry and food-aid programs assist export activities. While this is the legacy of “the Atlantic-centred food regime” as termed by Friedmann, then referring to the second food regime, the institutionalization of mechanisms and norms of global regulation that outline our current –and third- food regime (See Food Regimes) suggest that there is not a single country ruling the food system anymore, and that all states have been rendered subjects to corporate rights of free trade and private investment.⁵⁶⁰ Nevertheless, the geography of private firms and their operations proves that they overwhelmingly originate and belong to the developed regions, Europe and North America in particular. If it is true that the role of financial institutions interfering at various stages of the grain chain is relatively new, giving its name to the third food regime as ‘financialised food regime’ or ‘corporate food regime’, and as private industry, firms and transnational organizations largely supplant the role of the state at all levels of the grain chain, changes in the existing geography of power are not noticeable. The set of rules institutionalizing corporate power in the world food system only strengthened the WTO as the key institution alongside other associated institutional agents that preserve the “Northern agricultural subsidies behind a facade of economic liberalization,” thereby keeping states in developing countries of the Southern hemisphere under their dependency and control.⁵⁶¹ Few researchers questioning “whether and to what extent a private food regime is embedded in and behind the institutional trappings of the multilateral system” have investigated the spatial counterpart of these changes. Jason Moore in “Environmental Crises and the Metabolic Rift in World-Historical Perspective” argues of the relationship

⁵⁶⁰ Friedmann, "The Political Economy of Food: A Global Crisis."

⁵⁶¹ McMichael, "A Food Regime Genealogy," 153.

between the subordination of agriculture to capitalist production relations (progressive transformation of agricultural inputs, dependency upon chemicals and bioengineered seeds produced under industrial conditions) and an amplification of the historic spatial separation between countryside and city as agriculture industrializes.⁵⁶² He refers to the Marxist concept of 'metabolic rift', the separation of social production from its natural biological base. Moore's hypothesis is particularly relevant because it implies a change in scale, a shift from observing the political and economic effects of the grain chain at a geographic scale to that of national and territorial realms, progressing from the economy to the land.

⁵⁶² Jason W. Moore, "Environmental Crises and the Metabolic Rift in World-Historical Perspective," *Organisation & Environment* 13, no. 2 (2000).

2. EGYPTIAN TERRITORIES

2.1 POWER, SPACE, AND FOOD

A Territorial Interpretation of Power: From Muhammad Ali to Abdel-Fatah el-Sisi

Modern Egypt: Property, Discipline, Debt

Nasser's Territorial Agenda

Sadat's Open-door Policy

Three Decades of Mubarak

Revolutionary Momentum

El-Sisi: Perpetuating Status Quo

The City, the Countryside, the Desert

Food Policies, Food Production, and Food Security



2. EGYPTIAN TERRITORIES

2.1 POWER, SPACE, AND FOOD

In Egyptian, bread means life.

Ramy Essam, "Bread, freedom, social justice!" 2011, Karim Ali Ismail Production.¹

In January 2011, when the Egyptian population took to the streets of downtown Cairo to oppose President Hosni Mubarak's long-lasting regime, marchers chanted "Bread, Freedom, Social Justice!" During the ensuing wave of unrest, bread has been an ever-present component of rallies; it has been held up above crowds, tapped on heads, and even used as slogan board. This intersection of urban revolt and subsistence uncertainty points to food and bread as indisputably strategic political components; furthermore, it defines several issues of feeding populations and the spatial reality involved, while putting Egypt in the spotlight of this debate.²

A Territorial Interpretation of Power: From Muhammad Ali to Abdel-Fatah el-Sisi

A land beset by biblical plagues, toad rains, and famines documented as early as the Book of Exodus, Egypt's relationship to food is historically torrid and dynamic. Theological curses aside, the Nile Delta and Nile Valley were among the most fertile agricultural areas of ancient times, and attempts to control its revenues have been ongoing for centuries. A major geo-political point in the Fertile Crescent, Egypt provided food prosperity to the whole Mediterranean region. As a result, the area has suffered continuous foreign invasion and rule by the Greek, Roman, Arab Islamic, Ottoman, and British empires. Power over the country's resources, land, and people meant control over the most important asset of the region, the fertile strip formed by the Delta and the Nile Valley. Now as then, agriculture lies at the core of the Egyptian food system. All matters of land (e.g., soil, irrigation, labor, ownership, taxations) relate to both food provisioning and to territory, as a geographical space shaped by human needs and political processes. Egypt's history of sovereignty is characterized by abrupt land reforms and incisive interventions in political and social structures to manipulate control

¹ Essam, Ramy. *Bread, Freedom, Social Justice!*. Youtube Video. Cairo: Karim Ali Ismail Production, 2011. <https://www.youtube.com/watch?v=Y9Re4zJkoQM>.

² Jörg Gertel and Said Samir, "City Case Study Cairo. Cairo: Urban Agriculture and Visions for a 'Modern' City" (paper presented at the Growing Cities Growing Food: Urban Agriculture on the Policy Agenda Conference, Havana, Cuba, 2005). 209-234.

over resources. Initially, feudal and colonial rulers attempted to organize agricultural supplies and the “productive powers” of the country.³ In order to control Egypt's agrarian land, these leaders enforced authority over population and space through fiscal, political, and military rule (see section *Modern Egypt: Property, Discipline, Debt*). In addition to modernization and debt, this era (1840-1952) is marked by repetitive attempts to manipulate taxations of the agricultural system to appropriate land.⁴ During Gamal Nasser's rule (1952-1970), landownership reforms and construction of massive infrastructures led to socio-spatial transformations that remain central to today's territorial organization, to the link between urban and rural worlds, and to the pressing question of food security (see *Nasser's Territorial Agenda*). Anouar Sadat steered the shift of the local economy toward world markets. His government (1970-1984) notably revoked Nasser's land reforms, embracing tourism industry and speculative investments. In 1977, agreements with the IMF to cut subsidized food programs sparked notable food riots (see *Sadat's Open-door Policy*). Under Hosni Mubarak's rule (1984-2011), economic restructuring eroded the role of the welfare state, and more IMF measures finalized the country's liberalization. New land reforms in favor of bigger estates fueled rural poverty and exodus to cities. Lack of affordable housing for new migrants facilitated informal urban growth, which the state failed to regulate. Under claims of tackling food security and overpopulation, large-scale infrastructure projects and real-estate expansion significantly modified urban and rural spaces. Rampant political corruption, inflation, unemployment, and food crisis established the pre-revolution conditions, which eventually led to the fall of the regime (see *Three Decades of Mubarak*). Urbanization thrived during the vacuum of power ensuing the 2011 events and Mohamed Morsi's short-lived rule (2012-2013), and the rapid political shift did not allow for major changes to happen (see *Post-revolution Momentum*). Following the military coup and the election of Abdel-Fatah el-Sisi (2013-today), major administrative, industrial and agricultural projects were initiated or re-launched, suggesting political continuity in land policies and large-scale projects with expected territorial consequences (*El Sisi: Perpetuating Status Quo*). A chronological examination of these six eras through the lens of territory as “the spatial definition of governmental control, political, and military organization,” informs how the structures of

³ John Bowring, "Report on Egypt and Candia," *Sessional Papers* xxi (1840). 12.

⁴ Timothy Mitchell, *Colonising Egypt* (New York: Cambridge University Press, 1988). 39.

power that successively ruled Egyptian land affected its physical identity, and provide a historical context to spatial implications of the political economy of food.⁵

Modern Egypt: Property, Discipline, Debt

Muhammad Ali, an Albanian commander in the Ottoman army, deemed the “founder of modern Egypt,” came to power in 1805 as self-declared Khedive of Egypt.^{6 7} Prevailing landholding laws of the Ottoman Empire did not recognize land property as single ownership but rather as several entitlements on land revenue. Overruling this precedent, Muhammad Ali asserted himself as the sole ruler of the land, by placing the largest land-owning religious institution, the Endowment Authority (*el Awkaf*), under state control. Raising taxes to an untenable level, he pushed estate-owners into non-payments and confiscated their land, a process of territorial appropriation later repeated by colonial powers. Part of the land was redistributed to the royal entourage, instating a new landowning class. The first Khedive initiated infrastructural and agricultural improvements; a solely technical modernity considering the land remained under feudalist regime. The recently founded Egyptian army forced populations to submit to the discipline of its organized power, marking a new military order to be conveyed over Egyptian society and space. One of the most crucial changes brought about by this order was the control of the rural workforce. Villagers were confined to their districts and needed circulation permits to travel; every individual was ordered into forced labor such as maintenance of irrigation canals. Crop production was under constant surveillance. This organized but brutal system led to several uprisings violently suppressed by military forces. Abuse of corvée labor by big estates owners prompted the state to pursue the transfer of property via land reforms.⁸ In 1858, under Muhammad Said’s rule, the first Land Law established five types of land tenure: owned land, state land (*Amlak Amerya*), endowment land (*Awkaf*), public use land, and dead land (*Maoat*). A system for transferring land ownership was instituted, *Taboo*, requiring all landholders to register their property for taxing purposes. *Taboo* allowed registered landholders to change the use of

⁵ Jean Gottman, "The Evolution of the Concept of Territory," in *IPSA Round Table* (Institut d'Etudes Politiques, Paris: Interdisciplinary Research, 1975). 44.

⁶ Henry Dodwell, *The Founder of Modern Egypt: A Study of Muhammad `Ali* (Cambridge: Cambridge University Press, 2011). 43.

⁷ Khedive is a title that defines a viceroy of the sultan of Turkey and all governing rulers of Egypt from 1867 to 1914. Before 1867, the Ottoman Empire did not sanctioned the use of the title.

⁸ See Richard A. Debs, Frank E. Vogel, and Abd al-Wahhab Sayyid Radwan, *Islamic Law and Civil Code: The Law of Property in Egypt* (New York: Columbia University Press, 2010).

agricultural lands to any other. However, most of the land stayed unregistered.⁹ Debt generated by the construction of Suez Canal compelled Ali's grandson, Ismail, to seek loans from European banks. Credited for the urban development of Cairo as a modern capital, the Khedive Ismail was ill-advised by foreign experts. The ensuing further spending had Egypt caught in a downward spiral of debt. As financial collapse loomed, British banks set up a Debt Commission (forerunner of the Mixed Courts) with the mission of retrieving taxes to repay European creditors. By 1882, when British colonial power entered Egypt, foreign financial powers were already well rooted in the unstable and indebted nation. Locals soon considered the Mixed Courts, established by European countries and the USA, to be "a machine for transferring land" from debtors to creditors and from local to foreign.¹⁰ As insolvability was blatant, land estates were seized, marking the true beginning of British imperialism over Egyptian resources and property. A law passed by King Fouad I assessed that occupancy and use of the land for more than 15 years granted tenure for the ensuing 15 years (Land laws of 1936). Because of this law, uncultivated and un-owned lands were considered owned by the state, which could sell, rent, or transfer these unclaimed lands to whomever it considered suitable of using this land. The Agricultural Law of 1940 regularized the process of agricultural land subdivisions and conversions.¹¹ Colonial powers continued to shape Egypt's agricultural system by arranging its territory, ordering and managing earth and water. The country's agricultural prosperity and its geographical assets benefited the colonial occupants through debt repayment and access to the Suez Canal, a double spoliation at the economic and territorial level.¹² These modern state practices include the production of knowledge and data on territory and population to manage human life, defined as "governmentality" by Michel Foucault.¹³ For example, British authorities produced a new map to reorganize tax policies, repay debt, record ownership, establish farming rights and document soil quality. This act, conducted in a defined territory that later became a national economy, exemplifies governmentality as the power of the modern state. Egypt endured the constructive and the destructive power of Western ideology that turned the country into both

⁹ Mostafa Morsi El Araby, "The Role of the State in Managing Urban Land Supply and Prices in Egypt," *Habitat International* 27, no. 3 (2003).

¹⁰ Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002). 73.

¹¹ See Gabriel Baer, *A History of Landownership in Modern Egypt, 1800-1950* (London; New York: Oxford University Press, 1962).

¹² Sociologist Jacques Berque called this "*lucrum cessans et damnun emergens*," actual loss contrasted with lost gains. In Jacques Berque, *L'égypte. Impérialisme Et Révolution*, N.R.F. (Paris: Editions Gallimard, 1967). 174.

¹³ Michel Foucault, *Security, Territory, Population: Lectures at the Collège De France. 1977-1978*, Eds. Michel Senellart, Francois Ewald, and Alessandro Fontana (New York: Picador, 2009). 108.

a subordinate and a client of industrialized societies, transforming its territory into both a tool and a battlefield of interests.

Nasser's Territorial Agenda

Around 1950, Egypt was a deeply rural and unequal nation. Some 2,000 owners held 20 % of the land.¹⁴ Economic difficulties, political tensions, extreme poverty, a stagnant middle-class, a compromised monarch, and weakened colonial rulers set the stage for the Free Officers' coup in 1952. If Gamal Abdul Nasser established republicanism, drafted a new political system, industrialized the country, fought wars, built up an ideology and altered the social character of Egypt forever, effects on territory are a significant part of his reforms. The construction of the Aswan High Dam, cornerstone of Egypt's post-colonial identity, built (with help of the USSR) to serve agriculture and industry by increasing electric production and irrigated land, is exemplary of his governance. Along with the Suez Canal, both infrastructures were defining objects of spatial, political, economic, and social significance for Egypt. A top-down, state-inspired and state-led transformation, Nasser's program of "social justice, progress and development" included a dramatic reform of Egypt's unequal pattern of ownership.¹⁵ Land reforms affected rural territories by transforming agricultural ownership patterns, abolishing a whole social group and generating others. Those reforms characterize the Nasserite project, and they provide the banner issue on which the Free Officers decided to assume power. In 1950, millions of agricultural laborers were landless. By 1964, a series of laws known as the Agricultural Reform Act had gradually reduced ownership to 100 *feddans* per family, and 50 *feddans* by person.¹⁶ The Land Law N°100/1964 applied similar restrictions to urban and building areas, and declared all desert lands to be state property. Though revolutionary, the reforms only affected 15% of Egypt's agricultural land and brought few benefits to the landless and holders of less than 1 *feddan*. One third of the total expropriated area was owned by the royal entourage and a few wealthy families. The primary reform's intent was not to promote agricultural development, but instead to remove the privileged few from their dominant position, break up concentration of land wealth and redistribute income. If new farmers did not become independent owners under Nasser, they

¹⁴ Derek Hopwood, *Egypt: Politics and Society, 1945-90* (London: Taylor & Francis Ltd, 1991). 125.

¹⁵ Tarek Osman, *Egypt on the Brink : From Nasser to Mubarak* (New Haven: New Haven : Yale University Press, 2010). 38.

¹⁶ The *feddan* is a unit of area used in Egypt, Sudan and Syria. 1 *feddan* = 24 kirat = 60 m x 70 m = 4200 m² = 0.42 hectare = 1.038 acre

¹⁷ Beshir Sakr and Phanjof Tarcir, "The 1952 Land Reform," *Le Monde diplomatique* 2007.

gained revenue and status, reaching a level of economic security close to that of individual ownership.¹⁸ It is however claimed that the agrarian reform was never fully achieved, as many large landowners managed to illegally maintain possession of large estates.¹⁹ Nevertheless, the redistributions are considered Nasser's greatest social achievement. Establishing a social contract between the state and its people, these reforms promoted an ideology and practice of social welfare combined with a pan-Arabic historical and formational political project. The land reforms and attendant large-scale projects had significant impacts on political, social, and economic matters related to agriculture and food production. Furthermore, the reforms set precedents that remain fundamental to Egypt's territorial organization, specifically with regard to policies affecting urban and rural spaces.

Sadat's Open-door Policy

After Nasser's sudden death in 1970, Anwar al-Sadat became Egypt's president. He stands as "the champion of state and large landowning interests and a symbol of the country's reintegration into the North's global economic circuits."²⁰ Following the war with Israel, he instigated *Al-Infithah*, the "Open door policy," primarily as a political strategy to promote peace and prosperity. From a "social welfare mode of regulation" to a "neoliberal mode of regulation," Sadat steered away from state socialism and post-colonial, pan-Arabic nationalism towards the opening of the economy and a political shift to the West.²¹ His regime nonetheless tightly controlled who was to benefit from new opportunities and how. This period corresponds to a renewed interest of the American government in Egypt and its rural world, with aims to increase technical assistance and extend both political influence and techno-economic development. Sadat's strategies for the agricultural sector included a transition toward the production of high-value crops and increased investments in agribusiness, as well as transfer of farmland from local to commercial holders that matched American agribusiness corporation's interests.²² Sadat also engaged in a "de-nasserisation" of land ownership, returning land to owners who had been dispossessed by the agrarian reforms

¹⁸ Doreen Warriner, *Land Reform and Development in the Middle East: A Study of Egypt, Syria, and Iraq*, 2nd ed. (Westport, CT: Greenwood Press, 1975). 37.

¹⁹ Sakr and Tarcir, "The 1952 Land Reform."

²⁰ Mitchell, *Rule of Experts : Egypt, Techno-Politics, Modernity*. 126.

²¹ Leila Vignal and Eric Denis, "Cairo as Regional/Global Economic Capital?," in *Cairo Cosmopolitan: Politics, Culture, and Urban Space in the New Globalized Middle East*, ed. Diane Singerman and Paul Amar (Cairo, New York: American University in Cairo Press, 2006). 99.

²² Osman, *Egypt on the Brink : From Nasser to Mubarak*. 118.

of 1952 and 1961.²³ Opening the country to private and foreign capital investment fueled construction business and property markets in urban centers. Law N°69/1974 ended the state's role of custodianship of land. The same year, Sadat launched a program of new towns to be built in the desert. The first, Sadat City, was completed in 1977. Real estate and tourism development thrived; previous war stage areas in the Sinai became available land in the hand of military officers who generated massive profits by establishing touristic resorts. Law N°143/1981 allowed the utilization of state-owned desert land for military, new towns, tourism, and reclamation uses.²⁴ Under government supervision, legal construction zones, contracts, licenses, and permits were issued, often to the benefit of the regime. This imbalance in property and income distribution increased existing inequalities. Moreover, the obvious self-enrichment and corruption revolving around *Al-Infitah*' fusion of power and wealth caused popular resentment. Though some scholars mitigate the impacts of *Al-Infitah* as mere adjustments of a liberalization that had happened gradually, an irrefutable result is the direct involvement of foreign development agencies and financial institutions in Egyptian affairs. At Camp David in 1978, while signing the peace treaty with Israel, Sadat agreed to several US aid programs, a clear move away from the Soviet Block.²⁵ The IMF, the World Bank, and USAID, all institutions active across the postcolonial world, engaged in Egypt's internal politics. This involvement corresponds to a growing dependence on US imported grains, a worsening of the agricultural trade balance, and a sharp decrease on gross investment in agriculture. Egyptians did not approve of those changes and opposition to Sadat grew. Resistance emerged with the notable food riots of 1977 and peaked with the President's assassination in 1984. Sadat's policies can be described as the absolute opposite of Nasser's, trampling redistribution and social equity, placing power and profit in the hands of a few, all the while deepening the gap between a rich urban cosmopolitan elite and an undereducated rural population. Even if the regime did not outwardly contest all of the Nasserite reforms, the process of equalizing wealth on the land had been reversed, and the country thrust into a capitalist renaissance.²⁶

²³ Ray Bush, "Coalitions for Dispossession and Networks of Resistance? Land, Politics and Agrarian Reform in Egypt," *British Journal of Middle Eastern Studies* 38, no. 3 (2011).

²⁴ The Law N°3/1982 introduced regulations regarding planning rules, land use, urban growth boundaries, agricultural lands, and land subdivision.

²⁵ See John Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes* (Princeton, N.J.: Princeton University Press, 1983).

²⁶ Timothy Mitchell, "The Market's Place," in *Directions of Change in Rural Egypt*, ed. Nicholas S. Hopkins (Cairo: American Univ. in Cairo Press, 1998). 31.

Three Decades of Mubarak

When Sadat died at the hand of pro-islamists army officers in 1984, another former member of the military succeeded him, his vice-president Hosni Mubarak. Though dramatic governance change was expected, Mubarak embraced *Al-Infitah* and its economic program. Mubarak's first decade of rule was marked by liberalization of the economy, the army's continuous grip over the country, and tight political control. In 1991, Egypt signed a standby agreement with the IMF followed by a structural adjustment loan with the World Bank. The IMF plan included substantial reforms, including a requirement that Egypt commence large-scale privatization. The program, while successful in partly reducing the country's budget deficit, adversely affected both people and territory. The disengagement of the state from its social contracts led to rising unemployment, housing shortages, and inflation. For rural Egypt, the major change came in 1992, in the form of a law lifting restrictions on landowners setting the price of rents. Law N°96/1992 reversed the tenancy guarantees of Nasser's reform of land in perpetuity, controlled rents and state-provided inputs and marketing facilities.²⁷ Rent Law N°4/1996 accelerated this trend, exempting housing units erected from that date onwards from rent controls.²⁸ The Mubarak era laws marked the elimination of landlord rights over their properties, while still deeming them responsible for their maintenance. Another series of Land Laws voted from 1991 to 1997 defined the institutions in charge of land use and allowed the privatization of state land for urban use.²⁹ If USAID and the FAO both considered the reforms necessary to reestablish a land market, the results were detrimental to many tenants evicted after 1997, after the farming rents' dramatic increase.³⁰ Tenants who lost their existing leases were directed to land reclamation areas recommended by USAID such as the desert-greening project Toshka. Regarding urban development, the 1983 "Greater Cairo Region Master Scheme" promoted urban decentralization and the reorganization of the city into a number of manageable urban subunits, as an attempt to solve the housing crisis. One of the objectives was to divert Cairo's growth away from the fertile areas towards new cities in the desert, a project initiated by Sadat in 1978. In reality, state

²⁷ Rent control laws in Egypt dates from the early 20th century, with the first abolition of landlords' right to evacuate tenants, followed by the passage of a statute, under Nasser, allowing the inheritance of rented units, which permitted the continuation of rent control implications across generations. Laws passed under Sadat had allowed tenants to re-rent or exchange the unit they occupy without referring to the landlord.

²⁸ Salma Mansour, "New Law, Old Problems: The Egyptian Rent Control Dilemma," *The Chronicles* 1, no. Spring 2010 (2010).

²⁹ Land Law N°7/1991, Land Law N°96/1995, Urban Land Law N°7/1997.

³⁰ Ray Bush, "Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt," *Third World Quarterly* 28, no. 8 (2007).

land was sold to private investors to build gated communities unaffordable to the majority.³¹ Fueled by rural migration and lack of affordable housing, proliferation of illegal peri-urban settlements still continues today to cost Egypt thousands hectares a year of its agrarian land and poses a threat to local food production.³²

Under Mubarak's rule, poverty rates increased, reliance on world markets exacerbated social inequalities and rural decay, local food security was endangered, and national development and equality advancement neglected, laying the groundwork for the 2011 revolution.

Post-revolution Momentum.

The troubled period defined as the Post-revolution era spans between 2011 and 2014. It begins in January 2011 with Egyptians taking to the streets of their cities to protest against poverty, high food prices, unemployment, government corruption, and to demand the president in office step down. In February 2011, Hosni Mubarak resigned and handed over powers to the army council, ending thirty years of autocratic rule. After the Muslim Brotherhood (a.k.a. Brotherhood) won half of the seats in parliament, its candidate, Mohamed Morsi, was democratically designated president of Egypt, with 51.7% of votes, in June 2012.³³ Next, President Morsi issued a constitutional declaration immunizing the constituent assembly from dissolution by the court, granting him unlimited powers and the authority to legislate without judicial oversight. This decision sparked public unrest, and in June 2013, a wave of political demonstrations swept across the country, protesting the president in office. The military intervened and ousted Morsi in a largely supported coup. Army chief Abdel-Fatah el-Sisi then imposed a new interim government and appointed Adly Mansour as president, suspending the constitution. Lastly, battles between Muslim Brotherhood groups and security forces erupted, resulting in the mass killing of pro-Morsi supporters. The Brotherhood's Freedom and Justice Party were officially deemed a terrorist organisation. The newly drafted constitution was passed with 98% approval and Abdel-Fatah el-Sisi was elected President, marking the start of a new era.

Though it was clear from the decades of Mubarak's rule that the dominant political and economic coalition has used land as a vehicle for capital accumulation, it was less evident to

³¹ El Araby, "The Role of the State in Managing Urban Land Supply and Prices in Egypt."

³² Humanitarian News and Analysis IRIN, "Egypt: Desertification Threat to Local Food Production," *Humanitarian News and Analysis*, 11 July, 2011, <http://www.irinnews.org/report.aspx?reportid=93193>.

³³ David Kirkpatrick, "Named Egypt's Winner, Islamist Makes History," *The New York Times* (2012), <http://www.nytimes.com/2012/06/25/world/middleeast/mohamed-morsi-of-muslim-brotherhood-declared-as-egypts-president.html>.

draw such conclusions from the post-revolution period because of the rapid political shift. Regarding the Morsi presidency, a territorial impact is difficult to ascertain. By compiling relevant initiatives and plans launched during his term, however, an outline of the pursued agenda can be sketched. Immediately after assuming office, the Muslim Brotherhood targeted the alleviation of economic and social hardships. Bonuses for public sector workers and social insurance benefits were increased, and a “100 Days Plan” was announced. This plan was focusing on five areas of interventions: security, fuel, bread, garbage collection, and traffic.³⁴ While land, property, and housing were not directly referenced in this list, food emerged as a priority, notably food subsidies. Regardless of the new administration's religious aspirations, there is strong continuity between the regime of Hosni Mubarak and ensuing leaders, demonstrated by their reticence to reform the subsidy system. After a failed attempt (under pressure from the International Monetary Fund) to implement a new subsidization system for bread production and the lifting of flour subsidies issued from wheat purchased on world markets, the Morsy government changed approaches.³⁵ The Ministry of Supply announced higher pay for farmers to grow wheat and provided fertilizers and seeds to encourage an increase in production. No significant changes in land ownership, land reclamation, agrarian projects, or larger infrastructures were implemented.³⁶ In what appeared as marking a break from the previous rule, the Muslim Brotherhood was adamantly opposed to such schemes saying, “the answer to our problems is not in big projects. It’s about simple things...affordable housing and investment that leads to jobs.”³⁷ ³⁸ In reality, pre-revolutionary planning paradigms remained unchanged. For instance, while critical of Mubarak’s projects, the Brotherhood eagerly adopted existing desert development policies.³⁹ In May 2013, the Minister of Housing announced a plan to build 44 new cities all over

³⁴ Carrie Rosefsky Wickham, *The Muslim Brotherhood: Evolution of an Islamist Movement* (2013). 272.

³⁵ As a response, private bakery owners stormed the Ministry of Supply and Internal Trade in March 2013. In the absence of a clear food subsidies reform plan, these measures appeared to be part of the governmental stratagem to reduce foreign imports. Because of its lack of necessary funds to import wheat, the Morsi administration was exploring alternative saving and procuring methods. The aspiration of Morsi and of Bassem Ouda, his Minister of Supply, was to make Egypt self-sufficient by doubling national wheat production to meet its needs of over 18 million tones a year by 2016. In May, during harvest time, the President was quoted as saying: "By God's will, in two years we will be achieving more than 80% of our needs, and seek in four years not to import wheat." in Sarah McFarlane, "Egypt's Wheat Problem: How Mursi Jeopardized the Bread Supply," *Reuters*, July 25, 2013, <https://www.reuters.com/article/us-egypt-mistakes-wheat/egypts-wheat-problem-how-mursi-jeopardized-the-bread-supply-idUSBRE96O07N20130725>.

³⁶ Maria Cristina Paciello, "Economic and Social Policies in Post-Mubarak Egypt," *Insight Egypt*, no. 3 (2013).

³⁷ Robert Twigger, *Red Nile: A Biography of the World's Greatest River* (New York: St. Martin's Press, 2014). 6.

³⁸ Soraya Nelson, "Mubarak's Dream Remains Just That in Egypt's Desert," *National Public Radio*, July 10, 2012, <https://www.npr.org/2012/07/10/155027725/mubaraks-dream-remains-just-that-in-egypts-desert>.

³⁹ See David E. Sims, *Egypt's Desert Dreams: Development or Disaster?* (Cairo: The American University in Cairo Press, 2014).

Egypt between 2013 and 2052 (e.g., Fairuz City in Port Said, the New Alamein City on the North Coast).⁴⁰ Even though these schemes were targeting lower-income populations, they nevertheless perpetuated existing mechanisms of capital accumulation, diverting public funds in new cities instead of dealing with Cairo's informal areas. No plan for managing urban expansion was envisioned, a *laissez-faire* which resulted in thriving urbanization. There is evidence that the pace of constructions on fertile areas at the Cairo's fringes has quickened since the 2011 revolution.⁴¹ The immediate consequence of this booming informal expansion, apart from disclosing the powerlessness of planning authorities, is a doomed competition between urban informality and agricultural space at the fringes of Cairo. Thus, the Muslim Brotherhood was toppled without leaving a significant legacy of urban governance, and it is rather its absence that had a territorial impact, urban and rural.

El Sisi: Perpetuating Status Quo

In 2015, two years after President Abdel Fattah el-Sisi came to power, "Sustainable Development Strategy: Egypt's Vision 2030" was published by the American Chamber of Commerce in Egypt under the patronage of the Ministry of Planning, Monitoring, and Administrative Reform. Claiming to be a participatory planning tool, the 10 pillars of the strategy paper include "Economic Development, Energy, Knowledge, Innovation and Scientific Research, Social Justice, Health, Education and Training, Culture, Environment, and Urban Development" as the priority for the current administration. While rural development or agriculture are absent from this priority list, the report nevertheless acknowledges some food-related difficulties: "food security; infringement on agricultural land, importing 60% of wheat consumption, and low animal and agricultural production; (...) lack of sufficient water to increase agricultural areas."⁴² Vaguely targeting these issues, the solutions offered by the paper did not diverge much from Mubarak's approach. Hailing the greatness of Egypt, grandiose projects are announced as "Economic Development Programs to 2030." The broadening of the Suez Canal (inaugurated in April 2015), a new administrative capital, and a US\$40 billion project to build low-cost housing are advertised as key to rebuilding Egypt into a modern, dynamic country—a piece of well-known rhetoric.

⁴⁰ Kareem Ibrahim and Diane Singerman, "Urban Egypt: On the Road from Revolution to the State? Governance, the Built Environment, and Social Justice," *Egypte/Monde Arabe* 3, no. 11 (2014).

⁴¹ Charlotte Malterre-Barthes, "The Limits of Control. Informal City Versus Agricultural Land at Cairo's Fringes," *TRANS* 23 2013.

⁴² Ministry of Planning Monitoring and Administrative Reform, "Sustainable Development Strategy: Egypt's Vision 2030," (Cairo 2016). 12.

Coherent with his predecessors' logic, el-Sisi revived agricultural land reclamation projects such as the New Nile Delta scheme (in Toshka and the Western Desert), which is intended to increase Egypt's agricultural output.⁴³ These projects require huge public investment and supply the armed forces' companies with a steady stream of contracts. Scholars have recognized that with el-Sisi beholden to the army for political stability, the military has forcefully returned to the heart of the regime. Legally, this occurred in May 2015 with a presidential decree establishing the "Military Production Company for Engineering Projects, Consultancies, and General Supplies."⁴⁴ The military company is able to undertake all sorts of public projects (e.g., development, and construction for housing, urbanization and urban development activities, and real estate development).⁴⁵ These grand moves are criticized, as political sociologist Hazem Kandil sums up: "Sisi is surrounded by yes-men, who all agree that it's a great idea to build greenhouses in the middle of the desert. The larger picture is of Sisi using whatever funds are available for these mega-projects in the hope of creating sustainable employment at a time when people are really struggling to obtain essential goods."⁴⁶ Regarding subsidies, in August 2016 el-Sisi signed an initial agreement with the International Monetary Fund for a US\$12 billion loan, indicating austerity measures were ahead.⁴⁷ Almost immediately, the parliament passed a law introducing a value-added tax and in November, the government allowed the Egyptian pound to float. However, while the government embarked on a timid reform of food subsidies, as suggested by the introduction of smart ration cards, bread subsidies remain largely untouched.⁴⁸

The powers granted to the Egyptian armed forces over the national economy, the land, and all large construction projects confirms that the military has reconstituted its economic and political empire. Similarly, the continuation of food subsidies supports the hypothesis that the current regime intends to maintain the pre-revolution *status quo*.

⁴³ "Egypt's Sisi to Launch 1.5 Million Feddan Project in Late December," *Ahram Online* (2015), <http://english.ahram.org/News/173472.aspx>.

⁴⁴ "New Military Company Established with Wide Mandate," *Mada Masr* (2015), <http://www.madamasr.com/en/2015/05/23/news/u/new-military-company-established-with-wide-mandate/>.

⁴⁵ Marina Ottaway, "Al-Sisi's Egypt: The Military Moves on the Economy," in *Middle East Program Occasional Paper Series* (Washington D.C.: Woodrow Wilson International Center for Scholars, 2015).

⁴⁶ Hazem Kandil, "Sisi's Egypt," *New Left Review* 102, no. 1 (2016).

⁴⁷ "IMF Welcomes Egypt's Austerity Measures, Advises against Lifting Food Subsidies," *Mada Masr* (2016), <http://www.madamasr.com/en/2016/10/28/news/economy/imf-welcomes-egypts-austerity-measures-advises-against-lifting-food-subsidies/>.

⁴⁸ Oliver Balch, "Bread Rationing and Smartcards: Egypt Takes Radical Steps to Tackle Food Waste," *The Guardian* (2015), <https://www.theguardian.com/global-development-professionals-network/2015/mar/20/bread-rationing-egypt-food-waste-grain-wheat>.

Since Muhammad Ali, the successive authoritarian regimes that have ruled over Egypt have had effects on its territorial organization. The Nasser era in particular marked a watershed moment in property rights, agrarian land distribution, and food production. The Sadat period saw economic liberalization, the rise of desert cities, and informal urban growth, three phenomena that were augmented under Mubarak, and to a certain extent, perpetuated under Morsi's office.⁴⁹ The current government of el-Sisi follows a similar path of large ambitious projects detached from reality, albeit with major spatial consequences.⁵⁰ What appears constant throughout are the centralization of power, the government's inability to achieve substantial spatial policies benefiting the majority, and the dangerous reliance on food subsidies and on food security as political instruments to govern. A critical examination of the Egyptian territorial context can offer a necessary perspective, subsequently developed, for identifying the impact of these mechanisms.

The City, the Countryside, the Desert

The author of *La Description de l'Égypte* asks a sobering question: "Where could one find a country surrounded on all sides by such awful deserts?"⁵¹ Colonial invaders articulated this refrain regarding Egypt's dramatic geography as early as 1821. It illustrates a leitmotiv that still prevails in today's institutional and governmental approaches. These colonial views – based on the clear distinction between the fertile land and barren deserts – have since expanded further into national policies. Anchored in a blend of developmentalism and technocratic progress, national and international policy-making documents paint an alarming image of Egypt in which a large population crammed into a narrow, hyper-dense area relies on scarce food, water and land resources.⁵² The constructed perception of a nation at its limits shaped a policy-directing framework that Timothy Mitchell called a "topographical imperative."⁵³ The established narrative of "geographical

⁴⁹ Mohamed Nada, "The Politics and Governance of Implementing Urban Expansion Policies in Egyptian Cities," *Egypte/Monde Arabe* 3, no. 11 (2014).

⁵⁰ Ottaway, "Al-Sisi's Egypt: The Military Moves on the Economy."

⁵¹ "Où trouvera-t-on un pays circonscrit de toutes parts par des déserts plus affreux?" in C. L. F. Panckoucke, *Description De L'égypte Ou Recueil Des Observations Et Des Recherches Qui on Étè Faites En Égypte Pendant L'expédition De L'armée Française*, vol. 1 (Paris: Panckoucke, 1821). 584.

⁵² See Timothy Mitchell, "The Object of Development/ Fixing the Economy," in *Rule of Experts : Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002).

⁵³ Timothy Mitchell, foreword to *Egypt's Desert Dreams : Development or Disaster?*, by David E. Sims (Cairo: The American University in Cairo Press, 2014). xix.

realism” supports the picture of Egypt being a mere territorial difficulty, upon which experts can exert their “external intelligence.” He argued that problems posed in this way justified technocratic solutions rendered using “scientific management of resources, and new technologies to overcome (...) natural limits.”⁵⁴ Indeed, the geography of Egypt is extraordinary, and its population is large (an estimated 90 million inhabitants).⁵⁵ The problematical natural limits are visible on the map. According to the prevalent narrative, the habitable area of Egypt consists of a thin, green 1100-kilometers-long strip along the Nile delimited by the sea and vast, hostile deserts; the Nile River forms the country’s spine, around which cities and villages are located; in all, 4% of the country’s land, which is cultivated and irrigated with Nile water, is home to 97% of the population; the rest is state-owned, undeveloped desert land. Therefore and according to this leitmotiv, Egypt’s territory falls into one of three simple categories: urban, rural, or desert. But it is essential to remember that, as Mitchell argues, there is no such thing as “nature,” and that the Egyptian geography is the product of “power, technology, expertise, and privilege.”⁵⁶

With a population of 16 to 20 millions, Cairo dominates urban Egypt. Comprising 20% of Egypt’s inhabitants, the capital sits in a strategic location at the mouth of the Nile Delta.⁵⁷ Alexandria, the harbor city, is the second-largest urban area, with 4 million inhabitants. Port Said, Suez, Malhalla al-Kubra, and Tanta each have 500,000 inhabitants. Rural Egypt encompasses all the cultivated area along the Nile in Upper Egypt, in the Valley, and in the Delta, which are known as the “Old Lands.” In all, 3.6 million hectares (8.6 million *feddan*) are irrigated only with Nile water. About 56% of the population lives in these rural areas; they perform agricultural work, generating 15% of the gross domestic product (GDP).⁵⁸ In contrast, the three Egyptian deserts are immense and barren. The Western Desert, a Saharan, hyper-arid region spanning 680,000 square kilometers, reaches from the Mediterranean Sea to the Libyan and Sudan borders and includes the Siwa, Bhariya, Farafra, Dakhla, and Kharga oases. The Eastern Desert, a 225,000-square-kilometer area, consists of the arid lands between the Nile Valley and the Red Sea. The Sinai Peninsula is a smaller

⁵⁴ Mitchell, “The Object of Development/ Fixing the Economy.” 210.

⁵⁵ “Official: Egypt Will Have 90 Million Residents by Next Week,” *Mada Masr* (2015), <https://www.madamasr.com/en/2015/12/01/news/u/official-egypt-will-have-90-million-residents-by-next-week/>.

⁵⁶ “The Object of Development/ Fixing the Economy.” 211.

⁵⁷ See David Sims, *Understanding Cairo : The Logic of a City out of Control* (Cairo: The American University in Cairo Press, 2010).

⁵⁸ IFAD, “Investing in Rural People in Egypt,” ed. Abdelhaq Hanafi (Rome: International Fund for Agricultural Development, 2014).

desert, spanning 61,000 square kilometers between the Suez Canal and the Israeli border. Other than inhabitants who conduct a few agricultural activities in the oases and live on “New Lands” in the desert, there is very little population.

According to the official discourse, each area faces specific problems, bolstering the idea of a “topographic imperative.” Urban areas, particularly Cairo, have many issues, such as traffic congestion, air pollution, overpopulation, housing shortages, chaotic garbage collection, urban sprawl, and political unpredictability.⁵⁹ For example, the Morsi government emphasized traffic and bread in the “Renaissance project.”⁶⁰ In naming challenges related to “human, natural and financial resources,” the current El-Sisi administration declared that “the current inhabited areas have reached (...) vital capacity and population saturation,” leading to “the deterioration of the urban environment quality (...), as well as the spread of random construction on the most fertile agricultural lands.”⁶¹ Authorities have called urban sprawl on agrarian land deplorable. All governments have claimed that they will act against further encroachment. National administrations, from Mubarak to today, still neglect these endangered rural areas. There is proof of this in official documents that hold rural areas responsible for fueling “urban expansion and the increase in the rate of rural to urban migration.”⁶² However, Egypt’s migration rate from the countryside to cities is only 8%, one of the lowest in the world (e.g., 60% in India and 35% in Morocco).⁶³ Even though Egyptian agriculture is productive, with harvests two or three times a year, the agrarian sector’s productivity rates are systematically downplayed. In short, the official narrative says the “Old Lands” (i.e., cultivated areas in the Delta and Valley) are underserved and barely fertile. The miserable condition of indolent smallholders conflicts with the technologically advanced, Western-inspired, thriving agribusinesses operating on reclaimed “New Lands.” For a long time, the desert lands surrounding the Nile Valley and the Delta have been the hostile and inhospitable, “awful deserts” portrayed in *La Description de l’Égypte*.⁶⁴ After 1952, these gigantic, barren areas became an essential actor in Egypt’s national identity drama.

⁵⁹ The World Bank, “Cairo Traffic Is Much More Than a Nuisance,” *The World Bank News* (2012).

⁶⁰ Stephen Glain, “Ikhwanomics. The Muslim Brotherhood Has a Plan for Egypt’s Economic Recovery,” *The Majalla Magazine* 2012.

⁶¹ Ministry of Planning Monitoring and Administrative Reform, “Sustainable Development Strategy: Egypt’s Vision 2030.” 257.

⁶² “Sustainable Development Strategy: Egypt’s Vision 2030.” 257.

⁶³ Mitchell, foreword to *Egypt’s Desert Dreams : Development or Disaster?*, by David E. Sims (Cairo: The American University in Cairo Press, 2014).xx.

⁶⁴ “Où trouvera-t-on un pays circonscrit de toutes parts par des déserts plus affreux?” in Panckoucke, *Description De L’égypte Ou Recueil Des Observations Et Des Recherches Qui on Étè Faites En Égypte Pendant L’expédition De L’armée Française*, 1.584.

Leaders enthusiastically called for desert invasion. Supported by the ongoing discourse of overcrowded cities and underproductive rural areas, the solution to develop new towns and agriculture projects in the desert in an orderly fashion unfolds with an implacable logic. As the divide between Egypt as a nation existing only along the Nile and its deserts as a physical entity exterior to that nation vanished, the physical boundaries demarcating the zones of cities, cultivated lands, and sands also became blurry. Informal settlements have grown at cities' edges, turning into new urban districts with farming activities and residual agriculture. Rural areas are urbanized, with developing towns, villages, and scattered buildings on agrarian land. New irrigated fields expanding in the sand softened the "clean cut" between green and arid zones, and cities built from scratch brought urbanity to empty lands. In this context, the urbanization of deserts only expands on an existing manufactured geography of urban and rural areas that are produced, disciplined, and shaped by human activities over centuries. All in all, it appears logical that the argument of a "topographic imperative" led to territorial undertakings in lieu of governance, resulting in spatial paradigms of governmentality, which are examined in this work.

Food Policies, Food Production, and Food Security

To recognize complex contingencies between food, governance, and space in the context of Egypt, three key segments pertaining to the spatial impacts of the political economy of food are selected: (1) food policies, (2) food production, and (3) food security. Attributed to the satirical poet Juvenal, the phrase *panem et circenses*, "bread and games," summed up two millennia ago a solution to the practical political problem of feeding populations posed to governments.⁶⁵ It referred to the distribution of free grain to a large part of the people of Rome. An emblematic, politically motivated food policy, the *cura annonae* ("care for the grain supply") was introduced in 123 BC to alleviate the effects of dearth and to buy popularity.

(1) Food policies, today, form governmental frameworks of security meant to control populations through food provisioning and territorial ordering. "Food policy" as a term emerged in the 1970s to describe coherent bodies of measures endorsed by any government agency or organization concerning food production, processing, distribution, purchases, and

⁶⁵ Paul Erdkamp, "Feeding Rome, or Feeding Mars? A Long-Term Approach to C. Gracchus' Lex Frumentaria," *Ancient Society* 30 (2000).

protection.⁶⁶ As local and national instruments to avoid scarcity and ensure the feeding of populations, food policies primarily guarantee health and social peace (e.g. public distribution system of food at subsidized prices in India).⁶⁷ At a global level, food-related measures operate as a leveraging tool on the international stage (e.g. the Food for Peace program led by the United States).⁶⁸ Involving a myriad of actors and institutions at all levels, food policies are at the heart of competing interests and perspectives between the state, the supply chain and society. Furthermore, food-related measures, in particular food provisioning, invariably comprise a patronizing, autocratic component. This component translates spatially in lines of social hierarchy – of socio-spatial inclusion and exclusion.⁶⁹ For instance, the issue of accessibility to food public programs and outlets for low-income communities raises questions of social and spatial justice. Additionally, command (or lack of it) over the supply necessary to sustain human life is a political weapon that can and has backfired. Assuming responsibility for welfare, governments in charge of food provisioning who fail to deliver are exposed to popular discontent. In the context of dissent, history has shown that scarcity and dearth pose grave threats to governments. As argued by Foucault in *Security, Territory, Population*, the possible consequence to the event of scarcity is revolt, particularly in cities.⁷⁰ Food policies occupy a contested terrain structurally, socially, and spatially. As such, it stands as a key segment of the political economy of food to understand how biological, political, and economic contingencies affect space and territorial ordering.

Food policies are extremely significant in the Egyptian context. The country has been running a large food subsidy program, distributing cheap bread for more than half a century. Food subsidies were intended to be a social safety net; yet because the authorities rely on foreign grain, the program is expensive and targeted almost strictly at urban populations. Previously available to all consumers without restriction, the access and amount of subsidized

⁶⁶ Tim Lang, David Barling, and Martin Caraher, *Food Policy Integrating Health, Environment and Society* (Oxford: Oxford University Press, 2009). 19.

⁶⁷ Madhura Swaminathan, "Consumer Food Subsidies in India: Proposals for Reform," *The Journal of Peasant Studies* 27, no. 3 (2000).

⁶⁸ Dubbed "Food for Peace," the U.S. Public Law PL480 has been the legal instrument for food aid through surplus clearance since 1958, operating alongside an agenda to create new markets for North American wheat and promote capitalist development in agrarian countries during the construction of the free world. See Harriet Friedmann, "The Political Economy of Food: The Rise and Fall of the Postwar International Food Order," *The American Journal of Sociology* 88 (1982).

⁶⁹ Aaron Bobrow-Strain, "White Bread Bio-Politics: Purity, Health, and the Triumph of Industrial Baking," *Cultural Geographies* 15, no. 1 (2008).

⁷⁰ Foucault, *Security, Territory, Population: Lectures at the Collège De France. 1977-1978*. 30.

bread is now controlled through a system of smart cards.⁷¹ Sold by public outlets run by local municipalities or licensed private bakeries, the price of bread remains unchanged since 1989.⁷² There are 10,693 bakeries in Egypt.⁷³ Considered essential to maintain political stability, Egyptian food policies and subsidized bread distribution are politically sensitive topics.⁷⁴ In 1977, 2008 and 2011, Egyptians protested against austerity measures and high food prices, often labeled as “bread riots” or “hunger uprisings,” asking for “bread, freedom, social justice.”⁷⁵ Egyptian food policies offer a strong line of enquiry to reflect on the effects of the political economy of grain upon space.

(2) Food production and thus agriculture is the process of producing food and feeding products by cultivation of crops on land, also know as farming. (2) Because feeding populations is one of the most important objects of political power, control over food production means is central to governments worldwide and there are strict supervising mechanisms over food production units and farming populations. Food production is controlled by way of agricultural policy, economic liberalization, and land management via an array of tools (e.g., regulating agencies, legal measures, taxes and direct income supplements, land reforms, etc). Agricultural policy defines a set of laws relating to domestic agriculture and imports of foreign agricultural products. Its aim is to regulate supply and demand, to control land use, the type of cultivated crops, fertilizers and pesticides usage, monitor surpluses, etc. Economic liberalization has seen corporate efforts to gain control over agricultural systems towards capital accumulation.⁷⁶ Geographer David Nally claims that “the end game (...) is the corporate control of the means of production and the gradual

⁷¹ Balch, "Bread Rationing and Smartcards: Egypt Takes Radical Steps to Tackle Food Waste".

⁷² 2 piasters per loaf, less than US\$ 0.01.

⁷³ Akhter U. Ahmed et al., "The Egyptian Food Subsidy System: Structure, Performance, and Options for Reform," in *Research Report* (Washington, D.C.: International Food Policy Research Institute (IFPRI), 2002).

⁷⁴ Tamar Gutner, "The Political Economy of Food Subsidy Reform: The Case of Egypt," *Food Policy* 27 (2002).

⁷⁵ Thomas Heyne and Tamara Wyrтки, "Food Protests: Slogans of Resistance," working paper, Leipzig University, 2015.

⁷⁶ Articulated by Harriet Friedmann and Philip McMichael in *Agriculture and the State System*, the shift of control for biophysical aspects of food production occurred in three phases of food regimes. The first food regime (1870–1930s) saw a growing European demand for wheat fostering grain production in the U.S.A. The second food regime (1950–70s) is marked by a post-WWII international food order originated in the New Deal, and chronic grain surpluses re-routed in the form of subsidized exports into the world economy. The oil crises of the 1970s, with a global recession, the termination of the Bretton Woods monetary convertibility, rising grain prices, Structural Adjustment Programs, and the clash between state-regulated agriculture and corporate pressure ended the second food regime and initiated the third (1980s–present). This current stage marks the rise of biotechnologies and attendant corporations, and the privatization of nature- a new agrarian order according to GATT and WTO agreements. See Harriet Friedmann and Philip McMichael, "Agriculture and the State System: The Rise and Decline of National Agricultures, 1870 to the Present," *Sociologia Ruralis* 29, no. 2 (1989).

elimination of non-market access to food.”⁷⁷ One result of this approach is the dismantling of food production systems of poorer countries in favor of the development of a market global provisioning system dominated by Western exporting nations, supplemented by a rhetoric of improvement.

The case of Egypt illustrates how recent land reforms accelerated the historical process of “depeasantization” and the destruction of a local food system.⁷⁸ President Hosni Mubarak’s liberalization regime was marked by the erosion of farmers’ rights, an upsurge in land prices, and the failure to promote rural development. This administration left as enduring legacy a subordinated agrarian capitalism shaped by attempts to incorporate Egypt into the world food system.⁷⁹ The parallel failure of the state to provide affordable housing in booming cities also helped fuel informal urbanization and the loss of finite resources of fertile land. The physical reality of food production and agrarian policies confronted to larger dynamics is exemplified in this spatial conflict between cities and their food systems.

(3) Food security, according to the prevailing definition of the 1995 World Food Summit, “exists when all people, at all times, have physical, social and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”⁸⁰ The opposite condition, food insecurity, exists when these circumstances are not met, what Foucault defines as scarcity: “a state of food shortage that has the property of engendering a process that renews it and, in the absence of another mechanism halting it, tends to extend it and make it more acute. It is a state of scarcity, in fact, that raises prices.”⁸¹ Foucault’s writings on food provisioning suggest “the development of a political economy of food security that promotes market mechanisms as a protection against scarcity.”⁸² In this process, national political decision is supplanted by global technocratic discourse and the certainty of expert knowledge.⁸³ Under international pressure, the pursuit of national food self-sufficiency results in large-scale territorial transformations.

⁷⁷ David Nally, “The Biopolitics of Food Provisioning,” *Transactions of the Institute of British Geographers* 36, no. 1 (2010). 46.

⁷⁸ Farshad A. Araghi, “Global Depeasantization, 1945–1990,” *The Sociological Quarterly* 36, no. 2 (1995).

⁷⁹ Bush, “Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt.”

⁸⁰ Food and Agriculture Organization, “Trade Reforms and Food Security: Conceptualizing the Linkages,” ed. Commodity Policy and Projections Service (Rome: Food and Agriculture Organization of the United Nations, 2003). 29.

⁸¹ Foucault, *Security, Territory, Population: Lectures at the Collège De France. 1977–1978*.30.

⁸² Nally, “The Biopolitics of Food Provisioning.” 1.

⁸³ Alcock, Rupert Alcock, “Speaking Food: A Discourse Analytic Study of Food Security,” School of Sociology, Politics, and International Studies, University of Bristol Working Paper no. 07-09, 2009.

In fact, the discourse on food security finds no better terrain than Egypt. The expert-constructed image of a country on the brink of starvation due to its scarce agrarian land and explosive demographics, as denounced by Timothy Mitchell in *Rule of Experts*, epitomizes how a country engages in undertaking gigantic projects. Under the cover of achieving food security, these mega-infrastructures have been important to Egyptian agricultural policies and national politics since Muhammad Ali.⁸⁴ Most pointedly, the desert-greening project Toshka was President Hosni Mubarak's large-scale hydro-agribusiness solution for Egypt's urban density, food insecurity, and unemployment – all consolidated into one massive undertaking involving complex arrangements of foreign investments and expertise. It is in this sense that undertakings such as the Toshka project could be considered territorial results of biopolitics and spatial outcomes of a particular political economy of food.⁸⁵

⁸⁴ See Mitchell, *Rule of Experts : Egypt, Techno-Politics, Modernity*.

⁸⁵ Bradley Hope, "Egypt's New Nile Valley: Grand Plan Gone Bad," *The National*, 2012, <https://www.thenational.ae/world/mena/egypt-s-new-nile-valley-grand-plan-gone-bad-1.402214>.

2.2 CASE 1: FOOD SUBSIDIES AND URBAN SPACE, ALEXANDRIA

Food Subsidies: a Story of Dependence

Modern Origins of Food and Bread Subsidies

Social Pact (1952-1970)

Political Imperative (1970-1981)

Problematic Instrument (1981-2011)

Unalterable Policy (2011-2013)

A Reformed yet Consolidated Tool (2013-2016)

Alexandria Bakeries: From Harbor to Mouth

Tracking Bread Subsidies in Alexandria

Agents

Impacts on Space and their Consequences

Commentary: Space-shaping Forces

2.2 CASE 1: FOOD SUBSIDIES AND URBAN SPACE, ALEXANDRIA

“At the bakery, April 2013. It is a modest metallic structure on a triangular urban island, surrounded and almost hidden by shrubbery and trees. A board on the roof reads ‘Gleem Bakery.’ A small crowd is pressed against the bars that protect the four sales counters. There are indeed bars all around and even a decorative metal wall representing wheat sheaves, a gift from a local brick contractor. The baker is standing in the back entrance; his eyelashes are white with flour. Inside, the public bakery is a busy workshop. Bags of wheat flour are stacked in the right-hand corner. There are kneading machines on the left, a wood container for the dough, a large table for flattening it and forming the bread, and two directional ovens for baking. A simple wall separates the stacking shelves from the sales windows. There are about 8 men actively working. Outside, people buy at least 10 loaves at a time. Everyone spreads their purchases on any available horizontal surface outside the shop – except for the ground – to let it dry before restacking the loaves of bread and leaving. With impressive balancing skills, boys on bicycles leave with wooden boards full of loaves in plastic bags on their head. A mobile bakery in a large truck with a “Bread Supply - City of Alexandria” logo pulls up to load warm bread, which will be distributed in remote urban areas.”¹

Wheat is indeed the foundation of the Egyptian diet, and the government administers an important program of food subsidies that includes *baladi* bread and *baladi* flour.² Bread subsidies are examined here in the context of urban spaces, with a focus on grain supply and distribution flows.

Food Subsidies: A Story of Dependence

Food subsidies belong to an array of food policies deployed by governments to manage populations through food provisioning and are an important constituent of the political economy of food. Largely relying on foreign imports that strain the national budget, these policies constitute at once a tool of wealth redistribution, a social safety net, and an apparatus for maintaining political stability. An overview of Egyptian food policies show that, since Muhammad Ali’s rule in the early 19th century, leaders of the country have continuously relied on subsidized wheat and bread to serve their various agendas, establishing along the way a long-lasting dependency on foreign markets.

¹ Charlotte Malterre-Barthes, “The Alexandria Diaries,” in *Spaces of Change*, eds. Marc Angéilil and Cary Siress (Zürich: ETH Zürich, 2014).

² In Egyptian Arabic, *baladi* means local or traditional and *esh baladi* signifies ‘local bread.’ It is a small flat pitta-like bread made of white flour.

Modern Origins of Food and Bread Subsidies

In 1831, high wheat prices forced Muhammad Ali Pasha to open government ration shops in Cairo and Alexandria for the sale of imported grain from Europe and Russia, manifesting an early testimony to the political significance of food subsidies for Egyptian rulers.³ A decade later in keeping with a public stockholding strategy, grain was set aside as a pre-emptive measure in the eventuality of poor harvests or trading issues (i.e., the embargo on Russian wheat exports in 1828). As Egyptian agriculture was forced into large-scale cotton production, the fertile area dedicated to wheat production decreased, and as of 1885, the country ceased the exportation of wheat altogether and has remained an importer ever since.⁴

Between 1900 and 1913, as the population grew, the volume of cereals imports to Egypt doubled, making the country dependent on foreign nations to supplement its domestic production. With cotton exports thriving during the First World War due to increased demand, the need to sustain military troops brought about a shortage of local wheat and accordingly, exports were banned. This marked the inception of the Supplies Control Board, a public agency—governed by military entities—in charge of controlling, distributing, and setting the price of the domestic wheat supply.

At the end of the First World War, the British colonial government imported massive amounts of wheat from the United States, Canada, and Australia in order to lower domestic prices and offset local shortages. The following year, in 1919, hungry mobs revolted and coerced the British administration to recognize—at least on paper—the nation’s independence. Not incidentally, it was the same year that bread subsidies were definitively adopted by the administration, with shops distributing “government flour” and bakers’ cooperatives encouraged to purchase cheaper grain from state granaries.⁵ After the war, the Supplies Control Board was replaced by the Department of Supplies (predecessor to the current Ministry of Supply). During the year of 1920, more than 100,000 tons of wheat were purchased abroad and sold to the population for half the purchase price.

In 1926, local authorities intervened to counter the prospects of famine by imposing crop plantation controls and direct grain purchases. These measures were indicative of an emergent trend of government intervention and would herald the institutionalization of subsidies. A decade

³ See Grant M. Scobie, *Government Policy and Food Imports: The Case of Wheat in Egypt* (Washington, D.C.: International Food Policy Research Institute, 1981).

⁴ Scobie, *Government Policy and Food Imports*, 19.

⁵ Arthur Edwin Crouchly, *The Economic Development of Modern Egypt* (London; New York: Longmans, Green, 1938), 198.

later, when the country faced with a growing population, local agriculture was repurposed for intensive crop production in response to a decline in cotton export prices. Wheat tariffs were introduced to boost local production, however, it would never reach pre-war levels and thus was insufficient in meeting the increased requirements of modern Egypt. In 1938, local food prices increased drastically, setting off once again a wave of social unrest. The government reacted by subsidizing fertilizers to support wheat production. With the outbreak of World War II, farmers were required to plant a third of their land with wheat to feed military forces, sustain population growth, and offset the difficulty of importing grain.⁶ It is in this context that modern bread subsidies were institutionalized.

The circumstances surrounding the formal creation of the Egyptian food subsidy system in 1942, under the reign of King Farouk I, served perhaps as a forewarning of how such a policy would subsequently develop in correlation with a long-lasting concern for food security that bound administrations to procuring food for their populations. Born of urgency and indexed to local food shortages, urban population growth, and a major international conflict blocking imports, bread subsidies acquired an innate political charge.

Considering that local food production had been neglected in preference for cultivating cotton and that famine was looming, wheat prices increased and popular protests ensued. Mindful of the volatile situation of 1919, the British government took prompt action. The new Ministry of Supply managed wheat stocks, supplying state-mills with state-purchase wheat, and supervised bakeries selling cheap standardized flat bread called *raghif watani* (the national loaf).

Additional measures were taken as well: farmers were required to devote one third of their land to wheat cultivation, and a control on grain retail prices was instituted. Eric Schewe's "How War Shaped Egypt's National Bread Loaf" provides a detailed story of bread subsidies, showing how the issue of food security acquired political leverage and the conflicting circumstances led to the adoption of subsidy policies.⁷ The correspondence between the Prime Minister Husayn Sirri and the British Ambassador Sir Miles Lampson reveals just how high the stakes actually were, stating: "The shortage of bread which is one of the staple foods of the people would be liable to give rise to disturbances. It is imperative for the sake of public security and tranquility that its supply should be assured."⁸ The subsidies would remain in place after World War II and bread

⁶ Scobie, *Government Policy and Food Imports*.

⁷ Eric Schewe, "How War Shaped Egypt's National Bread Loaf," *Comparative Studies of South Asia, Africa and the Middle East* 37, no.1 (2017).

⁸ Ibid.

would rapidly become central to a nascent welfare system of a country in transition. In this way, imported wheat came to replace locally produced grain that had been lost to the cultivation of cotton. Consequently, Egypt's economic and political dependency was further cemented by the foreign wheat imports needed to supply subsidized bread for a growing population.

Social Pact (1952-1970)

Food subsidies and market interventions continued under the Free Officers' new regime after the 1952 Revolution. A USD 10 million American aid grant used to purchase American wheat in 1954 indicates that foreign imports supplied the bulk of the country's needs already at this time.⁹ Culminating during John F. Kennedy's administration, the Food for Peace program (PL 480) accounted for 77 percent of Egypt's wheat imports in 1961, and 99 percent a year afterwards, making the country the foremost recipient of US food aid.¹⁰ Combined with agrarian reforms, food subsidies became the backbone of the Arab socialist project for fostering a welfare state. Promoting social equity, poverty alleviation, and political stability, the principal objective of governmental policies was wealth redistribution, which in turn positioned the state as "food provisioner."¹¹

'Nasserism,' a particular strain of socialism, significantly affected the organization of space, in particular with respect to redistributive measures concerning land tenure and housing policies. Guided by this Arab nationalism ideology, the nation's modernization project was predominantly realized through infrastructure and territorial development, notably in rural and desert areas. State capitalism would see the eventual takeover of the country's resources under planned economy. Industrialization and agriculture were at the core of the economy, with great progress made between 1957 and 1970, even if the 4 percent GDP growth of the nation during this period was below expectations. The nationalization of the economy was spurred on by the endorsement of national Arab culture over and above the foreign leaning predisposition of the pre-Nasser era. With local identity revalorized, peasants and workers were presented as heroes of the nation, while infrastructure was either reclaimed as a national asset (i.e., Suez Canal) or constructed anew (i.e., the High Aswan Dam). The fact that Nasser had "imbued a sense of national identity and

⁹ Jon B. Alterman, *Egypt and American Foreign Assistance 1952-1956: Hopes Dashed* (New York: Palgrave Macmillan, 2006), 64.

¹⁰ William J. Burns, *Economic Aid and American Policy toward Egypt, 1955-1981* (Albany: State University of New York Press, 1985), 126.

¹¹ Nadia Khouri-Dagher, "The State, Urban Households, and Management of Daily Life. Food and Social Order in Cairo," in *Development, Change and Gender in Cairo: A View from the Household*, ed. Diane Singerman (Bloomington: Indiana University Press, 1996).

enfranchised it economically and politically” played an essential role in redefining Egypt as an independent nation and still holds sway today.¹² Nasser deployed the state-controlled media as a political instrument to influence public opinion, with the inauguration of important infrastructure projects like oil refineries or waterworks and the handing over of land property titles to peasants being widely documented by the press. As rural Egypt began to be newly outfitted with the requisite infrastructure for television and radio broadcasts, Nasser was able to communicate directly to the population, which contributed even further to his popularity (i.e., Radio Cairo).

Nasserism offered an implicit social contract whereby the politically authoritarian state would provide employment, services, a guaranteed minimum living standard, and bread. Over time, subsidized bread became a powerful symbol of this social pact between the Egyptian government and its population. Due in no small part to foreign aid, the impact of bread subsidies on the national budget was initially slight. Yet in 1957, Gamal Nasser wrote in “The Egyptian Revolution” that he wished “to reduce (...) imports of foodstuffs [including] wheat, oil and household articles. These savings will (...) preserve precious earnings in hard currency.”¹³ In 1961, all foreign businesses and trading operations were nationalized and wheat imports became entirely managed by the government. As diplomatic relationships between the United States and Egypt deteriorated, Nasser signaled his refusal to comply with PL 480 wheat shipments. The country began buying wheat at market prices and relied increasingly on Soviet grain and monetary aid.¹⁴ As local food prices rose, ration cards (or ration books) were introduced, facilitating access to a larger array of food and non-food subsidies sold at discounted prices. The subsidy system continuously expanded during the 1960s to include subsidized transport, housing, energy, water, health, education, and basic consumer products. In short, under Nasser, subsidization grew to become a broad public system of allocation aimed at guaranteeing social equity. The fulfillment of this mandate served to legitimize the state and ensure political and social stability.

Political Imperative (1970–1981)

In the wake of the Kippur War, Anwar Sadat pursued what can be viewed as a strategy of ‘de-Nasserization’ with his *Al-Infithah* agenda to liberalize the economy. At the time, wheat and flour subsidies cost 30 percent of government revenues, and Egypt was the third leading wheat

¹² Saleh Omar, “Arab Nationalism: A Retrospective Evaluation,” *Arab Studies Quarterly* 14, no. 4 (1992): 23–37.

¹³ Gamal Abdel Nasser, “The Egyptian Revolution,” *Foreign Affairs* 33, no. 2 (1955): 207.

¹⁴ Anne Mariel Zimmermann, *US Assistance, Development, and Hierarchy in the Middle East. Aid for Allies* (New York: Palgrave Macmillan, 2017), 186.

importer worldwide.¹⁵ As Sadat turned increasingly to the West for support, it is hardly surprising that wheat imports originated largely from the United States. The Food Aid program-PL 480, managed by USAID, had effectively been put back on the table and would last until 2003. A telling remark from Earl Butz in 1974, then American Secretary of Agriculture, indicated the renewed and increasing dependency of Egypt on foreign wheat: “I went down to Cairo with a little wheat in my pocket and they had the red carpet out for me there (...) I was speaking the language of food and they understood.”¹⁶

The history of subsidies under Sadat unfolds in a timeline of dependency that is quite revealing of the dominance of international food matters over national politics, or what is referred in general to as ‘food politics.’ In 1972, world grain supply was low and prices high. The Soviet Union had experienced a downturn in production and in July of that year purchased 10 million tons of grain from the United States for a sum of USD 700 million (i.e., 30 percent of annual US production). The purchase occurred via a USD 750 million credit previously made available by the United States to the USSR for grain purchases. Immediately after the sale, world wheat prices sharply increased, tripling in the year 1973 alone. The US-Soviet wheat deal of 1972, later known as the “great grain robbery,” had profound repercussions for Egypt’s economy.¹⁷ In 1976, due to hikes in global grain price and steep import costs, the country’s budget deficit reached EGP 1.5 billion, leaving few available options for solving the immediate economic crisis. Borrowing from Gulf States was one such measure (i.e., via the Gulf Organization for the Development of Egypt—GDFE). But, GDFE tied its limited support to Egypt to compliance with IMF reforms, and ultimately refused in the summer of 1976 to fund the entire deficit. Cornered, Sadat entered negotiations with the IMF in January 1977. The public sector was protected (i.e., military, state bureaucracy, parastatal agencies), and the IMF cited food subsidies as the “only way to resolve the budgetary crisis.”¹⁸ The Egyptian government gave in by slashing subsidized retail prices of flour, fuel, and tobacco by 50 percent and the IMF granted Egypt its first concession.¹⁹ The consequences

¹⁵ Scobie, *Government Policy and Food Imports*, 31.

¹⁶ James Risser, "Why They Love Earl Butz," *The New York Times*, June 13, 1976.

¹⁷ Clifton Luttrell, *The Russian Wheat Deal—Hindsight Vs. Foresight* (St Louis: Federal Reserve Bank of St Louis, 1973).

¹⁸ Memorandum of December 23, 1976, to the Managing Director from John W. Gunter (Acting Director of the Middle Eastern Department); cable of December 27, 1976, to the governor of the central bank of Egypt from the Managing Director; and memorandum to the Managing Director from Hans W. Gerhard (Assistant Director of ETR); all in IMF/CF (C/Egypt/810 “Mission, Gunter and Staff, December 1976”) in James M. Boughton, *Silent Revolution: The International Monetary Fund 1979–1989* (Washington, DC: International Monetary Fund, 2001), 690.

¹⁹ Harold Alderman and Joachim von Braun, "The Effects of the Egyptian Food Ration and Subsidy System on Income Distribution and Consumption," in *Research Reports* (Washington, D.C.: International Food Policy Research Institute (IFPRI), 2002).

were immediate, with people taking to the streets and mobs setting fire to foreign-run shops and imported vehicles. More than 80 people died in these so-called “food riots.” After the army was sent in to quell the revolt, the government backed down. With the IMF, another budget was drafted to allow for a more gradual reduction of subsidies in accordance with an amended allocation of USD 20 million.²⁰ In actuality, state subsidies were reinstated and the distribution of bread flour for home baking was introduced in rural areas, while the military took control of several bakeries to guarantee bread supply in times of crisis.²¹ ²² Sometimes dubbed the “IMF riots,” these events were to have a profound and long-lasting impact on subsequent administrations, illustrating the political dimension of food and the how ‘food power’ would dictate international and local politics.²³

Concern for this situation was further illustrated in Sadat’s statement in *The October Working Paper* published in 1978 in which he underscored his intention to “reduce [the] dependence on agricultural imports.”²⁴ But, as matter of fact, subsidies increased even further. Government shops sold nearly 20 available commodities on a monthly quota basis to ration card to holders of ration cards—90 percent of the Egyptian population—the result being an average 35 percent increase in per capita income.²⁵ Additionally, licensed bakeries sold unrestricted amounts of cheap bread loaves citizens, the price for a *baladi* loaf in 1979, for example, set at half a piaster.²⁶ Consequently, while local production remained stable, wheat imports—along with bread consumption—grew steadily.

When food prices increased in 1981, people took to the streets yet again.²⁷ This can be attributed to the fact that such price hikes have had severe impacts on the real income of urban

²⁰ Ram Sachs, “On Bread and Circuses: Food Subsidy Reform and Popular Opposition in Egypt” (Master’s thesis, Stanford University, 2012), 35.

²¹ Hamid E. Ali, “Military Expenditures and Human Development: Guns and Butter Arguments Revisited: A Case Study from Egypt,” *Peace Economics, Peace Science and Public Policy* 17, no. 1 (2011).

²² Akhter U. Ahmed et al., “The Egyptian Food Subsidy System: Structure, Performance, and Options for Reform,” in *Research Report* (Washington, D.C.: International Food Policy Research Institute (IFPRI), 2001), 9.

²³ John Walton and David Seddon, *Free Markets & Food Riots. The Politics of Global Adjustment* (Oxford: Blackwell, 1994), 39.

²⁴ Anwar Sadat, *The October Working Paper, Presented by President Mohamed Anwar El Sadat* (Cairo: Arab Republic of Egypt, Ministry of Information, State Information Service, 1974), 66.

²⁵ Bread (*baladi*, *shami*, and *fino*), flour, sugar, rice, tea, edible oil, beans, lentils, macaroni, coffee, sesame, shortening, imported cheese, frozen meat, fish, eggs, and chicken.

²⁶ John Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes* (Princeton, N.J.: Princeton University Press, 1983), 213.

²⁷ Khouri-Dagher, “The State, Urban Households, and Management of Daily Life. Food and Social Order in Cairo.”

households that spend 50 percent of their available budget on food. For them, rising food prices were not only a threat to their security, but a breach of the social pact as well.²⁸

Under Sadat, it became more and more apparent that food subsidies, international political economy, and urban discontent deeply intertwined, which made the provision of bread—the basic Egyptian staple—a political imperative for governments. Subsidies not only constituted a tool of national leverage but internationally as well, insofar as they maintained the position of the United States as leading grain exporter on the world market, while also playing an indirect role in Egypt's regional political engagement (i.e., peace treaty with Israel). On the one hand, food dependency and the associated bread riots paradoxically served to loosen loan conditions for Egypt, taking into account that the United States granted USD 190 million in aid to Egypt in the aftermath of unrest. On the other hand, food dependency and indebtedness to Western financial institutions obliged Egypt to sign the Camp David accords that, although ostensibly justified by reasoned political claims on all sides, would ultimately cost Sadat his life.

Problematic Instrument (1981–2011)

Hosni Mubarak took power following the assassination of Sadat in October 1981 and promptly declared a state of emergency that would last until 2012, while at the same time pursuing the interrupted economic reforms that had been signed with the IMF in 1976 and 1978. When Mubarak assumed office, color-coded ration cards were introduced, adding an additional red card for higher-income population with fewer subsidy entitlements to the existing green card. Bread subsidies were first revised in 1984, when, along with the one-piaster loaf, a higher-quality two-piaster loaf was introduced on the market. Gradually, as the one-piaster loaf became less and less available, a *de facto* price increase from one to two piasters per loaf was introduced.

Adhering to the ideological shift initiated under Sadat, an agreement was signed between Egypt and the IMF in 1987 to “stabilize the economy”.²⁹ Yet, the main motivations of the deal were more international and political in scope (i.e., normalizing diplomatic relations with Israel, democratization itineraries, fight against Islamic opposition).³⁰ Essentially, IMF and World Bank funding became a kind of reward for political behavior embracing Western foreign policy interests, an arrangement that served to materialize US presence in Egypt. In fact, Egypt did not

²⁸ See Walton and Seddon, *Free Markets & Food Riots. The Politics of Global Adjustment* (Oxford: Blackwell, 1994).

²⁹ Karima Korayem, "Egypt's Economic Reform and Structural Adjustment (ERSAP)," *The Egyptian Center for Economic Studies*, no. 19 (1997): 1.

³⁰ See Alberto Paloni and Maurizio Zanardi, *The IMF, World Bank and Policy Reform* (London: Routledge, 2008).

honor the conditions of reform attached to the 1987 agreement, and funding was accordingly interrupted after USD 160 million had already been allocated.³¹ Mubarak argued that the domestic consequences of reforms attached to the loan (i.e. reducing public spending, slashing of food subsidies, market prices increase) would result in more social turmoil—as the 1977 riots had demonstrated. Prior to entering a new deal with Western financial institutions and even during negotiation talks, the government was pressured into implementing market-oriented reforms in advance of signing the deal. Outside coercion was exerted in this way via biased food politics, with Australia and Canada, for example, phasing out its credit sales of wheat (Egypt had enjoyed 3-year credit terms to purchase grain), while most countries simply ceased business with the Egypt, fearing the prospect of the nation's insolvency. In a "Letter of Intent" published in 1989, the government committed to the withdrawal of all food subsidies and particularly the elimination of the bread subsidies within 2 years.³² The direct impact was the replacement of the two-piaster loaf with a five-piaster loaf in 1989, which is still in place today. The loaf weight was also gradually reduced, from 168-169 grams in 1984 to 130 grams in 1991. That year, having joined the American-led coalition against Iraq after its invasion of Kuwait, Egypt entered into further agreements with the IMF and the World Bank that were accompanied by concessional write-offs of the American military debt, the Arab debt, and the 50 percent of the Paris Club public debt.³³ ³⁴ The concurrent reforms were the Economic Reform and Structural Adjustment program (ERSAP) and the Structural Adjustment Loan (SAL), both to be implemented over an 18-month period. The measures imposed broad reforms of the public sector (i.e., applying employment rules of the private sector, privatizing public companies dealing with commodities and finance), of pricing policies (i.e. decontrolling of public sector set prices of energy), of the agriculture sector (i.e., Law N°97/1992 on land rent control, terminating existing leases), of the transport sector (i.e., end of subsidies to the Egyptian National Railways, and inter-city buses), and of housing policies (i.e., eliminating apartment rent control). ERSAP also demanded the reform of investment policies (i.e., cancelling public trade monopoly, preference given to private investment), of external trade practices (i.e., exchange rates, trade liberalization), and of monetary

³¹ David Seddon, "The Politics of Adjustment: Egypt and the IMF, 1987-1990," *Review of African Political Economy*, no. 47 (1990).

³² Seddon, "The Politics of Adjustment: Egypt and the IMF, 1987-1990."

³³ "Egypt to Get an I.M.F. Loan," *The New York Times*, May 18, 1991.

³⁴ See Hazem El Beblawi, *Economic Growth in Egypt: Impediments and Constraints (1974-2004)* (Washington: International Bank for Reconstruction and Development/The World Bank on behalf of the Commission on Growth and Development, 2008).

policies (i.e., credit ceiling in banking, freedom of banks to set lending and deposit rates).³⁵ In parallel, the government attempted to reduce the volume of food imports and embarked on a cautious plan of action to undercut subsidies. These efforts were accompanied by outbreaks of popular protest throughout the 1980s and 1990s against the dire effects of such reforms that, albeit lesser in scope than the 1977 riots, were nevertheless harshly repressed.^{36 37} Types of bread (*fīno* and *shami*) were phased out in 1992 and 1996 respectively.³⁸ Measures were also taken to reduce other available subsidized foodstuff (meat in 1990, and fish, tea, and rice in 1992). To make matters worse, ration cards became more difficult to attain, leading to a marked reduction in the overall number of cardholders from 90 percent in 1980 to 70 percent of the population in 1998. From 1989 onward, new-borns were no longer added to the system, while Egyptians living abroad and deceased persons were removed as well.

In September 1993, following the government's announcement to essentially privatize twenty public companies (i.e., cement companies, hotels, and beverage factories), another IMF agreement was signed to implement a second reform. By the end of the 1990s, 118 public companies had been privatized (i.e., energy, water, sanitation, irrigation, health services, transport companies, telecommunications, education) and Egypt's reforms were touted as a success-story.³⁹

In 1996, Egypt signed another agreement with the IMF for a total sum of USD 391 million to cover a period of two years. In its press release, the tone of the international financial institution is triumphant: "Since 1991, Egypt has successfully implemented wide-ranging macroeconomic stabilization and structural reform measures supported by two successive IMF credits," while it announces further dismantling of public companies: "the program already underway envisages significant divestiture of (...) public sector enterprises."⁴⁰ In self-congratulatory tone, the institution reassesses the overall success of its mission: "the experience of the past few years attests to the benefits of economic reform."⁴¹ Nevertheless, in 1998, the IMF

³⁵ Gouda Abdel-Khalek, "Stabilization and Adjustment in Egypt: Sequencing and Sustainability," in *Counter-Revolution in Egypt's Countryside: Land and Farmers in the Era of Economic Reform*, ed. Ray Bush (London: Zed Books, 2002), 32-55.

³⁶ William E. Farrel, "Mubarak Works to Untangle Egypt's Fiscal Plight," *The New York Times*, November 6, 1981.

³⁷ Walton and Seddon, *Free Markets & Food Riots. The Politics of Global Adjustment*, 40.

³⁸ Akhter U. Ahmed et al., *The Egyptian Food Subsidy System: Structure, Performance, and Options for Reform* (Washington, D.C.: International Food Policy Research Institute (IFPRI), 2002), 10.

³⁹ W.B. Fisher, "Egypt - Physical and Social Geography," in *The Middle East and North Africa - Regional Surveys of the World*, ed. Lucy Dean (London: Europa Publications, 2004).

⁴⁰ IMF External Relations Department, "IMF Approves 24-Month Stand-by Credit for Egypt," (Washington: The International Monetary Fund, 1996).

⁴¹ *Ibid.*

expressed concerns about the pace of restructurings, urging an increase in exports and the completion of structural adjustments. As austerity measures were further implemented and the resulting economic signals considered encouraging, socio-political unrest remained a daily reality as inequalities grew.⁴² In 1999, Mubarak announced his forth-consecutive six-year term in office. That year, worker protests and strikes contesting the dismantling of state enterprises proliferated, despite the official ban on unions and demonstrations. The Mubarak administration continued to curb food subsidies during its final years, becoming ever more repressive even though it was cited as an exemplary pupil of IMF reform agendas. Under tight state control aimed at quelling major popular discontent, the implemented reforms were fiscally successful in reducing subsidy costs from 15 percent in 1980 to 6 percent of the national budget in 2000.⁴³

In 2005, the first electronic smart cards were introduced to gradually replace the customary ration books.⁴⁴ In 2008, a rise in global food prices and an unprecedented amount of “food riots” broke out in Africa, Asia, the Middle East, the Americas and the Caribbean, highlighting the widespread political consequences of increased food costs. In the same year, subsidies were lifted on two types of flour, which led to shortages of subsidized bread. People died in bakery lines, prompting President Hosni Mubarak to summon the army to help provide cost-controlled bread, thereby extending military influence to governance as well as matters of the state economy.⁴⁵ These incidents corresponded directly to the inflation of local bread prices, the rising cost of wheat, rampant corruption in subsidized bread production and the distribution chain, and mounting popular dissent against the regime. In April, violence erupted at textile factories in Mahalla al-Kobra, a famous union bastion in the Delta. While riot police were sent to break up the general strike and arrest some 300 people involved, the government added 15 million new names to the register of ration cardholders and unlocked public land to construct new bread outlets in an urgent attempt to appease the population.⁴⁶ In 2009, new, specific

⁴² Kinda Mohamadi, "Egypt & the IMF: Conditions as Usual," *Middle East Institute*, June 27, 2013, <http://www.mei.edu/content/egypt-imf-conditions-usual>.

⁴³ Rachel Trego, "The Functioning of the Egyptian Food-Subsidy System During Food-Price Shocks," *Development in Practice* 21, no. 4-5 (2011).

⁴⁴ Sherine Al-Shawarby and Heba El-Laithy, "Egypt's Food Subsidies: Benefit Incidence and Leakages," (Cairo: The World Bank, 2010).

⁴⁵ Cynthia Johnston, "In Egypt, Long Queues for Bread That's Almost Free," *Reuters*, April 6, 2008, <http://www.reuters.com/article/us-agflation-subsidies-idUSL0404033220080406>.

⁴⁶ Michael Slackman, "In Egypt, Technology Helps Spread Discontent of Workers," *The New York Times*, April 7, 2008, <http://www.nytimes.com/2008/04/07/world/middleeast/07egypt.html>.

household categories were admitted into the ration card program and bread delivery by trucks was introduced to serve remote areas.

During Mubarak's three decades in power, the range of food subsidies was reduced to oil, sugar, *baladi* bread and flour, which accounted for the bulk of state expenditures. The failure to entirely eliminate the subsidies is testimony to the difficulty his administration faced in trying to comply with reform conditions determined by the nation's neoliberal-minded financial partners. Even though the state did try to diminish its foreign dependency, Egypt remained among the top world-wheat importing countries of the world. While the origin of wheat supply varied throughout the years, the imports of 2011—the year Mubarak was deposed—came from the Black Sea region, Eastern Europe, the USA, and France.⁴⁷ According to authorities and financial institutions, food subsidies were an antiquated, inefficient, costly, and problematic instrument in complete contradiction with the modernization path chosen for the country, which needed to be accordingly phased out. Yet, the popular resistance to any such food reform proved that recurring conflicts over bread had come to epitomize the struggle between decision-making elites, global market forces, and populations. As Ray Bush argued, "riots were very much linked with broader issues of poverty and resistance to it, and outrage that politicians ignored the suffering that this generated."⁴⁸ Adding to the growing discontent concerning the dismantling of the welfare state, chronic shortages of *baladi* bread and long queues at bakeries were in large part to blame for the riots, rather than just an increase in food prices alone. These riots were not merely about food and hunger, but moreover, about redistribution, democracy, governance, and social justice. It was in this context that Egyptians from all walks of life, facing yet another rise in international food prices, took to the streets in January 2011. Informal settlement dwellers and working-class populations barely able to satisfy their basic needs made up the bulk of the crowds, with protesters calling for President Mubarak to step down. At last, Hosni Mubarak resigned after a period of unrest lasting 18 days, ending his 27-year rule with the handing over power to his vice president Omar Suleiman.⁴⁹

⁴⁷ Julian Lampietti et al., "The Grain Chain: Food Security and Managing Wheat Imports in Arab Countries," ed. IFC Smart Lessons Brief (Washington, DC: World Bank, 2011).

⁴⁸ Ray Bush, "Food Riots: Poverty, Power and Protest," *Journal of Agrarian Change* 10, no. 1 (2010).

⁴⁹ David Kirkpatrick, "Egypt Erupts in Jubilation as Mubarak Steps Down," *The New York Times*, February 11, 2011, <http://www.nytimes.com/2011/02/12/world/middleeast/12egypt.html>.

Unalterable Policy (2011–2013)

The Supreme Council of the Armed Forces (SCAF), a dreaded faction within the Egyptian Army, took power after Mubarak's ousting and until the election of Mohamed Morsi in June 2012, was poised to rule once again after Morsi's removal from office, to be finally replaced by General Abdel Fattah el-Sisi in May 2014. The Council's limited institutional changes during its brief time in power led Mohamed el Baradei to withdraw from the presidential race, arguing that SCAF was governing "as if a revolution never happened and a regime never collapsed."⁵⁰ Indeed, these words summed up SCAF's approach to the economic and political tasks at hand, as if remaining forever loyal to the previous regime. True to the legacy of preceding rulers and to their deployment of 'food politics' to suppress popular discontent, one of the first measures taken by the interim government was to issue new ration cards for food subsidies, resulting in a 4.6 percent increase in the total number of cardholders (from 63.4 million in 2010 to 66.3 million in 2011).⁵¹ In June 2011, SCAF—headed by Field Marshall Mohamed Tantawi—entered negotiations with the IMF, only to reject the proposed USD 3.2 billion loan. Having argued that such debt would overburden the nation, Tantawi was actually hoping for financial support from Gulf countries (i.e., Saudi Arabia, Qatar, and United Arab Emirates pledged USD 18 million). When SCAF rejected the IMF deal, the Muslim Brotherhood applauded the break from the previous government's collaboration with the financial institution, announcing in a communiqué: "the authorities are reconsidering ensuring the independence of the state, which is consistent with the aspirations of the revolution, to get rid of the inherited dependency of the old regime."⁵²

The Muslim Brotherhood's Freedom and Justice Party won the parliamentary elections of 2012 and reaffirmed its opposition to any new deal with the IMF unless a new proposal was drafted. Mohamed Morsi was then elected president. In November 2012, the Morsi administration and the IMF reached an agreement aimed at reducing "the large budget sector deficit" by targeting "wasteful expenditures, including reforming (...) subsidies."⁵³ Following this arrangement, President Morsi's cabinet made risky announcements, indicating that subsidized bread would be rationed to reduce both the budget strain and Egypt's wheat imports. In an interview given in

⁵⁰ Jane Kinninmont, "Bread, Dignity and Social Justice': The Political Economy of Egypt's Transition," in *Middle East and North Africa Program* (London: The Royal Institute of International Affairs, 2012).

⁵¹ Ministry of Social Solidarity, "Monthly Bulletin," (Cairo: Ministry of Social Solidarity, 2010).

⁵² Open Source Center, "MB Statement on Current Domestic and Regional Affairs," *Ikhwanweb*, July 9, 2011, <http://www.ikhwanweb.com/article.php?id=28801>

⁵³ IMF External Relations Department, "IMF Reaches Staff-Level Agreement with Egypt on a US\$4.8 Billion Stand-by Arrangement," (Washington: The International Monetary Fund, 2012).

February 2013 to the newspaper *Al Abram*, President Morsi unveiled plans for the reforms, the increase of wheat state-purchasing prices, and a new property tax. He also attempted to deflect the rumor that Egyptians would be entitled to three *baladi* loaves a day and to appease apprehensions concerning the reform of bread subsidies, conceding in the end only that “the quality of the bread may be less than optimal.”⁵⁴ A pilot project of smart cards specifically for bakeries was introduced in Port Said, with cardholders allowed five *baladi* loaves per family member per day.⁵⁵ But the most radical step came when the Minister of Supply and Internal Trade introduced the main reform to restrict the disappearance of grain on the black market, relying on the Muslim Brotherhood’s strong presence in local communities to monitor bakeries and report any fraudulent activity. Following this March 2013 declaration, the association of bakers that claimed 25,000 members across Egypt threatened to strike and actually stormed the headquarters of the Supply Ministry in Cairo.⁵⁶ Popular discontent spread further in June 2013 via a series of protests that the Morsi administration failed to keep under control, prompting the government to postpone the IMF-requested reforms until the June 2013 parliamentary elections—which never took place. The IMF offered emergency short-term financing (i.e., a short term loan of USD 700 million) that was rejected by the authorities, which provoked the Obama administration to state “we have been working very hard (...) to get the government of Egypt to (...) deal with the IMF, to come to an agreement which will allow Egypt to begin to transform its economy and improve the lives of its citizens.”⁵⁷

Serving as a reminder of grievances that had precipitated the fall of the regime in 2011, the politically tense climate led the army to depose the president from power in July 2013. That year, Egypt was still the world’s leading wheat importer, before China, Brazil, Indonesia and Algeria.⁵⁸ The post-2011 picture of bread subsidies that emerged was not only that of a system that was essentially untouchable, but one that was ingrained as a social safety net. As the population faced

⁵⁴ "Egypt's President Morsi Unveils Raft of Tax, Subsidy Reforms," *Abram Online*, February 25, 2013, <http://english.ahram.org.eg/NewsContent/3/12/65573/Business/Economy/Egypt's-President-Morsi-unveils-raft-of-tax,-subsid.aspx>.

⁵⁵ Maggie Fick, "Egypt's Bread 'Smart Cards': Financial Miracle for Age-Old Problem?," *Reuters*, February 25, 2014, <http://www.reuters.com/article/us-egypt-wheat-idUSBREA1O0P520140225>.

⁵⁶ "Hundreds of Bakers Storm Supply Ministry Again," *Egypt Independent*, March 19, 2013, <http://www.egyptindependent.com/hundreds-bakers-storm-supply-ministry-again/>.

⁵⁷ Reuters Staff, "Egypt under IMF Spotlight as \$4.8bn Loan Talks Resume," *Gulf Times*, April 3, 2013, <http://www.gulf-times.com/story/347837/Egypt-under-IMF-spotlight-as-4-8bn-loan-talks-resu>.

⁵⁸ Gary Vocke and Olga Liefert, "Wheat Outlook," in *World Agricultural Supply and Demand Estimates and supporting materials*, ed. World Agricultural Outlook Board Economic Research Service (Washington, D.C.: United States Department of Agriculture, 2013).

hardships, access to cheap bread was perceived as a matter of life and death and defended accordingly. It became one of the last symbols of public welfare, placed in a Manichean interplay of standoffs: food against money, bread subsidies against neoliberal forces, local governments against global financial institutions, vitality means against capital. But beyond these conflicts, bread subsidies, in effect, made Egypt an easy target for critique as being beholden to foreign aid and the conditional reforms that come with it—the means of its dependency being linked to entrenched autocracy, widespread poverty, and chronic debt.

A Reformed yet Consolidated Tool (2013-...)

After the 2013 *coup d'état* and the 2014 election, and despite his predecessor's unsuccessful bids to improve the system, President Abdel Fattah El-Sisi moved quickly to reform food subsidies through Ministerial Decree.⁵⁹ True to form, the state resumed negotiations with the IMF. In 2014 and 2015, IMF staff visited Cairo several times to assess the situation. A change in narrative was noticeable after the institution's second visit when it voiced support for "authorities' policies to protect the poor (...), and the launch of a new cash transfer scheme and the reform of food ration cards," marking its acceptance toward a slow reform of subsidies, as opposed to the strict elimination approach it previously advocated.⁶⁰ The smart card system initiated under Mubarak for food subsidies and tentatively applied to bread subsidies under Morsi was implemented nationwide.⁶¹ One electronic smart card per household allowed access to all subsidized products including *baladi* bread. This system limits bread purchases to smart-cardholders, putting an end to the "era of universal bread subsidies in Egypt—73 years after its introduction."⁶² It also terminated the proviso of unlimited allowance, with each registered member receiving a maximum of 150 loaves a month. However, there were several reports claiming the system was vulnerable and had been hacked.⁶³ The price of the *baladi* loaf remained unchanged, at 5 piasters (EGP 0.05). Another fundamental change concerned the source of the provided subsidy. As of 2014, the state no longer subsidized flour, but sold the flour sacks at

⁵⁹ Olivier Ecker et al., *Nutrition and Economic Development: Exploring Egypt's Exceptionalism and the Role of Food Subsidies* (Washington, D.C: International Food Policy Research Institute (IFPRI), 2016), 53.

⁶⁰ IMF External Relations Department, "IMF Executive Board Concludes 2014 Article IV Consultation with the Arab Republic of Egypt," (Washington: The International Monetary Fund, 2015).

⁶¹ Reuters Staff, "Egypt Food Subsidy Reforms to Slash Wheat Imports," *Reuters*, July 17, 2014, <https://af.reuters.com/article/egyptNews/idAFL6N0PS23L20140717>.

⁶² *Nutrition and Economic Development: Exploring Egypt's Exceptionalism and the Role of Food Subsidies*, 55.

⁶³ Eric Knecht, "Baking Bad: Egypt's Dirty Wheat Problem," *Reuters*, March 15, 2016, <http://www.reuters.com/investigates/special-report/egypt-wheat-corruption/>.

market price to bakers (i.e. EGP 155/50 kg in 2015), and covered bread production costs instead (i.e., 30 piasters per loaf).⁶⁴ The previous system saw half of the bags of state-subsidized flour *given* to bakeries resold on the black market, with the baker actually producing only half the amount of bread officially declared. After the reform, bakers were paid per loaf sold with an agreed price per day via bank transfers. Production rules remained unaffected: 130 grams per bread loaf, 1,160 loaves from one 100-kilogram flour bag. Such measures were primarily aimed at tackling systemic corruption. The link between customers and bakers was reformed as a well. Prior to 2015, cardholders were assigned a bakery where they had to purchase their allocated supply of *baladi* bread, which eliminated competition among shops. This move succeeded in reducing breadlines and improving the overall quality of bread, while creating a sort of informal charity system with surplus bread distributed for free to the poorest of the population—in order to cash in on the 30 piasters paid by the state for each loaf produced.

In August 2016, the IMF and Egypt reached an agreement for a loan of USD 12 billion. Before this transaction was ratified in November, however, the Egyptian pound was devalued by 48 percent and allowed to float, thus meeting a condition key for release of the loan. In the press release announcing the issue of the fund a week later, Managing Director of the IMF Christine Lagarde restated the goal of “strengthening social safety nets by increasing spending on food subsidies and cash transfers.”⁶⁵ This indicated how IMF demands had evolved from a hardline position of lifting subsidies altogether to a smoother approach, one more accepting of better targeting and increased prices. What would appear to be a purely economic shift in policy must be understood as an act of political maneuvering by the IMF to recast itself as a virtuous financial institution. This policy shift should also be critically assessed in view of the global grain trade in which Egypt remains a key player. To maintain the provision of cheap *baladi* bread, the government bought 45 percent of the local wheat production at the same time that it was forced to purchase wheat on the global market. It received foreign aid via the World Food Program to leverage hardships, obtaining, for example, USD 87 Million in 2017 alone.⁶⁶ Far from honoring the populist promises of reducing foreign dependency by increasing agrarian land availability and

⁶⁴ Hossam El Din Ahmed, “Bread Subsidy Policies in Egypt: A SWOT Analysis of Recent Systemic Reforms” (PhD diss., American University in Cairo, 2015), 44.

⁶⁵ IMF External Relations Department, “IMF Executive Board Approves US\$12 Billion Extended Arrangement under the Extended Fund Facility for Egypt”, ed. IMF Communications Department (Washington, D.C.: International Monetary Fund, 2016).

⁶⁶ “Egypt Country Programme (2013–2017),” in *Development Operation*, (Rome: World Food Programme, 2017).

grain productivity, el-Sisi's Egypt remains highly reliant on imports for procuring wheat. Numbers show that grain imports remained steady from 2008 to 2014, with a three-year average of 10 million tons, whereas imports for 2016-17 were estimated at 12 million tons.^{67 68} In March 2017, in an attempt to curb corruption, the Ministry of Supply announced a reduction in the number of subsidized loaves that bakers were allowed to sell through the 'gold card' scheme—loaves to be sold to those without subsidy smart cards. The amount was reduced from 4000 loaves to 500 loaves a day per bakery, and bakers were to report the amount sold. This immediately prompted an outbreak of protests in several cities, including in the popular neighborhoods of Alexandria and Cairo, revealing once again that the political nature of food subsidies have remained by and large unaltered and that Egyptians still consider any change to bread subsidies as a red line not to be crossed.⁶⁹

Conclusion

The political and social incentives underlying the politics of bread in Egypt, food subsidies and efforts to reform the system, as well as the country's reliance on exports are inextricably linked to foreign politics and global financial institutions, which impact larger realms of socio-spatial organizations. The food subsidy system is a recurring actor of Egypt's modern history. However, the meaning and ideological frameworks associated with the subsidy system changes from government to government. This transformation of the discursive practices of governing is notably visible in the case of the el-Sisi administration. Food subsidies stand in contradiction to the neoliberal line followed by the current military-led regime, which demands a strict rule of law based on free-market principles. Thus, in contrast to previous leaders, the local discourse deployed by the current government on food-subsidies is now aligned with that of IMF officials. For instance, the consensual argument that subsidies should be reformed "to protect (...) poorest and most vulnerable citizens," a discourse supported on the one hand by state announcements of extra funding for food subsidies, pensions and social safety net provisions, and on the other hand, by the slashing of other subsidized commodities, hinting at the possible elimination of subsidies altogether

⁶⁷ Julian McGill et al., "Egypt Wheat Sector Review," in *Country Highlights*, ed. FAO Investment Centre (Rome: The Food and Agriculture Organization of the United Nations, The European Bank for Reconstruction and Development, 2015), 5.

⁶⁸ Food and Agriculture Organization, "Country Brief on Egypt," in *Global Information and Early Warning System on Food and Agriculture*, ed. FAO GIEWS (Rome: Food and Agriculture Organization of the United Nations, 2017).

⁶⁹ MEE Staff, "Egypt Bread Riots: Government Says 'Fight against Corruption' Behind Cuts," *Middle East Eye*, March 8, 2017, <http://www.middleeasteye.net/news/egypts-fight-against-corruption-sends-poor-bread-riots-1717772414>.

in the long-term.^{70 71} By placing the definition of ‘poor’ as well as the criteria for accessing a bread-card in the hands of bureaucrats, as opposed to the former uniform distributing system of bakeries open to all, the regime can reduce the number of those actually benefitting from state-purchased wheat. Yet, the trajectories taken by governing powers with regard to food procurement and bread subsidies add up to a story of manifold dependence. A social safety net, bread subsidies have ultimately created a dependency among populations vis-à-vis their governments, particularly in dense urban areas. The increasing expectation of the state’s provision of subsidized bread has in turn made the government overly reliant on subsidies to alleviate poverty and maintain social peace. Above all in cities, subsidies are necessary for mitigating discontent concerning the shortcomings of authorities in terms of services and infrastructure. To preserve this fragile pact and honor its unspoken contract, the country must import wheat, fueling the costly dependency on foreign imports and global markets—wheat paid by foreign aid. This complex ecology is evident on the ground in the varied infrastructure that serves the subsidization system, from grain berths to public bakeries.

Alexandria Bakeries: From Harbor to Mouth

“At the grain terminal, April 2013. On the road leading to Alexandria-El-Dekheila industrial port, traces of glory appear and disappear in the art deco facades of import-export warehouses that bear Italian and Greek names of bygone traders, and among abandoned shed-halls dating back from Nasser’s industrialization programs. Along the coastline, from behind the warehouses and at the end of dusty streets appear the sea, cranes, and containers. Getting closer, the goods transiting the land from the harbor become visible; coke trucks overtake in honking exasperation; coal is conveyed on bridges over the road; bags of grain are loaded onto lorries parked on the roadside; iron ore piles appear from behind walls. The El-Mex steel plant tower overlooks the area. A distinguishing aspect of the city has changed; it is no more the nostalgic Alexandria of rundown tramways and aging European-style villas, but instead an energetic urban organism bustling to the dynamics of the subsistence industry. This is the entry point of goods from around the globe, a site of extreme relevance, and this is palpable in the very tension inscribed into the place. In apparent confusion, men with hard faces and dirty clothes climb on and off lorries and minibuses as drivers are shouting, lorries honking, cranes turning, and trucks

⁷⁰ IMF Communications Department, "Statement by IMF Managing Director Christine Lagarde on Egypt," (Washington: International Monetary Fund, 2017).

⁷¹ David Butter, "Egypt's Sisi Gives with One Hand, and Takes Away with the Other," *Chatham House*, June 28, 2017, <https://www.chathamhouse.org/expert/comment/egypts-sisi-gives-one-hand-and-takes-away-other>.

lining up at gates. The three ordinary blue metallic buildings next to the pier are where the nation stocks its grain. Here the supply chain materializes: raw goods and commodities are exchanged and transferred to be transformed and processed elsewhere.”⁷²

Tracking Bread Subsidies in Alexandria

The survey of the grain commodity chain has shown that food systems are inseparably linked to the global economy and political, economic, and social matters (see section 1.4. THE POLITICAL ECONOMY OF GRAIN). Explicitly addressing the scale of the city, as well as the relationships between global and local territories, the flows of grain and the logistics involved need to be foregrounded, with particular focus on identifying the spaces corresponding to every action of the materialization of food procurement in the context of the global food system.

In Egypt, approximately 75 percent of all subsidized grain is imported and delivered by cargo to the port of Alexandria, where vessels discharge their shipments at grain berths.⁷³ With an urban center of 4 million inhabitants, Alexandria encompasses an entire section of the global food system—from harbor to mouth. In fact, the city is not only the entry point of imported wheat for the entire country, but also includes more than a thousand bakeries selling government-subsidized bread. In this sense, the materiality of grain procurement on Egyptian territory can be clearly identified in Alexandria across four locales: the harbor, mills, bakeries and the transition spaces between these facilities. The legendary city founded in 331 BC on the Mediterranean coast is now Egypt’s largest seaport and second largest city. The Port of Alexandria (*Mina al Iskandariyah*) is the main commercial port, accessed via a channel called the Great Pass that is used by deep draft vessels. The Eastern harbor, as opposed to the ancient Western harbor, is a major infrastructure of national and regional importance. Sheltered by a quay wall, the harbor is considered relatively dangerous due to rocks and shoals.⁷⁵ Greater Alexandria Port includes the extension of El-Dekheila, on the natural El-Mex bay facing the harbor 7 kilometers away, which was developed between 1994 and 1999. Heavy industries (chloro-alkali, cement, chemicals, textile, tanneries, industrial dyes, ink, petroleum refining, meat processing, fish production, and iron or steel industries) are now installed on the southern side of the bay.

⁷² Malterre-Barthes, "The Alexandria Diaries."

⁷³ A small fraction is unloaded in Damietta.

⁷⁴ Akhter U. Ahmed et al., *The Egyptian Food Subsidy System: Structure, Performance, and Options for Reform* (Washington, D.C.: International Food Policy Research Institute (IFPRI), 2002), 14.

⁷⁵ Anthony Bigio, "North Africa Coastal Cities: Address Natural Disasters and Climate Change - Summary of Regional Study," (Washington, D.C.: The World Bank, 2011).

Foreign wheat bought on the global market to sustain the subsidized bread program—coordinated by the General Authority for Supply Commodities (GASC), a state agency established in to purchase and manage grain supply (see the following section *Agents*)—first arrives on vessels in the bay of Alexandria. GASC only accepts grain shipments imported by *Panamax* ships (55–60,000 tons) to prevent traders from sending smaller ships that ultimately cause delays in the port. Upon arrival, the grain cargo is inspected before the carrier is allowed to unload the cargo via infrastructure located in two areas specifically dedicated to receiving grain shipments. The Grain Terminal is in Zone 3 of the Port of Alexandria with three 535-meter-long and 10-meter-deep grain berths (N°82, 84, and 85), equipped with a grain elevator and silos with a total storage capacity of 8,000, 50,000, and 100,000 tons respectively.^{76 77} These berths were upgraded in 1977 with the help of a US grant, which financed a bagging system and conveyors.⁷⁸ The other Grain Terminal is at El-Dekheila harbor with five 490-meter-long and 14-meter-deep grain berths (N° 92, 94/1, 94/2, 94/3, 94/4) and a storage complex of silos with 120,000 tons capacity.⁷⁹ The berths vary in size, from 60 meters to 210 meters in length and 6 to 11 meters draft. The grain is unloaded at these dedicated grain berths with the help of the ship unloading system, bucket elevators, chain conveyors and other associated ancillary equipment. The wheat is elevated to a height of 57 meters on a chain conveyor with multiple outlets to feed the system of silos at a rate of 300 to 500 tons per hour.⁸⁰ At this speed, it takes four full days to unload a *Panamax* shipment of 50,000 tons of grain. The load is then stored in private or government-managed storage facilities. Hosted in large, unspectacular metallic structures, these mostly horizontal silos are particularly important, as they store the country's grain reserve. After storage, as there are no *in situ* mills for controlling and processing wheat at Greater Alexandria Port, the grain is loaded on trucks to be transported further inland to silos, warehouses, and mills.⁸¹ Vehicles exit the secured harbor zone and utilize the city's road infrastructure to reach processing and storage

⁷⁶ World Port Source, "Port of Alexandria," World Port Source, accessed October 7, 2017, http://www.worldportsource.com/ports/commerce/EGY_Port_of_Alexandria_304.php.

⁷⁷ Japan International Cooperation Agency., "Present Situation of Major Egyptian Ports," (Tokyo: Japan International Cooperation Agency, 2002).

⁷⁸ United States Department of State, *United States Treaties and Other International Agreements* (Washington, D.C.: Dept. of State, U.S. Government Publishing Office, 1977), 4391.

⁷⁹ "Horizontal Grain Silos," ALPHA Industries & Construction., accessed May 5, 2018, <http://www.alphainco.com/projects/horizontal-grain-silos>.

⁸⁰ Guttridge, "Guttridge Local MENA Support Leads to Supply of Grain Handling Systems to One of Egypt's Largest Grain Importers," accessed May 6, 2015, Guttridge Limited, <https://www.guttridge.com/eu/en/alexandria-grain-handling>.

⁸¹ Adel Sedqy, interview by Mohamed Ossama, June 24, 2013, Alexandria Port Security Administration.

facilities. Imported grain is allocated to local mills depending on their storage availability.⁸² Fourteen storage facilities are based in the city and sixteen mills operate in Alexandria, both public and private (80 public and 69 private in the whole of Egypt).⁸³ ⁸⁴ Most mills are located in the vicinity of the Mahmoudiyah canal, with a few in the harbor area and two outside of the city, while storage spaces are evenly distributed throughout the central urban districts.⁸⁵ Grain is unloaded and weighed upon arrival at the mill and mixed with local wheat of lower quality to achieve an acceptable blend. After cleaning, wheat goes through the break system and is turned into *baladi* flour at an extraction rate of 82 percent. This is specific to the production of *baladi* bread, and only public mills or private mills with a state contract are allowed to extract this type of flour. After extraction, the flour is sifted and mixed again to achieve a specified quality before being bagged for distribution and exiting the mill. Most mills have storage space for grain and flour. The *baladi* flour bags are manually loaded onto small trucks. Private bakeries come to pick up the bags with their own trucks, while public, government-owned bakeries have their supplies delivered. There is no fixed schedule of delivery. Usually a mill distributes the flour to the nearby bakeries, but can deliver to shops in other areas if other mills are short on supply.⁸⁶ Bakeries purchase the flour at free market price, produce and sell the bread at low prices, and the government refunds the difference (circa 31 piasters per loaf). Leakages occur at all levels of the chain; grain is stolen from harbor storage spaces, flour from the mill, and bread from the bakery.⁸⁷ Grain and flour diverted from the subsidy system are usually sold on the black or open markets. Among the 1,344 bakeries in Alexandria, there are 215 licensed bakeries, of which four are government-owned and are situated in the investigated area of the Eastern district.⁸⁸ While many private bakeries are veritable holes-in-the-wall, tiny facilities that process relatively small amounts of flour (from 400 to 1,100 kilograms a day), public bakeries are larger and have a higher production rate (2,000 to 6,000 kilograms a day).⁸⁹ The bread price is fixed and has remained

⁸² Moataz Osman, interview by Mohamed Ossama and Bassant Essam, May 21, 2013, Alexandria Mills Company

⁸³ McGill et al., "Egypt Wheat Sector Review."

⁸⁴ Ali Amer, interview by Bassant Essam, June 30, 2013, El-Assafra Supply Unit Administration.

⁸⁵ Fieldwork, 2013, Alexandria. See Appendix C.

⁸⁶ Mahmoud El-Sayed, interview by Mohamed Ossama, June 23, 2013, Alexandria Mills Co. Administration Building.

⁸⁷ Akhter U. Ahmed et al., "The Egyptian Food Subsidy System: Structure, Performance, and Options for Reform," 70.

⁸⁸ "Alexandria Governor Celebrates the Opening of a Number of Automatic Bakeries in the Frame of Developing Bread System in the City," *El-Abram*, May 21, 2014.

⁸⁹ Directorate of Supply and Internal Trade, "Statement of Automatic Municipal Bakeries Following the Governorate Project," ed. Administration of Supply Affairs (Alexandria: Alexandria Governorate, 2013).

unchanged since 1989 at 5 piasters per loaf.⁹⁰ Most bakeries double as points of sale where smart-ration cardholders can buy *baladi* bread.

The particular case of the Gleem Bakery, the end destination of the commodity before it reaches homes and private places of consumption, is useful for understanding how the global food system really functions on the ground. Opened in 2008, the Gleem bakery is a public *baladi* bread-production and sales facility in Eastern Alexandria.⁹¹ Located in a populous but fairly wealthy area of Alexandria, neighboring the Architecture Faculty and the Four Seasons-San Stefano on the sea front, its position is consistent with findings that “more outlets for subsidized *baladi* bread were found in rich neighborhoods than in poor.”⁹² The outlet is a freestanding metallic structure of approximately 100 square meters surrounded by a small garden with trees on a traffic island. On a wall adjacent to one of the four sales counters, a board itemizes the shop’s specificities: “Alexandria Governorate / Automatic Bakeries Project Administration, gas half automatic, daily output: 6 tons, numbers of production lines: 2, weight of the loaf: 120 grams, price of the loaf: 5 piasters.”⁹³ It is run by a team of eight people and operates from 7 a.m. to 2 p.m. at which point the bread supply usually runs out and the bakery closes. A guard supposedly surveys the shelter, but no flour is stored in the building, since supplies are purchased from the mill or from a storage facility each day. The Alexandria Mills and Bakeries Company, for instance, delivers 50 kilograms of local flour to the Gleem bakery from the public mill of *El Tero-Muharam Beik* on a daily basis.⁹⁴ The bakery is supposed to process 6 tons (6,000 kilograms) of this flour per day. Its bakers are required to produce ten loaves of *baladi* bread per kilogram of flour, keeping in mind that about 525 loaves can be produced from a bag of 50 kilograms.⁹⁵ Thus, the expected output of Gleem bakery is 63,000 loaves of bread a day, entailing a production rate of 5,250 loaves an hour and serving an average of 12,000 people (with five loaves being the average consumption). While the fabrication of *baladi* bread is a straightforward, rapid process, these official numbers appear unrealistically high and must be taken with caution. During operating hours, people queue to access their bread—on average between 30 minutes and two

⁹⁰ The Egyptian pound is divided into 100 piasters. The value of 5 piasters is less than a US cent.

⁹¹ FAO Regional Office for Near East and North Africa, “Egypt,” in *Food and Agriculture Policy Review* (Cairo: Food and Agriculture Organization, 2010).

⁹² Ahmed et al., “The Egyptian Food Subsidy System: Structure, Performance, and Options for Reform,” 33.

⁹³ Fieldwork, 2013, Alexandria. See Appendix C.

⁹⁴ Ibid.

⁹⁵ Mona El-Fiqi, “Differences over Bread,” *Al-Abram Weekly*, March 19, 2013, <http://weekly.ahram.org/News/1888/18/Differences-over-bread.aspx>.

hours, with crowds spilling over into the road and often disrupting traffic. At the time of the investigation, consumers were purchasing stashes of 20 to 30 loaves at once, a practice that ceased after the introduction of individual smart cards. Crowd-controlling devices (protective metallic grilles and rods) have been added to the four sales counters as well as the windows of the store, which only goes to illustrate the pressure the building endures and reveals the importance of subsidized bread to urban dwellers. Some people pay others a small fee to queue in their place, while still others have their bread delivered to their homes. Delivery boys depart from the premises on bicycles and carts with boards of loaves on their heads. When the supply runs out, the bakery closes and the staff leaves, the building remaining but an empty shell.

Mapping out how the flow of grain moves across Egyptian territory discloses the landed materiality of the world food system, revealing how grain permeates urban space from its arrival at the harbor via local transportation to storage, handling, milling, baking, and finally, to local distribution at the unassuming building of the Gleem bakery. The logistic chain that conducts the cross-border, internationally sourced grain from harbor to bakery does not follow a systematic logic and it appears plagued with leakages and corruption. Yet the chain functions and it is significant as the manifestation of implemented national food policies, illuminating how infrastructure, urban space, and architecture are implicated in this practice of nationwide political and social control. The bakery as a single point of sale, for example, when comprehended as part of a larger network of public shops, becomes a territorially situated instrument for conducting national food policies. Thus, architecture can be seen to serve a political system in pursuit of a common goal, rather than simply constituting a series of discrete, stand-alone structures. In this sense, a bakery with its processing and distributive functions is an embodiment of government food policies, becoming at once a political and architectural object. These aspects will be developed further in the Commentary section.

Agents

“Egypt provided \$121 million in emergency funding to GASC”: this Reuters headline is one of many that mention the General Authority for Supply Commodities (GASC).^{96 97} Expectedly, GASC regularly makes news in Egypt and abroad as a vital food-providing agent and driving force behind flows of grain sourced abroad for feeding Egypt. While the role of

⁹⁶ Ahmed Aboulenein and Mark Trevelyan, "Egypt Provided \$121 Mln in Emergency Funding to GASC in May - Finance Ministry," *Reuters Africa*, June 17, 2017, <http://af.reuters.com/article/investingNews/idAFKBN198086-OZABS>.

⁹⁷ Reuters Africa, "Egypt Provided \$121 Mln in Emergency Funding to GASC in May - Finance Ministry".

international actors in the global grain chain has been covered in the first chapter, what requires further investigation is how institutional, financing, trading, transportation, processing, distribution, and consumption agents operate within the context of Egypt.

Established by decree N° 118 under President Nasser in 1968, GASC is a governmental agency based in Cairo and one of the few remaining public grain agencies acting globally. While the headquarters are in the center of the Egyptian capital, GASC has branches in every harbor that receives wheat (Alexandria, Port Said, Damietta, Suez, and Safaga).⁹⁸ Since 2005, GASC has come under the authority of the Ministry of Trade and Supply (MOTS) and is responsible for the implementation of the food subsidy program supervised and funded by the Central Bank at an annual cost of USD 3.1 billion.⁹⁹ GASC is in charge of purchasing all imports of subsidized wheat. The amount imported depends on the volumes of the local harvest as well as the availability of state funds. The goal of GASC is to “maintain a five-month supply of strategic wheat reserves for *baladi* bread production at any one point in time.”¹⁰⁰ The agency regularly releases international tenders and long-term bilateral contracts on Reuters, late in the evening in Cairo after the Intercontinental Board of Commodity Exchange (Chicago Board of Trade) has closed. The purchase window of GASC used to be from May to June, but in the past few years GASC has been buying wheat all year round at intervals of every two to three weeks. The shipping times are very short, meaning additional costs for arranging transportation at short notice. In early June 2017, for instance, GASC issued a call for tender that was published online on specialized platforms in English and addressed specifically to global suppliers for 60,000 tons of wheat to be shipped during the period between 25th of July and 5th August 2017. The tender specified the amount and type of grain required: “cargoes of 55,000 to 60,000 tons of soft and /or milling wheat.”¹⁰¹ Only certain wheat types are approved by GASC.¹⁰² Ten grain traders replied with offers for the cheapest options of Russian and Ukrainian grain: Venus (based in Nasr-City, Egypt), ADM (Chicago, USA), GTCS Trading (Dubai, UAE), Daewoo POSCO (Seoul, South

⁹⁸ GASC Information Center Programmer, "Contact Us," General Authority For Supply Commodities, accessed January 7, 2018, http://www.gasc.gov.eg/callus_en.htm.

⁹⁹ Ahmed et al., "The Egyptian Food Subsidy System: Structure, Performance, and Options for Reform," 14

¹⁰⁰ Oday Kamal, *Half-Baked, the Other Side of Egypt's "Baladi" Bread Subsidy: A Study of the Market Intermediaries and Middlemen in the System* (Barcelona: CIDOB, 2015), 39.

¹⁰¹ General Authority For Supply Commodities, "Egypt's GASC Says Seeks Cargoes of (55.000 to 60.000) Tons Optional Origin Wheat for Shipment (July 25-August 5, 2017)," *Wheat Tenders*, accessed July 30, 2017, http://www.gasc.gov.eg/wheat%20bids_en.htm.

¹⁰² US North Pacific soft white, Canadian soft wheat, French, Australian, German, Polish, British, Romanian, Russian, Kazakh or Ukrainian milling wheat; Paraguay, Bulgaria and Hungary were added in 2016.

Korea), Aston (Rostov-on-Don, Russia), AOS (Dubai, UAE), Cerealcom (Segarcea, Romania), COFCO (Beijing, PRC), Glencore (Baar, Switzerland), and Casillo (Corata, Italy). The ABCD's—the four major grain traders, see the section *Trading Agents: Public, Private*—responded to many other tenders in 2017 with Cargill (Minneapolis, USA) and Louis Dreyfus (Rotterdam, The Netherlands), which only confirms their hegemony in the global grain trade markets.¹⁰³ The prices offered by grain traders are on both a free-on-board basis (FOB), a term used in non-containerized sea freight to indicate that the buyer would be responsible for the shipping, and a cost-and-freight basis (C&F), which means the seller is to arrange shipping by sea to the port of destination and organizes all legal documents for the buyer. The difference is substantial: Glencore offers 60,000 tons of Romanian wheat at USD 196.20 FOB, with USD 13.65 C&F equating to USD 209.85 a ton.¹⁰⁴ Major grain trading firms often set up transportation and chartering departments that allow them to bid with competitive prices for grain shipment, activity that constitutes a substantial part of their business. With regard to the previously mentioned tender, the private Egyptian trader Venus International, which was selected, also provides stevedoring and marine services, and manages grain storage at the port of El-Dekheila under the name “Venus International Free Zone for Grain Trading & Marine Services.”¹⁰⁵ Because Venus International is also a shipping and chartering agency, the firm is able to arrange the transport of the purchased wheat by sea, a complex logistic task otherwise undertaken by shipbrokers that act as intermediaries between ship-owners and charterers (see the section *Transportation Agents: Logistics of Grain*). Among the firms attending to the overseas movement of grain to Egypt, several have offices in Alexandria. These include the Egyptian brokers Sadat Marine, Star Link, Seaways Marine Services, and Misr Marine Trading Co. to name but a few, plus international firms Clarkson Shipping (UK), Louis Dreyfus Company (The Netherlands), and Kuehne + Nagel Ltd. (Germany). When transport is arranged, the wheat is inspected before being loaded onto one of the 7,000 *Panamax* ships available worldwide for the ocean transport of grain.¹⁰⁶ Egypt sends delegations to examine imported grain at ports of origin in order to clear wheat that GASC has purchased ahead of shipment. A six-member committee inspects the wheat, composed of two members each from the Central Administration of Plant

¹⁰³ Eric Knecht et al., “Egypt GASC Wheat Tender Lowest Offer \$190.88/T from Ukraine,” *Reuters Africa*, June 22, 2017, <https://af.reuters.com/article/egyptNews/idAFL8N1JJ32X>.

¹⁰⁴ Ibid.

¹⁰⁵ Venus International, “Venus International Free Zone for Grain Trading & Marine Services,” accessed May 5, 2018, <http://venusint.net/index>.

¹⁰⁶ Isaac Arnsdorf, “Money-Losing Panamax Owners Boosted by Brazilian Crop: Freight,” *Bloomberg News*, February 19, 2013, <https://www.bloomberg.com/news/articles/2013-02-19/money-losing-panamax-owners-boosted-by-brazilian-crop-freight>.

Quarantine (CAPQ, under MALR), the General Organization for Import and Export Control (GOIEC) and the Ministry Of Health, in coordination with the Egyptian Customs Authority (ECA).¹⁰⁷

In February 2017, GASC bought a total of 360,000 tons of wheat: 300,000 tons of Russian wheat (Cargill) and 60,000 tons of Ukrainian wheat (Louis Dreyfus).¹⁰⁸ The Russian wheat departed from the grain terminal Kombinat Stroykomplekt (KSK) in Russia's port of Novorossiysk, of which agribusiness giant Cargill holds a 75 percent stake.¹⁰⁹ Louis Dreyfus Commodities shipped the Ukrainian wheat from the grain terminal of the Port of Odessa, which it co-owns with Brooklyn-Kyiv.¹¹⁰ Once the shipment is authorized, a ballet of port operators, pilots, dock workers, towage operators, road and rail operators, depot operators, marine surveyors, and regulators perform their respective tasks, allowing the boat and its load to proceed. Heading to Alexandria, the ship follows the main maritime routes. Upon arrival, under the control of the Ministry of Maritime Transport, the Alexandria Port Authority (APA) supervises port management and boat traffic. APA controls port authorities—owns the land and the port infrastructure—and is in charge of assuring navigation security and marine services in the port. Once the vessel is docked at the grain berth, the wheat is unloaded under the supervision of the Alexandria Port Authority and the General Company for Silos and Storage (GCSS), which performs all customs clearance and unloading to public silos on behalf of GASC. GCSS owns grain terminals and steel storage spaces in Alexandria and El-Dekheila, among the five it keeps nationwide.

Adhering to Hosni Mubarak's commitment to privatize public companies in the 1990s, the government sold part of its GCSS shares in 1997. Listed on the Cairo Stock Exchange, GCSS is still a subsidiary of the Food Industries Holding Corporation (FIHC), a state-owned holding.¹¹¹ It operates through its head office and branches located in Cairo, Alexandria,

¹⁰⁷ Ahmed Wally, "Food and Agricultural Import Regulations and Standards - Narrative," in *GAIN report*, ed. Office of Agricultural Affairs of the USDA (Cairo: USDA Foreign Agricultural Service, 2015).

¹⁰⁸ Eric Knecht and Maha El Dahan, "Egypt's GASC Buys 360,000 Tonnes of Wheat," *Zawya Reuters*, February 23, 2017, https://www.zawya.com/mena/en/story/MIDEAST_STOCKS__Factors_to_watch__Feb_23-TR20170223nL8N1G8039X2/.

¹⁰⁹ Reuters Staff, "Cargill Buys Stake in Black Sea Grain Terminal in Russia," *Reuters*, December 12, 2013, <http://www.reuters.com/article/grain-cargill-russia-idUSL6N0JR2XX20131212>.

¹¹⁰ Vladislav Vortnikov, "Ukraine Aiming to Double Grain Output," *World Grain*, October 10, 2016, http://www.world-grain.com/articles/news_home/Features/2016/10/Ukraine_aiming_to_double_grain.aspx?ID=%7BDB4A868F-6814-4F17-B1E6-F978D97DB422%7D.

¹¹¹ State holdings are companies where ownership and management functions are separated, and usually ownership remains with the state.

Damietta, Port Said, Suez, and Safaga. Two GCSS-owned silos serve the greater Cairo area with 100,000 tons (in Shubra) and 600,000 tons (in Imbaba) respectively. Managed by GCSS, most of the imported GASC-purchased wheat is stored in public port storage, although the agency occasionally rents facilities from private sector traders and mills. The other agency in charge of storing the wheat for *baladi* bread production in silos is the Egyptian Holding Company for Silos and Storage (EHCSS), a public company founded by decree in 2002. EHCSS manages inland silos all over Egypt. Foreign investors and international grain traders have a hand in storage spaces as well. Between 2014 and 2017, the United Arab Emirates, Saud-Arabia, and Italy have helped EHCSS by funding a total of 60 silos.¹¹² Cargill owns the majority of shares of one of the grain discharge terminals (Berth 94, El-Dekheila) via the National Stevedoring Company.¹¹³

Once the shipment is out of the harbor, GCSS and EHCSS are the main transportation actors between port storage and mills. GCSS and EHCSS-owned trucks take the imported wheat from harbor silos to public mills, costs covered by GASC. Private mills under contract have their own fleet of trucks. The government is heavily involved in milling via government-run mills and contracted private mills. Two public holding companies, the Holding Company for Rice and Wheat Mills (HCRWM) and the Food Industries Holding Company are the main bodies in charge of milling for the state. While partially privatized, they are still managed by the government as public organizations.¹¹⁴ FIHC manages 126 public sector mills via seven holding companies, of which GASC holds a majority of shares, such as the Alexandria Flour Mills and Bakeries Company.¹¹⁵ The latter engages in the manufacture, trade, import and export, storage, fumigation and maintenance, packaging, processing and distribution of grain and its substitutes. It operates eleven mills for the production of *baladi* flour.¹¹⁶ Overstaffed and still relying on stone milling techniques, these types of mills produce 86 percent of the *baladi* bread flour nationwide. Private mills under state contract are better equipped and cheaper as they rely on automatic roller mills to extract flour. Each mill has its own means to then transport the *baladi* bread flour to

¹¹² Shaimaa Al-Aee, "National Project to Build 60 Silos to Be Completed in January 2016," *Daily News Egypt*, September 7, 2015, <https://dailynewsegyp.com/2015/09/07/national-project-to-build-60-silos-to-be-completed-in-january-2016/>.

¹¹³ Cargill Incorporated, "Cargill in Egypt," accessed October 7, 2017, <https://www.cargill.com/worldwide/egypt>.

¹¹⁴ See Kamal, *Half-Baked, the Other Side of Egypt's "Baladi" Bread Subsidy: A Study of the Market Intermediaries and Middlemen in the System*.

¹¹⁵ East Delta Flour Mills, Middle and West Delta Flour Mills, South Cairo Flour Mills, Upper Egypt Flour Mills, Middle Egypt Flour Mills and North Cairo Flour Mills.

¹¹⁶ Alexandria, Moharam Bek 1 & 2, Nofal, Milling Industries, El-Dekheila, Ibrahim Awad, El-Mahmoudea, Rashid, El-Sowehy, and Abdel Gawad cylinders. "Flour Mills Sector," Alexandria Flour Mills and Bakeries, accessed April 20, 2016, <http://www.alexflourmills.com/en/flourMillsSector.aspx>.

licensed bakeries and warehouses. As the end agent before consumers, *baladi* bread bakeries are prominent actors of the grain chain and food subsidy system. GASC's flour distribution to bakeries takes into consideration the allocated quota and the density of the population in a given area. 40 percent of the bread distribution is carried out via state bakeries, and the rest by licensed bakeries. Licenses to produce *baladi* bread are granted after application and authorized by the governor and the Ministry of Supply and Internal Trade (MSIT). The "location of the potential bakery and the population count in the area, the number of bakeries available in that locality and the feasibility of transporting the *baladi* bread flour from mills or warehouses to the bakery" are factored in as determining criteria.¹¹⁷ Before the smart card system, bakers themselves had to manage bread queues, which they did by limiting individual purchases to 20 or 30 loaves. Bakers are known to generate extra profit by setting aside some of the *baladi* flour and selling it on the black market. Of course, bakery inspectors are present as state agents sent by the Ministry of Supply and Internal Trade to control operations. In reality, these inspectors occasionally collect bribes for overlooking violations. Meanwhile, bakers are organized in a private-bakers association, the Bakery Owners' Division at the Federation of Chambers of Commerce, which comprises some 25,000 bakers. They threatened to strike in 2013 to protest unpaid incentive packages and the government promptly ceded to their demands, revealing its in-built dependency on the licensed bakers.¹¹⁸ Other powerful agents involved in the bread subsidy system include government ministers (policy-making), governors (bread-licensing), and the Egyptian military. The military plays an indirect role via the National Service Project Organization (NSPO), its economic arm. Campaigning for national self-sufficiency, the military took over six large-scale industrial bakeries in Cairo (part of a public holding company), now operating to feed 250,000 military personnel, with a daily output of 500,000 loaves.¹¹⁹ Wheat is purchased by NSPO from GASC and sourced from the national harvest. During the 2008 and 2011 crises, MSIT called on the military to assist in producing and distributing *baladi* bread.¹²⁰ Military trucks distributed loaves throughout cities, which largely contributed to the army's popularity among the population.

¹¹⁷ Kamal, *Half-Baked, the Other Side of Egypt's "Baladi" Bread Subsidy: A Study of the Market Intermediaries and Middlemen in the System*, 54.

¹¹⁸ Tom Perry, "Egypt Bakers Delay Strike, Expect to Meet Kandil Next Week," *Reuters*, March 21, 2013, www.reuters.com/article/egypt-bread-strike-idUSL6N0CDGEZ20130321.

¹¹⁹ Kamal, *Half-Baked, the Other Side of Egypt's "Baladi" Bread Subsidy: A Study of the Market Intermediaries and Middlemen in the System*, 44.

¹²⁰ Ian Black, "Struggling Country Where Bread Means Life," *The Guardian*, April 12, 2008, <https://www.theguardian.com/world/2008/apr/12/egypt.food>.

At the very end of the chain are the consumers, for whom *baladi* bread constitutes at once a social safety net and essential staple. Roughly 80 percent of Egyptian people consume 180 to 210 kilograms of bread per year—a consumption rate higher than the global average of 70 kilograms. Poverty alleviation targeting has long been considered problematic, as a state survey found that 30 to 40 percent of *baladi* bread was discarded nationwide and used as animal fodder.¹²¹ Nevertheless, bread subsidies remain an essential tool of food security and social stability. The political character of bread subsidies has been discussed at length (see the previous section Food Subsidies: A Story of Dependence), with food provision seen as the government's responsibility. In short, bread subsidies emerge as an extremely complex apparatus involving both private and public actors, with profits made at every turn. The complexity of a system that evolved over time as a thorny, yet inviolable political instrument bears on the logic of free-market principles, which in turn is indexed to the shift from a top-down system of control introduced by Nasser, supplemented by the complexity of privatizing parts of the system under Mubarak, to the current dismantling strategies of the el-Sisi's administration. Yet, in March 2017, as another bread crisis loomed, Supply Minister Ali Moselhy apologized publicly to people who did not receive their daily loaves and concluded by saying: "Every citizen has a right to bread," epitomizing how, at the end of the grain chain, 73 million ration cardholders have come to see the urban bakery as much as a symbol of the daily hardships they endure as a proving ground of the state's capacity to deliver their daily bread.¹²²

Impacts on Space and their Consequences

From a 50,000-ton grain shipment to a 120-gram loaf of bread, from Russian seaports to Egyptian neighborhood bakeries, from global markets to individual bodies, the grain chain impacts spaces of all sizes. With regard to the political economy of food and the current food regime, the examination of the spatial ramifications of subsidization can be analyzed by scales following the flow of goods from the: 1) *Transnational Scale*, the 2) *Territorial Scale*, and the 3) *Urban Scale*, to the 4) *Architectural Scale*.

¹²¹ Ecker et al., *Nutrition and Economic Development: Exploring Egypt's Exceptionalism and the Role of Food Subsidies*.

¹²² Reuters Staff, "What You Need to Know About Egypt's Bread Crisis," *Al Arabiya English*, March 9, 2017, <http://english.alarabiya.net/en/News/middle-east/2017/03/09/What-you-need-to-know-about-Egypt-s-bread-crisis-.html>.

1) *Transnational Scale*

In 2017, GASC topped the headlines of financial newspapers when it announced it had refused wheat shipments from Russia and Argentina due to an excessive amount of ergot fungus.¹²³ The two Russian boats had set sail from the ports of Taman and Novorossiysk, and the Argentinian boat from the port of Bahia Blanca, before receiving a rejection notification and turning back. It was not the first time that the agency had rejected shipments over concerns of a common grain fungus. The immediate consequences of this local decision were: a spike in grain prices, higher priced and fewer offers for GASC, and a general boycott from traders of the agency's tenders. Analysts agree that because it is the world's largest buyer of grain, Egypt's behavior impacted world prices.¹²⁴ This incident demonstrated how Egyptian food procurement procedures could impact larger realms beyond national boundaries. But how exactly did food procurement via the harbor-city of Alexandria affect spaces at a transnational scale?

There are particular effects that can be ascribed to Egyptian domestic food policies, the bulk of which are devised to facilitate capital flows and cross-border economic transfers made via global, digitalized markets. While GASC does not directly participate in the futures markets, where the price of commodities is determined for the long-term (see the Wheat Trade section), the agency and its trading partners have been active for decades on the global spot markets, where commodities are traded immediately or "on the spot" at the present market price of the product through significant transactions. Large sums of money are continuously transferred from the Egyptian Central Bank to the bank accounts of grain trading houses. It is well-documented, as highlighted by Timothy Mitchell, that some of this fluid capital has its origin in Western "economic assistance" or "aid programs"—amounting, in essence, to camouflaged US and EU agricultural subsidies flowing back to the donors, by means of a mechanism initiated in 1958 by U.S. Public Law PL480 ("Food for Peace"), which utilized food aid to export North American wheat surpluses and used these transfers as political leverage.¹²⁵ Still, with 10-11 million tons of wheat purchased on the global markets annually, the financial influence of the largest wheat importer worldwide is substantial to say the least, totaling USD 2 billion.¹²⁶ Attempts to

¹²³ Maha El Dahan and Polina Devitt, "Two Russian Wheat Cargoes, One Argentine Cargo Bound for Egypt Rejected," *Reuters*, March 7, 2017, <http://www.reuters.com/article/us-egypt-wheat-idUSKBN16E1HB>.

¹²⁴ Emiko Terazono and Heba Saleh, "Egypt Cancels Wheat Tender Amid Regulatory Confusion," *The Financial Times*, February 2, 2016, <https://www.ft.com/content/1961f124-c923-11e5-be0b-b7ece4e953a0>.

¹²⁵ Timothy Mitchell, "The Object of Development/Fixing the Economy," in *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 236.

¹²⁶ Like most commodities, grain is traded in US dollars (USD or US\$).

unbundle these cross-border transactions show that recipients are predominantly Western, vertically integrated trading houses (e.g., Cargill, ADM, Louis-Dreyfus, Glencore) with financial ramifications for global trading hubs. This network of cities created by the globalized economic sector serves to centralize power, and the financial flows generated by the constant Egyptian need for grain perpetuates the concentration of capital in trading cities of the Northern hemisphere via transnational businesses.¹²⁷

The capital that flows from Egypt's budget to the trading companies has also shaped the material conditions of the trading houses themselves. Any global commodity-trading firm has a situated physical counterpart, a building with an address from where it operates. What is made tangible by the very existence and the location of these corporate offices, headquarters, and operational grounds is the company's practices, particularly its links to a specific local economy and the spatial dynamics of trade.^{128 129} The trading agent that benefits most from Egyptian's food subsidies program is Louis Dreyfus Company.¹³⁰ This firm operates from a large, corporate, urban office in the old harbor area of Rotterdam, Europe's largest shipping port and from anonymous offices in the World Trade Center in Amsterdam. In the metropolitan region of Seoul, South-Korean POSCO Daewoo is housed in a skyscraper facing the container terminal and the international airport that sits on a reclaimed area of Incheon.¹³¹ Russian JCS Aston is close to grain shipping and storage facilities in an industrial zone of the export harbor Rostov-on-Don. ADM, formerly located in rural Illinois, relocated its headquarters in 2014 to a high-rise in downtown Chicago, the global center of grain trade.¹³² AOS Trading DMCC operates from the Armada tower, a skyscraper in the marina of Dubai. The head office of Cerealcom is located on the premises of a modest, formally state-owned grain silo in rural South Romania, the heart of the country's grain production region.¹³³ Swiss trading house Glencore conducts operations from an unassuming 1970s three-story building complex in the quiet tax haven of Baar, Switzerland.

¹²⁷ See Saskia Sassen, *The Global City: New York, London, Tokyo* (Princeton: Princeton University Press, 1991).

¹²⁸ See Appendix A, "GASC's awarded tenders from February 15 to August 21, 2017."

¹²⁹ Grainbow, Olam, Alegrow, Lecureur, Casillo, Ameropa, GTCS, CofCo, Venus, and Solaris.

¹³⁰ "Egypt GASC Wheat Tender Lowest Offer \$192.74/T from Ukraine," *Reuters*, June 13, 2017, <http://af.reuters.com/article/egyptNews/idAFL8N1JA38Y>.

¹³¹ POSCO DAEWOO, "General Inquiry," POSCO DAEWOO Corporation, accessed October 15, 2017, <http://www.daewoo.com/eng/generalInquiries.do>.

¹³² Archer Daniels Midland Company, "ADM Opens Global Headquarters and Customer Center in Chicago," news release, August 25, 2014, http://www.adm.com/news/_layouts/PressReleaseDetail.aspx?ID=601.

¹³³ Cerealcom Group, "Contact," accessed October 17, 2017, http://www.cerealcom.com/contact_en.html.

Located within the US wheat-belt in a suburb of Minneapolis, Cargill recently moved its HQ from a nineteenth-century-style manor to a neutral, modern office complex.¹³⁴ Finally, Midgulf International Ltd. is based in a small office building in Limassol, South Cyprus, the largest ship management center in Europe. This overview of the HQ locations reveals rational decisions: Cerealcon, Cargill, and Aston are located close to grain production areas; Daewoo and Louis Dreyfus are near global shipping infrastructures; ADM, Midgulf, and AOS are in globally-relevant trading and shipping logistic centers; and Glencore is in a low-regulation trade zone. This is not to suggest that these facilities are so situated solely because the firms that occupy them are trading grain with Egypt. And, these operational headquarters of the grain trading partners of GASC hardly just a dispersed sequence of points on a map, for they have become part of the globally networked spaces and infrastructures directly profiting from Egypt's food import policies, and some of the trading houses have benefitted from this arrangement for decades.

As global grain trading houses become more integrated, they have more subtle, but nonetheless noteworthy, secondary transnational impacts. These secondary effects are not direct outcomes of Egypt's trading transactions, but rather of trading house strategies. Cargill, for example, constructed a new 28,000-ton grain terminal in Alberta, Canada to facilitate the handling of Canadian wheat for export.¹³⁵ Glencore, through its firm Vittera, built extra storage facilities for 500,000 tons of grain in Australia, adding to its 274 grain silos, 23 port terminals, a charter fleet of 180 ocean-going ships, and 2,000 rail cars worldwide.¹³⁶ A few trading companies even moved into grain production. For instance, Romanian grain trader Cerealcon is involved in large-scale grain production, with 50,000 hectares of land dedicated to intense farming of crops that are strictly for export.¹³⁷

The physical outcomes of the Egyptian grain trade at the transnational scale occur at various levels, with consequences that are not always obvious. Besides prompting questions of uneven growth, the financial flows moving from South to North work to perpetuate the disproportionate concentrations of capital in the business centers of the Global North, thereby

¹³⁴ Oliver Staley, "Cargill's Top Officers Are Abandoning Their Executive Chateau and Mixing with the Rank and File," *Quartz*, May 9, 2016, <https://qz.com/679118/cargills-top-officers-are-abandoning-their-executive-chateau-and-mixing-with-the-rank-and-file/>.

¹³⁵ Cargill Incorporated, "Cargill to Build State-of-the-Art Grain Terminal in McLennan, Alberta," news release, June 28, 2012, <http://www.cargill.ca/en/news/NA3046632.jsp>.

¹³⁶ Jane McBride, "Vittera to Build up to 500,000 Tonnes of Additional Storage," news release, August 19, 2016, <http://www.glencoreagriculture.com/media/news/p/vittera-to-build-up-to-500000-tonnes-of-additional-storage>.

¹³⁷ Antoine Roger, "Power in the Field. Explaining the Legitimation of Large-Scale Farming in Romania," *Sociologia Ruralis* 56, no. 2 (2016).

consolidating the hegemony of large urban agglomerations like Chicago, Paris, and London.^{138 139} While large, cross-border transactions are advantageous to trading firms, also encouraging the lucrative construction of support infrastructure, what emerges is an unequal geography of finance that is shaped and sustained by capital transfers associated with the grain trade.

2) *Territorial Scale*

In July 2017, GASC bought another 235,000 tons of Black Sea wheat (Russian and Romanian in origin).¹⁴⁰ The substantial volume of such purchases underscores the territorial impact of Egypt's grain-trading practices that move along three axes: production areas, logistical infrastructure, and transportation spaces. By defining precisely which type of wheat grain to be purchased and by choosing certain tenders over others (usually based on the lowest bid), GASC impacts specific spaces and production areas beyond its national boundaries.¹⁴¹ In fact, through its continuous demand for particularly sourced wheat, GASC could be said to generate a distinct geography of production. GASC's tenders from February to August 2017 revealed that the wheat imported was exclusively obtained from Russia, Ukraine, and Romania, with the exception of two French and US wheat shipments within the entire period. Indicative of dwindling US influence in agricultural policies, the dominance of Black Sea wheat is price-related, with Russian, Ukrainian, and Romanian grain among the world's cheapest. Low prices are not only correlated to a weak Russian ruble, but also to the area's large harvests, as the Black Sea territories of wheat production are as immense as they are productive.¹⁴²

Following the collapse of centrally planned agricultural institutions in 1991, and with a decline in subsidy programs, technology transfers, fertilizer trade, and loss of market access, cereal-planted areas and grain productivity sharply diminished in former Soviet republics in the 1990s. The Food and Agriculture Organization of the United Nations estimated that 90 percent, or 23 million hectares, of arable land within the agricultural systems of Russia, Ukraine, and

¹³⁸ See Saskia Sassen, *The Global City: New York, London, Tokyo* (Princeton: Princeton University Press, 1991).

¹³⁹ See Neil Smith, *Uneven Development: Nature, Capital, and the Production of Space* (New York: Blackwell, 1984).

¹⁴⁰ Mike Verdin, "Egypt's GASC Turns to Black Sea, Again, for Wheat Order," *Agrimoney*, January 16, 2017, <http://www.agrimoney.com/news/egypts-gasc-turns-to-black-sea-again-for-wheat-order--10341.html>.

¹⁴¹ U.S. North Pacific soft white wheat, U.S. soft red winter wheat, U.S. hard wheat, Canadian soft wheat, French milling wheat, Bulgarian milling wheat, Australian standard white wheat, Polish wheat, German milling wheat, UK milling wheat (UKP or UKS variety), Romanian milling wheat, Russian milling wheat, Ukrainian milling wheat and Kazakh milling wheat.

¹⁴² Russia (27.3 Million Hectares planted, 67 Million tons wheat harvested), Ukraine (6.6 Million hectares, 25 Million tons), Kazakhstan (11.5 Million hectares, 13 Million tons), and Romania (2.11 million hectares, 8 Million tons). Foreign Agricultural Service/USDA, "World Agricultural Production," in *Circular Series* (Washington, USA: United States Department of Agriculture, 2017).

Kazakhstan had ceased being productive.¹⁴³ Still, after 2010, production rates went up again and grain exports increased steadily, with Russia, Ukraine, and Kazakhstan becoming major players of the grain trade.¹⁴⁴ ¹⁴⁵ As the region enjoys geographic proximity to the stable export markets of the Middle East and Northern Africa, it is assumed that 13 million hectares of fallow land will be used once again for agricultural production, specifically for the cultivation of grain.¹⁴⁶

Furthermore, driven by world grain futures prices, weather conditions, domestic policies, and other related factors, some areas of wheat production are absent from the tender process, or rarely selected, because it is deemed too expensive. In 2017, for instance, the US production of wheat fell to its lowest level since 1909 because farmers chose to grow soybeans that brought better returns, leaving the bulk of wheat production to the Black Sea region, a move that by and large helped to consolidate current trends.

Yet another type of space that is affected by GASC's grain practices is that set aside for logistical infrastructure. The impact of trade on Black Sea ports is particularly striking. Russia's grain port facilities include deep-water ports on the Black Sea (Novorossiysk, Tuapse, Taman) as well as shallow-water ports on the Volga-Don basin and Azov Sea (Rostov-on-Don, Eysk, Azov, Temryuk, Kavkaz, and Taganrog). Significant grain export facilities located at Ukraine's deep-water ports are Yuzhny, Mykolaiv, Odessa, and Illichivsk. Romania's grain is shipped down the Danube River to its export harbor of Constanta. Following the region's recovery, the development grain export infrastructure boomed, with substantial amounts of capital flowing in from private investors, international institutions, and foreign and local grain trading houses. In 2012, Glencore, together with a Ukrainian partner firm, bought one of the largest Russian grain export terminals in the port of Taman, near the main grain-producing region in southern Russia.¹⁴⁷ Olam International Ltd. acquired a grain terminal in Azov, Rostov. Ukrainian trader Nibulon engaged in modernizing the port of Mykolaiv's grain infrastructures, while Bunge

¹⁴³ FAOSTAT, "Food and Agriculture Organization Statistics," (Rome, 2009).

¹⁴⁴ World Grain Staff, "Ukraine's Wheat Production Increases," *World Grain*, February 8, 2016, http://www.world-grain.com/articles/news_home/World_Grain_News/2016/02/Ukraines_wheat_production_incr.

¹⁴⁵ Anatoly Medetsky, "Russia Becomes a Grain Superpower as Wheat Exports Explode," *Bloomberg*, October 6, 2016, <https://www.bloomberg.com/news/articles/2016-10-06/russia-upends-world-wheat-market-with-record-harvest-exports>.

¹⁴⁶ Elena Lioubimtseva and Geoffrey M. Henebry, "Grain Production Trends in Russia, Ukraine and Kazakhstan: New Opportunities in an Increasingly Unstable World?" *Frontiers of Earth Science* 6, no. 2 (2012).

¹⁴⁷ Michael Haddon, "Glencore Buys 50% Stake in Russian Grain Export Terminal," *Dow Jones News*, October 2, 2012, http://www.advn.com/news_Glencore-Buys-50-Stake-In-Russian-Grain-Export-Te_54378149.html.

Ukraine also bought new elevators there.^{148 149} The Ukrainian government partnered with Chinese and Gulf investors to develop the port of Yuzhny for grain exports, where Cargill had invested USD 100 million to build a new grain terminal.¹⁵⁰ Louis Dreyfus Company, with support from the European Bank for Reconstruction and Development (EBRD), recently built a new grain terminal (two loading berths, 10 50,000-ton silos) in Azov, Rostov.¹⁵¹

Additionally, substantial influences of Egypt's grain procurement come by way of transportations spaces that are part and parcel of this logistics infrastructure. If the effects of trading transactions can appear somewhat elusive and intangible, grain shipments are by contrast an inherently material and territorial affair, with the commodity sourced from one region and taken to another through a series of logistically-driven movements. The transportation of a grain load of 50,000 tons from Novorossiysk to Alexandria entails the movement of cargo in a calculated interval of time through a succession of quantifiably contained spaces of various sizes, be they mobile and logistical (i.e., wagons, containers, conveyors belts, vessels) or static and architectural (i.e., silos, storage halls). A multimodal, at times automated, physical infrastructure (e.g., train tracks, roads, berths, harbors, and maritime routes) enables the movement of grain through time and space. The hypothesis formulated here is that the physical movement of commodities impacts space at a geographical scale through the formation of a specific, logistical infrastructure that sustains the transportation itinerary and organizes territory in the process. In short, the very movement of foodstuffs establishes a territory of grain transportation that transcends national boundaries. For instance, moving grain via vessels on national and international waters generates a semi-continuous, yet transient physical infrastructure of maritime routes that serve as an extension of the land. These routes are not neutral itineraries but defined spaces of a few kilometers wide shaped by physical constraints (e.g., shorelines, winds and currents, depth, reefs, political boundaries), geopolitics, and trade flows of the global maritime network. One example is the Strait of Bosphorus on the route between Black Sea ports and

¹⁴⁸ Holly Demaree, "Nibulon to Invest in Ukraine's Ag Infrastructure," *World-Grain*, May 3, 2017, http://www.world-grain.com/articles/news_home/World_Grain_News/2017/05/Nibulon_to_invest_in_Ukraines.aspx

¹⁴⁹ UkrAgroConsult, "Developing the Grain Market's Inland Infrastructure Has Become Necessary in Ukraine," news release, August 8, 2015, <http://www.blackseagrains.net/novosti/developing-the-grain-market2019s-inland-infrastructure-has-become-necessary-in-ukraine>.

¹⁵⁰ Turloch Mooney, "Ukraine Port Dredging Latest Notch in Belt and Road," *The Journal of Commerce*, May 22, 2017, http://www.joc.com/international-trade-news/infrastructure-news/europe-infrastructure-news/ukraine-dredging-latest-notch-belt-and-road_20170522.html.

¹⁵¹ Louis Dreyfus Company, "Louis Dreyfus Company Inaugurates Grain Terminal in Azov, Russia," news release, May 2, 2017, <http://www.ldcom.com/global/en/investors-media/press-releases/press-release-2017/louis-dreyfus-company-inaugurates-grain-terminal-in-azov-russia/>.

Egyptian harbors. Under Turkish authority, the Strait is a strategic maritime passage and a chokepoint with capacity constraints that have direct bearing on the costs of grain transport. In 2016, during the alleged coup attempt on the Turkish government, the maritime authorities disrupted traffic for several hours by shutting down the Strait to transiting grain-loaded vessels and oil tankers.¹⁵² And so, while grain trade impacts and delineates territorial contours, transportation spaces, which are also always political spaces, can in turn act back upon grain flows.

So how are the mechanisms of Egyptian's exports enacted at the territorial scale? Large-scale fluctuations in land use in production areas, e.g., changes in crop-type or usage, foreign-funded construction and upgrading of grain export infrastructure, as well as cross-border transportation spaces both generated by and for the movement of grain are all manifestations of Egyptian policies that are implemented in response to the imperatives of the global food system. Of relevance here are the works of Charles Waldheim and Alan Berger who contend that such manifestations constitute the spatial translation of capitalism as expressed through logistics.¹⁵³ Formed by speculative practices and private interests, in conjunction with national policies and the needs of populations, the landscapes so generated highlight the critical importance of logistics in giving spatial expression to the politics of the food system. Shaped by commodity trade flows, the configurations that emerge form a built, worldwide landscape that places global supply chains at the center of territorial and geopolitical questions.¹⁵⁴ Picturing the flow of grain from the fields of Novosibirsk to the harbor of Alexandria reveals how the spatial organization of logistics and the globalization of grain trade go hand in hand, not to mention the central role played by space in neoliberal economies undergoing transformation.

3) *Urban Scale*

The port of Alexandria has been a defining feature of the city since its founding by Alexander the Great. To open up the country to Mediterranean trade via sea-going traffic, a site oriented to the North away from the floodable delta was chosen for what was to become a megalopolis of the Hellenistic world as well as a universal emporium.¹⁵⁵ With a difficult

¹⁵² Ayla Jean Yackley, "Turkey Reopens Key Route for Oil, Grains Transit after Coup Attempt," *Reuters*, July 16, 2016, <http://www.reuters.com/article/turkey-security-shipping-idUSL8N1A20G6>.

¹⁵³ Charles Waldheim and Alan Berger, "Logistics Landscape," *Landscape Journal* 27, no. 2 (2008).

¹⁵⁴ See Deborah Cowen, *The Deadly Life of Logistics: Mapping Violence in Global Trade* (Minneapolis: University of Minnesota Press, 2014).

¹⁵⁵ See Sandro Breccia, *Le Port D'Alexandrie Guide Sommaire*, XIVe Congrès International De Navigation (Alexandrie: Société de Publications Égyptiennes, 1926).

hinterland of lakes and swamps, the city was angled towards the water. The port created a trade network, which allowed it to export wheat from its quays to Rome during the period of Roman imperial expansion. This activity gave rise to the enduring legend of Egypt as the “granary of mankind.”¹⁵⁶ The resulting prosperity lasted for centuries until the port's decline at the beginning of the sixteenth century. The harbor of Alexandria had almost been abandoned completely when Muhammad Ali (1805-1849) came to power in 1805 and launched a series of *Grands Travaux* relying on forced labor.¹⁵⁷ A new lighthouse, an arsenal, and a royal palace were constructed in the Old Harbor, which would become the modern Port of Alexandria.¹⁵⁸ By the time of Ali's death in 1849, the harbor was already prosperous and the population had increased, which brought life back to the city. In 1869, under the authority of Khedive Ismail (1863-1879), Minister of Public Works Linant de Bellefonds Bey designed a redevelopment plan for the Old Harbor.¹⁵⁹ Major works were undertaken to facilitate navigation and the handling of goods.¹⁶⁰ In the vicinity of a new berth connecting the quays to the *Gabbari* freight station to Cairo, a large complex comprised of ten mills was the site of intense grain-related activities.¹⁶¹ Under British rule (1882-1952), the harbor profited from the increased mobility of capital, goods, and people that was facilitated by the standardization of travel and communications. More train tracks, new lighthouses, wood storages, quarantines compounds, nitrates silos, and other infrastructures connected to the port were built along the west coast towards the bay of El-Mex, and the course of urbanization followed this linear path of development. The exploitation of national resources, exports of Egyptian agricultural goods, imports of British manufactured goods, and a generally good business climate led to the emergence of a wealthy foreigner class and further urban development. It was during this period that Alexandria acquired its renown both as prized locus of national self-esteem among Egyptian and as cosmopolitan haven where a Levantine

¹⁵⁶ Maguelonne Toussaint-Samat, *A History of Food* (Malden: Wiley-Blackwell, 2009), 125.

¹⁵⁷ For instance, the Mahmoudiyah canal was key to the city's revival, bringing fresh Nile water and allowing navigation from the Nile to the harbor.

¹⁵⁸ Designed by French engineers Louis Lefèvre de Cerisy and Eugène Mougel.

¹⁵⁹ Louis Linant de Bellefonds Bey, “Mémoires Sur Les Principaux Travaux d'Utilité Publique Exécutés En Égypte Depuis La Plus Haute Antiquité Jusqu'à Nos Jours,” in *Atlas Historique De La Ville Et Des Ports D'Alexandrie*, ed. Gaston Jondet (Cairo: Institut Français d'Archéologie Orientale, 1869), 111.

¹⁶⁰ Works included embankments gained from the sea stretching over 2700 meters, new quays and berths, the cleaning and deepening of basins, a new area for commercial vessels, new sea walls, and berths equipped with train tracks and unloading cranes. A 2.3 kilometer-long breakwater protecting the harbor was completed in 1874.

¹⁶¹ Malaval and Jondet, “Port D'Alexandrie,” in *Atlas Historique De La Ville Et Des Ports D'Alexandrie*, ed. Gaston Jondet (Cairo: Institut Français d'Archéologie Orientale, 1869), 112.

community thrived due to the harbor's prosperity.¹⁶² Following the 1952 revolution, the Free Officers, including General Nasser (1952-1970), promoted state-controlled industry and consequently various plants were built in the harbor area. Leaving their assets behind, most foreigners left Egypt due to the Suez crisis and to Nasser's pro-national laws (Egyptianization Laws of 1957, Nationalization Laws of 1961). Under Sadat (1970-1981), harbor-related activities such as salt and tanning industries, an oil refinery, and a cement works had reached the coastal village of El-Mex. At the western side of the El-Mex Bay, El-Dekheila, a pristine shoreline known historically as the landing point of Napoleon Bonaparte and his French troops, experienced massive development under Mubarak (1981-2011) in response to the increasing amount of container trading and to serve the industrial area in the delta (e.g. El-Dekheila Iron and Steel complex, the free zone and the electricity plant located in west Alexandria).¹⁶³ Such growth reinforced the extensive, linear pattern of coastal urbanization, with some industries located south of the harbor. Today, 60 percent of the nation's foreign trade proceeds through Alexandria's port and harbor-related industries remain the city's main employers.¹⁶⁴ However, the combination of bureaucracy and traffic congestion impairs export trade (e.g., oil, gas, cotton and agricultural goods) and it would seem that, perhaps due in large part to the country's longstanding dependency, the harbor operates more successfully with imports than exports, with grain being the major commodity imported.¹⁶⁵

How does the operative logic of the grain trade map onto urban form? It would be hard to deny the influence of harbor industries and their attendant infrastructure on the city of Alexandria—a conclusion supported broadly by historical accounts. The economic preeminence of the harbor, from the Eastern harbor to El-Dekheila, has been physically translated into kilometers of appropriated waterfront that has been urbanized and industrialized over centuries. The urbanization pattern of the city closely follows the harbor zone and the coastline. But more specifically, grain flows entering the port have an effect at the urban scale via infrastructure. Just as cotton determined which installations were built in the nineteenth century (i.e., the railway connecting the port to the Nile Delta, Cairo, and the Nile Valley), the import of grain too has

¹⁶² Sakis Gekas, "Colonial Migrants and the Making of a British Mediterranean," *European Review of History: Revue Européenne d'Histoire* 19, no. 1 (2012).

¹⁶³ See Charles L. F. Panckoucke, *Description De L'Égypte Ou Recueil Des Observations Et Des Recherches Qui ont Été Faites En Égypte Pendant L'Expédition De L'Armée Française*, vol. 1 (Paris: Panckoucke, 1821).

¹⁶⁴ Yasser G. Aref, "Plans and Projects for Alexandria: 1952 to Present," in *Alessandria D'egitto Oltre Il Mito [Alexandria Beyond the Myth]*, eds. Luisa Ferro, Cristina Pallini (Cuneo: Boves, 2009).

¹⁶⁵ See Fouad N. Ibrahim and Barbara Ibrahim, *Egypt. An Economic Geography* (London; New York: I.B. Tauris, 2003).

resulted in the construction of contemporary facilities necessitating territorial reorganization to facilitate its constant inward flow. Larger grain-loading vessels (*Panamax*) required the construction of bigger berths. For the construction of berths 91, 92, and 94, land was reclaimed from the sea.¹⁶⁶ Thus, specific infrastructure was constructed and machinery installed (i.e., unloading conveyor systems, belts, pumps, lifts, bagging machines) to handle the grain from vessel to quay, from quay to storage, and from storage to processing and distribution locations. These installations are located in the secured harbor compound that is physically separated by walls and fences from the surrounding urban fabric. Symptomatic of the vital character of grain, this segregation is underlined by administrative demarcations due to the presence of the nation's strategic grain reserves. The many gates that open to the city generate constant in-and-out traffic of goods and people, thereby establishing an immediate link with Alexandria's network of roads, highways, and train tracks. Connected directly to the harbor, this transport grid is under heavy strain because it is constantly congested and in poor condition, serving not only to move grain to local storage and mills, but also to Cairo, the rest of the country, and the rest of the continent as well.

All in all, grain-loaded ships currently arriving from the Black Sea and docking and unloading at grain berths perpetuate interactions between historical sea-trade and urban form. With regard to national food subsidies, the import of grain establishes the harbor time and again as the entry point of a vital commodity and a facility fundamentally necessary to the political stability of the country. The importance of the harbor is accentuated by the ongoing construction of state-funded, specific infrastructure, land reclamation from the sea, and the thorough integration of grain transportation networks into those of the city. In the case of Alexandria, the entire infrastructure for the importation of grain was financed with public funds, and to date, remain largely in public hands, save for container terminals in the Port built and owned by the Hutchison Group and a grain terminal owned in parts by Cargill. The course of deregulation and privatization that the Egyptian state has undergone since 1991, including ERSAP and the waves of IMF agreements, has also had a bearing on this logistical urban landscape with marine transport companies being semi-privatized as well. While the Alexandria Port Authority still owns the land and the infrastructure, the state sold shares of the General Company for Silos and Storage (GCSS) for storing grain upon arrival. Thus, not only must these large installations be understood within their historical context and the role they play in the modernization of Egypt,

¹⁶⁶ Lofty Azaz Abdou, "Monitor Urban Growth in Alexandria - Egypt Using Satellite Images," in *Remote Sensing of Urban Areas*, ed. Toni Breuer et al. (Regensburg/Germany: Institut für Geographie an der Universität Regensburg, 2001).

but also how their spatial organization has been more recently shaped by a complex collusion of national interest and neoliberal forces that come together in the materialization of the political economy of food.

4) *Architectural Scale*

A gigantic, 40-meter-high concrete grain elevator, not unlike those seen along the highways running through the American Midwest, towers over berth 85 of the Port of Alexandria. It receives tons of imported grain bought by GASC on the global market. Along with grain storage sheds, mills, and bakeries, grain elevators are examined here as manifestations of the grain chain at an architectural scale. In the framework of a long-term national plan to construct a network of silos to reduce wheat loss, the grain-storage infrastructure was commissioned purposely “to cover the requirements of the populations in the cities.”¹⁶⁷ At berths 85 and 86, a pneumatic conveyor (“marine leg”) scoops the grain directly from the vessel to the distribution floor of the imposing structure. Built in 1992, the monumental, 260-meter-long by 30-meter-wide reinforced concrete structure is made up of two connected bodies, one larger than the other.¹⁶⁸ This type of industrial building is ubiquitous in production and consumption areas worldwide. A long, lateral building with a storage capacity of 100,000 tons, the main structure houses a work floor at ground level, above which nine-meter-diameter silos or storage bins are aligned in 16 rows of three bins. A distributing floor over the silos and an upper ‘head house,’ the head drive of the conveyor system on top of the building, complete the structure. After being weighed, the grain is brought up to the distribution floor, carried along the floor on gallery belts to be distributed in the appropriate bins below. Although this distribution system is mechanized, it is still manually controlled. Workers must move the machinery to ensure that the grain goes in or out of the desired silo. Grain is stored both in the circular concrete bins and in odd-shape interstitial bins between the circular ones. The work floor below the silos is where the grain is poured into train cars connected to a five-track railway terminal along the Alexandria-Cairo line or into trucks. Organized in a similar fashion, the smaller body of the elevator is a reinforced concrete structure composed of six-meter-diameter silos in 13 rows of 3 bins, with a storage capacity of 8,000 tons.¹⁶⁹ The semi-public General Company for Silos and Storage currently

¹⁶⁷ Faris El-Lakwah, "Post Harvest System of Cereal Grains in Egypt," (Rome: Food and Agriculture Organization, 1995), 5.

¹⁶⁸ See Lisa Mahar-Keplinger, *Grain Elevators* (New York: Princeton Architectural Press, 1993).

¹⁶⁹ Japan International Cooperation Agency., "Present Situation of Major Egyptian Ports," (Tokyo: Japan International Cooperation Agency, 2002).

manages the elevator. Such a massive structure could be viewed as a representative architectural object that stands as a symbol of the government's commitment to feeding its population. But this is not how the structure is commonly seen. Enclosed in the gated harbor compound, several rows of industrial buildings create a visual barrier between the building situated near the water and the city. Therefore, despite its enormous size, the impressive building is barely visible from the street. This invisibility holds true for more recently constructed public grain storage spaces in the city as well. The importance of these particular spaces is inversely proportional to their inconspicuous appearance and to the confidentiality that surrounds their usage. The complex of ten unassuming, steel-constructed grain sheds next to the grain berths N° 91, 92, and 94 in the harbor compound of El-Dekheila are certainly the most significant buildings of the harbor. Built between 2008 and 2009, the blue steel structures are typical warehouses. Usually designed by engineers, the technical requirements for such buildings are standardized, yet specific. Dimensions are determined based on the anticipated volume and tonnage of wheat to be stored. In the El-Dekheila complex, a typical structure consists of an impermeable, reinforced concrete floor (to sustain the weight), steel pillars, concrete lower walls, metallic upper walls, a free-span, gabled, aluminum-clad roof with eaves, ventilation openings under the eaves, and at least two entrances equipped with metal sliding doors.¹⁷⁰ The sizes of the horizontal sheds vary from 70 by 45 meters to 75 by 90 meters and are 20 meters high. Additionally, there is a complex of 20-meter-diameter steel silos in two rows of seven units, which complete the 260,000-ton storage capacity of El-Dekheila terminal.¹⁷¹ Located just off of the harbor, a few privately or semi-privately owned structures (e.g. Venus Grain Terminal) store imported grain, although their product is sold on the open market and is rarely used for the national bread subsidy program. In charge of purchases, GASC aims to have a constant three- to six-month reserve supply of *baladi* bread. The consumption of wheat controlled by GASC remains constant at about 800,000 tons per month.¹⁷² In short, the main and auxiliary buildings identified here store the bulk of the nation's strategic grain reserves that the government stockpiles to guarantee domestic procurement and provide a buffer against food prices peaks as well.

¹⁷⁰ Delano L. Proctor, "Grain Storage Techniques. Evolution and Trends in Developing Countries," in *FAO Agricultural Services Bulletin*, ed. Group For Assistance On Systems Relating to Grain After Harvest (Rome: Food and Agriculture Organization of the United Nations, 1994).

¹⁷¹ "El-Dekheila Yards," General Authority for Alexandria Port, accessed 5 May, 2017, <http://www.apa.gov.eg/index.php/en/-el-dekhila-port-/yards>.

¹⁷² Arwa Gaballa, "Egypt Wheat Reserves at 2.6 Months, to Buy 3.8 Million Tonnes from Local Harvest," *Reuters*, April 24, 2017, <http://www.reuters.com/article/us-egypt-wheat-idUSKBN17R03S>.

Due to the amount of grain required by the subsidized *baladi* bread program, the stored grain does not remain in the silos and warehouses of the harbor zone for long, but is rapidly transferred to the mills of Alexandria, Cairo, and other governorates. If not processed and bagged on the spot, grain in bulk can be stored at mills' storage facilities.

In the central area of Moharam Bek, between the Mahmoudiyah canal and the freight train tracks, the Alexandria Flour Mill Company is a decade-old, walled building complex, representative of mills in the area. A control room flanks the large entrance gates. To the left of the control room are two large, concrete storage halls 120 meters long and 20 meters wide. One receives grain, the other flour. Two five-story buildings serve administrative purposes, for this is the main mill of the eleven managed by the large and public Alexandria Flour Mills and Bakeries Company. At the center of the compound, there is an ordinary green and white metal shed of 45 by 40 meters; this is the mill building where the flour is produced. The Moharam Bek mill aims to produce 128,000 tons of *baladi* flour per year. For all 10 mills, the total volume produced should reach 594,400 tons of flour per year.¹⁷³ At first sight, the architecture of the compound seems unremarkable and says little about the importance of the work that takes place behind its walls. However, the compound is organized as if self-contained, with the mill building surrounded on all sides by other structures acting as protective walls. Furthermore, the well-secured compound is visibly subjected to tight surveillance. From the control room, military staff guards the entrance gates and any stranger to the mill is promptly turned away. While surveillance of public buildings is common in Egypt, the very fact that mills are situated in a fortress-like architecture and deemed worthy of military protection is particularly telling. Not only attesting to the omnipresence of armed forces in the food industry, the dissuasive measures also betray very real fears concerning food supply (e.g., theft, looting, attacks) and are indicative of the lengths to which authorities are—or claim to be—prepared to go to protect the commodity before it reaches consumers.

Lastly, bakeries play their part in the grain chain, manifesting the final publically visible operations take place: the processing of flour into *baladi* bread and the allocation of the finished subsidized product to the population. But, a distinction must be made between public and licensed bakeries. The latter, constituting the majority of such facilities, are privately owned bakeries with a license obtained from municipal authorities to produce and sell subsidized bread. Often, they have operated as “normal” bakeries prior to being licensed, in contrast to those

¹⁷³ "Flour Mills Sector," Alexandria Flour Mills and Bakeries, accessed May 6, 2017, <http://www.alexflourmills.com/en/flourMillsSector.aspx>.

designated public bakeries, which are commissioned and purposely built by the authorities to produce and sell subsidized bread. In the investigated area of the Eastern district of Alexandria, the built typologies of private bakeries vary, from tiny, non-descript points-of-sale to larger, semi-industrial production units and stores. In the district investigated, only three percent are manually operated (using ancient fire-powered ovens) and 92 percent are semi-automatic (with gas or electric ovens). 37 percent of the units process between 600 kilograms and one ton of flour per day, while 24 percent process between one and five tons.¹⁷⁴ In general, licensed outlets produce less than those specifically licensed by government. Spatially, private bakeries are, almost without exception, integrated in the ground floor of residential buildings, built as plastered structures with concrete framework and brick infill. Most have one sales counter and an access door that is always open for ventilation. A marquee or a metal canopy, more often simply the cantilevering balconies above, protects waiting customers. Sales happened over the counter, but may occur outside if the sales employee is installed at a little desk in front of the store. Money is collected before customers get their bread share and queues are common. All bakeries without exceptions have metal grids to protect both counters and doors, often with intricate decorative patterns. Inside, the baker's workshop comprises one room (from 25 to 80 square meters) and might include a small, adjacent storage area. Interiors, as well as some exteriors, are tiled in white ceramic. Wrapped in isolation material, chimneys run vertically along the building facade to the roof. There are openings on the facade above the door or the counter and also in the back of the room where possible for ventilation purposes. It is mandatory for licensed bakeries to place a plaque outside the shop that stipulates the following: the names of owners and manager, address of the shop, daily production output and type of bread produced, weight and price of the loaf, the shop's opening hours, the mill delivering the flour, as well as the phone numbers of the bakery and the directorate.

The structural differences between licensed and public bakeries are telling because public bakeries are explicitly designated to produce and sell *baladi* bread. Architecturally speaking, they are designed to fulfill this final stage of the food subsidy system. In 2009, following the 2008 Mahalla 'food riots', the governorate of Alexandria allocated land for building bakery houses on public space (i.e., streets, parking lots, traffic islands, etc.) to facilitate public access to bread.¹⁷⁵ Based on data collected in the investigated Eastern district, one can identify a typological

¹⁷⁴ See Appendix B, Statistics, Bakeries of the Eastern District, Alexandria, 2013.

¹⁷⁵ FAO Regional Office for Near East and North Africa, "Egypt," in *Food and Agriculture Policy Review* (Cairo: Food and Agriculture Organization, 2010).

distinction: government bakeries are large, low-cost, one-story buildings erected on public space.¹⁷⁶ The buildings are basic, rectangular, concrete or steel and brick infill structures, sometimes plastered in yellow and brown. Areas vary from 50 to 100 square meters relative to the stipulated output of the store (three or six tons of flour processed daily). All public outlets are automated (e.g., industrial kneading machines and ovens), and, while connected to the municipal power network, are equipped with diesel generators. Transactions take place at sales counters, simple windows protected with decorative metal grids and crowd-control bars. A narrow one-meter wide concrete sidewalk goes around the building and simple, corrugated iron or aluminum canopies overhead protect the sales counters and the sidewalk. Two side doors allow access to the production rooms for flour delivery. Interiors are rudimentary and without partitions, accommodating the production machines and the one or two ovens. Typically, the racks for storing the flour bags prior to processing are placed outside. A single chimney pipe serves the premises, usually towering some four meters above the roof. The gabled roof is most often made comprised of a single, corrugated iron covering. Fitted with protective metal grids, ventilation openings are placed all around the building on the upper wall under the roof. As for licensed bakeries, public ones are also required to display a plaque with all necessary information concerning the output and management of the outlet. Next to the building, there is a blue, rounded, plastic booth for a guard, present during operating hours.

Conclusion

Both licensed and public bakeries are characteristically heavy-duty, robust outlets that operate under constant pressure to feed populations, while being sustained by foreign grain imports delivered from the harbor via mills. If licensed outlets appear as rather run-down, tiny spaces well integrated in the city fabric, public ones are newer, stand-alone structures, yet both serve the same purpose. As such, they form a pervasive and ubiquitous network of thousands of architectural spaces that translate state food policies on the ground. Legible at the architectural, urban, and national scale, they are part of a built landscape of state service and control, benefitting governments as long as this landscape remains operative. These spaces define the local staging of distribution policies, a repository for the unseen and remote landscapes of production, transportation, and logistics that make up the broader network of infrastructure formed by a multitude of tiny spaces organized to serve larger national and global strategies. Thus, grain elevators, silos at the port, and the mills and bakeries of Alexandria constitute architectural

¹⁷⁶ Gleem bakery, Kobri el-Namoos bakery, and El Kalaah bakery.

objects shaped by Egyptian food policies, and, as such, can be understood as direct spatial consequences of the political economy of food and of the extensive forces powering the global food system. Each of these objects has a spatial form that gives expression to integral processes of this system. Hence, these objects stand as discrete components of distended spatial operations that connect world realms and local environments, making visible those intangible economic and political networks by which these material nodes are connected.

Commentary: Space-shaping Forces

In April 2008, in the context of a global food crisis, 11 people died in breadlines of Cairo's subsidized bakeries. At the time, Hosni's Mubarak's spokesman Suleiman Awad told journalists that "Egyptians must be given loaves of bread and the phenomenon of bread lines must disappear," thus faintly implying some sense of governmental responsibility.¹⁷⁷ As a grain shortage loomed, Mubarak summoned the army to produce and distribute bread—albeit in quantities far short of what was needed. The situation escalated quickly and violence erupted in Mahallah, with 'food riots' spreading to other cities and igniting the events of 2011. This incident provides insight into the impacts of the political economy of food systems on the built environment. What are the consequences of such spatial ramifications of food policies for the organization of territory, the form of the city, and the political agency of architecture? Chronic grain shortages and enduring susceptibility to fluctuations in global food prices are indicators of a country—and government—highly dependent on food imports, a dependence that plays out in territorial organization, while generating contingencies for the nations that exceed its borders. Additionally, reliance on foreign grain markets necessitates complex logistics networks and the construction of specific infrastructure that are spatially determinate of entire urban areas as seen in Alexandria. The bakery constitutes an architectural translation of the government's imperative to provide sufficient amounts of bread as a precondition for political stability and social accord.

Food Subsidies and Territorial Organization

Tracing the flow of grain that sustains the production and distribution of *baladi* bread shows that while formerly dependent on American and European grain, Egypt is now sourcing its wheat mostly from the Black Sea region. This involves myriad agents and the semi-automated movement of grain from one place to another reveals the multilayered, multi-scalar spaces through which the food system operates: global financial centers, production areas, multimodal

¹⁷⁷ Johnston, "In Egypt, Long Queues for Bread That's Almost Free."

transportation networks, cross-border maritime routes, massive infrastructures, and building-scale facilities. In particular, the logistics that orchestrate the cross-border movement of internationally sourced grain to Egypt are significant as the manifestation of national food policies and larger-than-national markets. Accepting Jean Gottmann's thesis that "territory is the fruit of (...) organization," one might argue that the global sourcing stream serving the world's food system produces a range of complex logistics solutions, managed infrastructures, regulated systems, operated buildings, and other spaces, with strategic organization shaping territories of production, transportation, and consumption alike.¹⁷⁸

Specifically, the fallout of this territorial organization is a newly delimited geographical space (i.e., the Black Sea production area, the export harbors, the maritime routes) defined by economic and political imperatives (i.e., the situation of the global grain trade, grain and oil prices, national policies, sovereignty of nations). Territory on the other hand, as Harriet Friedmann has claimed, is also a site of transformation and a fluctuating space.¹⁷⁹ It can change, expand, or shrink according to global circumstances. Moreover, territory is engulfed by economic activities and could thus be considered integral to economic spaces at work—physical space being the platform that serves the dynamics of resource procurement in an increasingly interdependent world. This is to say that by linking parts of the world, displacing commodities, fostering transnational property ownership, and blurring national boundaries, the global grain trade propelled by Egyptian food policies and other factors creates an apparatus of organization that forms what could be termed "territories of grain." Embedded in the geography of the global food system, this amalgamated sum of spaces (i.e., areas of production, infrastructure of logistics, transportation spaces) not only impacts their own distinct location, but also delineates a larger portion of geographical space, a spatial arena corresponding to the dispersed activities generated by the current materialization of food procurement processes.

Food Subsidies and Infrastructure

In and around Alexandria's harbor, the network of large-scale grain procurement, management, and processing infrastructure (i.e., grain berths, grain elevators, silos, train tracks, and mills) should be regarded as expressions of grain flow patterns. Because of its long history with wheat and being the entry point of foreign grain, the entire harbor can also be considered a physical

¹⁷⁸ Jean Gottmann, "The Evolution of the Concept of Territory," in *IPSA Round Table* (Institut d'Études Politiques, Paris: Interdisciplinary Research, 1975).

¹⁷⁹ Harriet Friedmann, "What on Earth Is the Modern World-System? Foodgetting and Territory in the Modern Era and Beyond," *Journal of World-systems Research* VI, no. 2 (2000).

manifestation of the Egyptian government's dependency on foreign markets and its entanglement in global commodity trade. By extension, economic, social, and political directives of successive administrations helped determine the character, evolution, and form of the city. In this regard, the grain-handling installations of the harbor establish a formative infrastructure that has directed the evolution of Alexandria's particular urban morphology, while also being instrumental to constructing the identity of a modern nation.

In "Infrastructure and Modernity," Paul Edwards quotes the definition offered by the US 1996 President's Commission on Critical Infrastructure Protection of infrastructures as systems that "produce and distribute a continuous flow of essential goods and services."¹⁸⁰ The notion that infrastructures constitute in and of themselves environments that shape and process natural resources by technological means to serve human needs certainly bears on Egypt's grain-specific installations as "paragons of modernity," to borrow Edwards's terminology. For the large-scale built structures of the grain industry here are indeed logistical environments and social settings at once that are controlled by large institutions, having been central to the nation's modernization, if not "constitutive of [its] modern condition," in general.¹⁸¹

Seen from this point of view, Alexandria's harbor, grain silos and berths, the neighborhood's mills, and attendant processing installations are all components that define the condition of Egypt's modernity. As large-scale, human-made physical structures, they stand not only as the manifestation of implemented national food policies but as crucial "systems without which societies cannot function."¹⁸²

However, the fundamental importance of food-related logistics and infrastructure should not overshadow critical questions that arise with respect to the political economy that makes such technological investments seem legitimate. For such infrastructures is primarily built to facilitate faster flow rates of capital and commodities, to match growing scales of distribution systems worldwide in the context of accelerated capital accumulation, to assist the country's ever-growing dependency on global markets, and to maintain the government's grip over the population via its favored food procurement policies. The control exerted over place, people, and production processes, so central to the paradigm of modernization, is facilitated by the infrastructure of

¹⁸⁰ Paul N. Edwards, "Infrastructure and Modernity: Force, Time, and Social Organization in the History of Sociotechnical Systems" in *Modernity and Technology*, eds. Thomas J. Misa, Philip Brey, and Andrew Feenberg (Cambridge, Mass.: MIT Press, 2003), 187

¹⁸¹ Edwards, "Infrastructure and Modernity: Force, Time, and Social Organization in the History of Sociotechnical Systems", 191.

¹⁸² *Ibid.*, 187.

logistics. And, any logistical space serving capital accumulation and circulation is just as disposed to market performance as anything else, for this space as well is always faced with the looming prospect of becoming inoperative as market interests and capital flows shift to the next site in the pursuit of higher returns.

Food Subsidies: the Bakery as Political Tool

Decoding the *baladi* bread point-of-sale in view of how infrastructure, urban space, and architecture are implicated in food subsidies as integral to nationwide political, economic, and social control foregrounds a governmental bias in favor of urban agglomerations over rural regions. The majority of licensed and public bakeries that allocate subsidized food to households are located in urban centers. This spatial preference says much about the correlations between cities and popular discontent (see the section on Urban Food Riots). The government favors the distribution of food to urban areas, hoping to keep political troubles at bay, a strategy that undeniably has not always been successful.¹⁸³

Control exerted through outlets is multifaceted: control over the commodity, over buildings, over populations. Currently, most of the supply chain (i.e., sourcing, processing, distribution, sale) and its attendant infrastructures are largely in the hands of the state, though they are strongly supported by private enterprises as well.¹⁸⁴ Thus, control exerted over the commodity chain includes, by extension, control over the building stock and over the terms of spatial organization. The landscape of distribution may change overnight, insofar as authorities can open or close a public outlet, and grant or revoke a shop license. But there is an inherent danger to the food subsidy system in that if bakeries are not able to satisfy the demand for bread demand, the government inevitably will be held accountable and weakened. Bread shop customers find themselves tied to larger scales of population control. With access to supply regulated by smart cards, bakeries ensnare people in webs of large administrative and regulatory systems, supplanting individual needs with overarching imperatives of the state.

Ultimately, considering the bakery only as an isolated architectural object misses the point of it being nested within a much larger distended network and its role as a situated territorial instrument for conducting national food policies. There are over 10,000 bakeries selling government-sponsored bread in Egypt's 26 governorates. Enabling and constraining access to

¹⁸³ Bush, "Food Riots: Poverty, Power and Protest."

¹⁸⁴ Food Price Monitoring and Analysis, "Egypt Halts Subsidies for Flour and Bread Production," *Food Policies*, July 14, 2017, <http://www.fao.org/giews/food-prices/food-policies/detail/en/c/1024546/>.

supply, the outlets are built, nodal entities that serve a political system. Their very physical presence attests to the state's particular approach to feeding a nation and population control, its use of buildings as political tools suggesting that architecture can acquire political agency, for better or worse.

Conclusion

Observing the spatial ramifications of food subsidies on the organization of territory, the form of the city, and the political agency of architecture leads to a possible response to the motivating questions of this research, namely, that food policies are constitutive of the built environment. At the same time, these policies are embedded in larger, political, and economic systems, which must also be recognized as defining the purposes, goals, as well as architectural and urban characteristics of specific settings. But if the role of the global food system and its political economy can be seen as shaping parts of the built environment, territory too should be perceived as an active entity that 'responds' to these stimuli. Constructed to facilitate the procurement of grain, the socio-spatial elements of the organizational processes reciprocate action on policies and practices at other scales. These territorial arrangements act back upon the global food system, as to establish a mutual dependence—*reciprocity*. The "territories of grain" discussed earlier are an ever-shifting, combined sum of spaces hosting dispersed activities at the service of global grain trade. These react and adapt to changing conditions of the political economy of food. In exporting countries, hinterlands' grain silos are abandoned and their operative functions displaced to new facilities at harbors shipping to overseas markets. Grain cargos are transferred offshore on international waters from a ship sailing under a flag to another to circumvent political sanctions. Bottlenecks at strategic straits prompt the development of substitute rail and truck transportation networks. The adaptive abilities of logistical transportation networks sustaining commodity flows demonstrate how alternative infrastructural reactions counter impediments along the grain chain—an *adaptive* form of spatial reciprocity.

Furthermore, infrastructures of grain inform the mutual relation between the specificity of each physical space along the chain and the broader apparatus at work in its formation, as demonstrated by the paradigmatic nature of the bakery. The conditions generated by the frictions between the contextually specific architectural object, the state apparatus, and the global grain chain indicate a constant adjusting of socio-spatial environments that might be best described here again as reciprocity of *resistant* nature. As intangible forces of the global food system and their tangible effects at the transnational, national, urban, and architectural scales emerge in spatial arrangements; they are confronted to socio-political realities of a threatening nature (i.e.,

attacks, riots, unrest). These events recast distribution spaces as reactive agents of change that can craft contingent spaces of contestation against the currently operative system—a *resistant* form of spatial reciprocity. This understanding of spatialization processes of the political economy of food and of food subsidies in particular thus can offer to the discussion a trajectory of investigation that demonstrates how protocols of the food system are co-constitutive of the production of space.

2.3 CASE 2: FOOD PRODUCTION AND URBANIZATION, CAIRO

Agrarian Policies and Land Tenure

Early Agrarian Policies, Cotton Trade, and Large Estates (1804–1952)

Socialist Land Reforms (1952–1970)

Liberalization Era (1970–2011)

Revolution and New Presidency (2011–2013)

Contemporary Situation (2013–...)

Agriculture versus Urbanization in Greater Cairo

History, Factors, Mechanisms, and Governmental Responses

Three Farmers, a Developer, and All the Other Agents

Impacts on Space and their Consequences

Commentary: Receding Rurality, Fostering Dissent

2.3 CASE 2: FOOD PRODUCTION AND URBANIZATION, CAIRO

“It is May 2015 in Cairo. Sitting under a tree on a pile of discarded furniture, surrounded by fifteen-story buildings, a farmer and his wife tell a gloomy story about the disappearance of agriculture on the periphery of Cairo. The man is in his mid-sixties, dressed in a *garbiya*, the traditional long shirt of the rural areas. His wife, dressed in black, feeds *baladi* bread from a plastic bag to a buffalo tied to the tree. Surrounded on three sides by blind brick facades, their field is about 100 meters long and 15 meters wide, planted with clover. The farmer explains that he has been working this land for over 50 years, but his sons do not want to farm. He does not own the land, and he knows it is only a matter of time until the soaring real estate values in the area prompt the landowner to sell and force him out. He has no hope left. His field stands in the shade of the neighboring buildings and is sprinkled with trash from the streets.”¹ This rather bleak encounter with a peasant farmer took place in Ard-el-Lewa, an informal neighborhood of Cairo close to the upscale area of Mohandesseen, where land once reserved for agrarian use has been increasingly urbanized.

What is happening in contexts like Ard-el-Lewa can be better understood by examining relations between political and economic policies regarding Egypt’s agricultural hinterland as well as the processes driving urban growth in Cairo’s informal areas. The particular case study in Cairo illuminates two complementary strands of this study: firstly, the key role of land tenure and agriculture practices in shaping the informal urban landscape and secondly, the spatial effects brought about by rapid urbanization on land available for agriculture. Taking into account how agriculture and land tenure have been integral to national political and economic policy-making since the reign of Muhammad Ali Pasha in the 19th century, attention is then given to specific urbanization processes and how they have successively impacted land use and food production in relation to the growth of Cairo. An overview of informal growth on agrarian land follows the evolution of the Egyptian capital from the appearance of informal settlements (so-called *ashwa’iyyat*, meaning chaotic, uncontrolled, or hazardous) to prevalent forms of contemporary urban production. Against this backdrop and based on fieldwork carried out from 2013 to 2015, the respective roles of numerous actors engaged in agriculture and building construction are analyzed for their part in this evolution. The spatial consequences of informal growth on agrarian land are examined relative to interrelated scales, from the impact on the urban organization of Cairo and on the country as a whole, from architectural types to urban forms and their impact on local territories

¹ Charlotte Malterre-Barthes, "Receding Rurality," in *Housing Cairo: The Informal Response*, eds. Marc Angéilil and Charlotte Malterre-Barthes (Berlin: Ruby Press, 2016), 260.

as well as on the national and global realms. To examine the precarious imbalance between urban growth and agricultural land is to provide overdue insight into how global economic relations impact urban dynamics with regard to local food supply and how socio-spatial transformations in this context are intricately related to food systems.

Agrarian Policies and Land Tenure

Efforts by the state and its rulers to control land via agricultural production and land ownership have recurred throughout Egyptian history. The evolution of state intervention, agrarian policies, and land reforms are divided into five periods and sections.

Early Agrarian Policies, Cotton Trade, and Large Estates (1804-1952)

Surprisingly, the most important turning point for Egyptian agriculture in the nineteenth century was the American Civil War. As unlikely as it might seem, the secession of the US Southern States actually powered the transformation of Egypt into a modern country.² Muhammad Ali Pasha (1804-1849) recognized the potential of cotton as an emerging cash crop and thus encouraged its cultivation. Around 1830, Egypt was already positioned as a high-quality cotton producer, albeit experiencing only modest export and trading activity. Meanwhile, since the beginning of the Industrial Revolution, Britain had been advancing a profitable textile industry, with products being produced primarily for export. To feed Lancashire's textile factories, for example, cotton was imported in bulk, at first from India, but by the mid-nineteenth century, from slave plantations in America as well. As imports from the New World ceased owing to the outbreak of the Civil War and blockades at ports, Britain turned to Egypt to solve what could be called its 'cotton famine'. This particular shift in trade relations would see the integration of Egypt into the world economy.

Driven by a culture for exports, the growing demand for agrarian products in turn drove the construction and upgrade of irrigation works on the Nile (see the section on Water Infrastructures: National Agendas, Food Security, and Foreign Influence). Early land reclamation projects, new transportation infrastructure, and harbor facilities were constructed, all requiring the importation of new machinery. Cotton production quintupled between 1860 and 1865; by 1872, for instance, 200 million pounds of cotton had been exported yearly to foreign markets via new port facilities in Alexandria.³ The eagerness to increase cotton production was no doubt due

² Edward Mead Earle, "Egyptian Cotton and the American Civil War," *Political Science Quarterly* 41, no. 4 (1926).

³ Sven Beckert, "Emancipation and Empire: Reconstructing the Worldwide Web of Cotton Production in the Age of the American Civil War," *The American Historical Review* 109, no. 5 (2004).

to the exceptionally high crop prices yielded, which had increased by 300 percent over this period.⁴ This said, technological improvements and the significant profits to be made in the cotton industry did not necessarily benefit local farmers—quite the opposite. At the time, the majority of the population lived in rural areas under a rather repressive feudal system, with the monarchy frequently exerting brutal force in its quest for revenue and manpower to sustain its ambitious program.⁵ Military conscription, *corvée* (statute) work, and high taxation often led to the mass flight of farmers from villages as well as to peasant revolts. Conscript troops themselves were routinely subjected to forced labor in order to maintain the requisite canals for irrigating cotton fields. Heavy taxes (land tax, *kharaj*) for the right to cultivate land (state-owned since antiquity) resulted in the seizure of land from insolvent peasants. Fields of those who had deserted or revolted were likewise confiscated and reassigned to wealthier, more consenting farmers.⁶ As of 1814, the monarchy had seized majority ownership of national land, relying on decentralized control to manage land and the population. With grants and land distributed to families in the royal entourage and government officials, ownership would be concentrated in the hands of a few, resulting in—parallel to the emergence of the *pasha* class—the formation of large estates. Whereas some forty percent of the land had initially been granted to select proprietors, it was ultimately owned by just a handful of elite families (two percent).^{7 8} Considering that land had been previously state-owned, this preferential manner of distribution signaled “the emergence of private property” and agrarian capitalism.⁹

In 1813, an official cadaster plan was devised and certified documents for tenure rights were introduced that tended to favor prominent and educated landowners, official means that would coincide with new forms of rural population control.¹⁰ The exploitation of large estates adhered to the tenets of an *izba* (“isolated hamlet”) system. Large estates required an operative workforce, obliging landowners to provide housing for peasants who in turn were often displaced

⁴ Earle, "Egyptian Cotton and the American Civil War," 533.

⁵ Various researchers and Nasser himself use the term “feudal.”

⁶ Kenneth Cuno, "A Tale of Two Villages: Family, Property, and Economic Activity in Rural Egypt in the 1840s," in *Agriculture in Egypt. From Pharaonic to Modern Times*, eds. Alan K. Bowman and Eugene L. Rogan (Oxford: Oxford University Press, 1999), 305.

⁷ Alan Richards, "Land Tenure," in *The Agriculture of Egypt*, ed. Gillian M. Craig (Oxford: Oxford University Press, 1993).

⁸ Afaf Lutfi Sayyid-Marsot, *Egypt's Liberal Experiment: 1922-1936* (Berkeley: University of California Press, 1977), 12.

⁹ Timothy Mitchell, "Para-Sites of Capitalism," in *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 74.

¹⁰ Kenneth M. Cuno, *The Pasha's Peasants: Land, Society, and Economy in Lower Egypt, 1740-1858* (Cairo: American University in Cairo Press, 1994), 67.

from their home province.¹¹ The gradual rationalization of productive hinterland for the cultivation of export crops resulted locally in the rise of controlled spaces, with monitored worker villages emerging as their social counterpart.¹² These settlements would become zones of exception where state law did not apply, thus making the *'izba* system a de facto tool for socially and spatially containing workers, a system which essentially forced them to cultivate the master's crop on the master's land. British advisor to the *Pasha* and associate of Jeremy Bentham, John Bowring referred to this form of coercion by claiming, "Nothing but despotic authority would have forced the cultivation of many of those important articles such as cotton, opium, sugar, indigo, etc., of which Egypt furnishes so large a supply."¹³

When the American Civil War ended in 1865, agriculture in Egypt had already been entirely subordinated to the production of cotton, thus requiring the nation to import its food supply.¹⁴ In 1867, Egypt gained the status of an autonomous vassal state from the Ottoman Empire (*Khedivate*), having established itself financially as an independent nation-state that was integrated into the world economy. This new political and economic status warranted the thorough re-organization of Egyptian territory under the rule of a dominating social group—the *pasha* class—whose hold on power was reinforced by a coercive apparatus of control, including military force, vagrancy laws, labor codes, crop rotation rules, and annual labor contracts.¹⁵ Firmly in the hands of landowners, large tracts of fertile Egyptian land were used exclusively for growing cotton or sugar cane (the other local cash crop), all of which was farmed by a harshly controlled and increasingly impoverished population of peasant farmers. This form of landed wealth was also the result of the particular fiscal system devised by the state for increasing domestic revenues.

In 1871 the fiscal *Muqabala* Law stipulated that those who could pay six years worth of tax immediately would be granted tenure of the taxed land and a subsequent tax reduction of half the due amount.¹⁶ This very stipulation underscores how the commodification of land had begun even before European interference in Egyptian affairs. The emergence of large estates was also

¹¹ Traditionally, farmers were tied to their villages and could not emigrate without state permits. The creation of villages enclosed in estates and under the authority of the landlord was new.

¹² Ghislaine Alleaume, "An Industrial Revolution in Agriculture? Some Observations on the Evolution of Rural Egypt in the Nineteenth Century," in *Agriculture in Egypt. From Pharaonic to Modern Times*, eds. Alan K. Bowman and Eugene L. Rogan (Oxford: Oxford University Press, 1999).

¹³ Mitchell, "Para-Sites of Capitalism," 60.

¹⁴ Earle, "Egyptian Cotton and the American Civil War," 521.

¹⁵ Beckert, "Emancipation and Empire: Reconstructing the Worldwide Web of Cotton Production in the Age of the American Civil War."

¹⁶ See Cuno, *The Pasha's Peasants: Land, Society, and Economy in Lower Egypt, 1740-1858*.

due to early land reclamation programs meant to increase the amount of territory to be cultivated. New agriculture-generated tax revenues proved to be a powerful incentive for state investments in massive infrastructure that targeted flooded or uncultivated land within the Nile Delta. Large, spatially unified properties expedited the implementation of irrigation systems requiring the deployment of technological knowledge on a territorial scale. Thus, newly reclaimed lands and existing estates were aggregated and planted solely with cash crops that, ideally, would quickly compensate for initial investment costs and also yield sufficient revenue for the state. The relative success of such projects would come to influence modern visions for the territorial expansion of arable land, with land reclamation moving ever further into the desert and becoming ever more rooted in Egyptian political discourse (see CASE 3: FOOD SECURITY AND INFRASTRUCTURE, TOSHKA).

The successors of Muhammad Ali Pasha, the Khedives Said, Ibrahim, Ismail, and Tewfik, would continue the existing tenure system. Through a succession of estate management systems (*'uhda*, *ibbadiya*, *iltizam*, *chiflik*), long landholding tenures ruled by the elite were consolidated.¹⁷ Cotton production, however, went hand in hand with debt accumulation, bearing in mind that the British had seized power through land managing institutions. At the end of the nineteenth century, agricultural practices had evolved toward more intense cultivation, with monetization becoming commonplace and landowners resorting to credit to pay taxes. In cases of insolvency, estates were transferred from debtors to creditors, that is, from Egyptian landowners to those real estate companies backed by European banks. These land managing companies and credit institutions gradually came to replace owners and leased land to farmers. Established by foreign banks, the “machine for transferring land”—as locals called the Mixed Courts—contributed to the handover of state land to private owners and institutions, while facilitating the aggregation of many small estates to create large-scale properties. State domains would be liquidated as part of the settlement of public debt after the Khedive’s declaration of bankruptcy in 1876, just when colonial order had been instated. Two decades later, foreigners owned 11.5 percent of all land (550,000 acres), a figure that would rise to 13 percent (711,000 acres) at the outset of World War I.¹⁸

¹⁷ For instance, “*uhda*” referred to the “responsibility” attached to the right to the income of a village. The *uhda* system transferred indebted villages to individuals in a sort of forced grant, where they had to pay back the state with land for the unpaid arrears. This system was amended with the *iltizam* system, whereby recipients of the *uhda* would receive a plot of land exempted from taxes, and the right to enroll farmers by force to work on the “inherited” estate. *Uhda* recipients were usually high functionaries with sufficient wealth to deal with the debts. For a detailed account of the land taxation system prior to 1840, see Ghislaine Alleaume, “An Industrial Revolution in Agriculture? Some Observations on the Evolution of Rural Egypt in the Nineteenth Century,” in *Agriculture in Egypt. From Pharaonic to Modern Times*, eds. Alan K. Bowman and Eugene L. Rogan (Oxford: Oxford University Press, 1999).

¹⁸ Roger J. Owen, “Lord Cromer and the Development of Egyptian Industry 1883-1907,” *Middle Eastern Studies* 2, no. 4 (1966).

Between 1882 and 1914, the British made their largest contribution to Egyptian agriculture by establishing a network of hydro-infrastructure for irrigation and cotton cultivation. Whereas the local government clearly favored investment that would be beneficial to agriculture, it was resistant to the outright industrialization of the country and was particularly opposed the formation of a textile industry. It must be recalled that by that time, Egypt had essentially developed a monoculture of cotton and was thus reliant on a one-crop economy. Since enormous amounts of the raw commodity were exported to Britain's factories, landowners of large estates had profited significantly from the export economy at the turn of the twentieth century and would profit even more so considering that world prices for cotton remained high during the First World War.

In 1919, widespread urban violence and rural unrest ensued when the country revolted after the arrest of the founder of the *Wafq* party, with Egyptians of all classes protesting occupation and demanding the right to self-determination. Following the 1919 revolution, the British reorganized the local Ottoman dynasty in Cairo into a national monarchy and Egypt was granted partial independence with a new constitution in 1922. But in view of the fact that colonial powers controlled the higher echelons of the military, the administration, as well as the government, and bearing in mind that foreigners owned banks, factories, and extensive tracts of land, the newly won independence appeared to be insubstantial. Yet the legislative power of local land ownership remained strong, with Egyptian landlords holding a majority of seats in cabinets continuously from 1914 to 1952.¹⁹

Following the Great Depression, the cotton market collapsed, with cotton prices having basically lost half of their market value in the 1930s and exports dropping to LE23.4 million a year, down from LE43.1 million some two decades earlier. Farmers and landowners were unable to sell their cotton, pay land taxes and mortgages, let alone their workers, and could not afford to buy seeds, thereby leaving many to face bankruptcy. In response to the crisis, the government bought cotton and decreased land rents (a precursor of modern-day rent control). Still, as land income decreased, wages stagnated and rural poverty increased. This economic situation, combined with the general neglect of domestic food production, led to widespread famine by the early 1940s and the ever-looming prospect of urban food riots. While wheat export was prohibited, food rationing and food distribution were introduced to adequately supply cities with requisite foodstuffs (a precursor of modern-day food subsidies). Moreover, acreage controls were enforced to urge landowners to switch from cotton cultivation to food production. Prior to this

¹⁹ See Selma Botman, *Egypt from Independence to Revolution, 1919-1952* (New York: Syracuse University Press, 1991).

crisis, for example, a farmer had been allowed to plant half of his property with cotton, a constraint that was subsequently lowered to 16 percent during World War II.²⁰ The famine, followed by a malaria epidemic, triggered intense discussions among Egyptian politicians concerning the question of land distribution, with widespread poverty being blamed on the excessive concentration of property in the hands of select landowners. In 1944, a bill limiting the size of landholdings was proposed to the Senate, but was rejected. Numerous books and articles advocating land reforms were published with no effect, as neither the parties represented in parliament nor the British ruler favored agrarian reforms.²¹ This should come as no surprise, considering that big landowners were overwhelmingly represented in political parties and that farmers were politically unorganized. In fact, at the time of the 1952 revolution, the overall social structure as well as the system of land tenure was profoundly unequal. On the one hand, there was the poor farming population, the majority, with little leverage, landless and illiterate; and on the other hand, there was a small, ruling, wealthy landowning elite inherently opposed to change.

Socialist Land Reforms (1952-1970)

A *fallah* (farmer) holds Nasser's neck and kisses his forehead. There is a huge crowd of farmers in traditional outfits cheering in the background. The president is seen only from the back, but even so, it is clear that he holds a property title in his hand. Similar scenes would become common throughout the 1950s and they were well documented by the press, with the president seen time and again handing over official tenure documents to male and female peasants at formal land redistribution ceremonies. This formal procedure was indeed a sign that the more equitable reallocation of agrarian land had become an issue of great political importance for the new regime. Land, as Egypt's principal, yet limited resource, and its tenure had already been of utmost relevance even before the July 1952 revolution, but would take on even more significance after the Free Officers' power seizure.

In September, "Free General" Muhammad Neguib announced that a new Agrarian Reform Law would be implemented.²² The first restriction (Land Reform Law 178/1952) regarding the maximum size of land parcels that could be owned limited ownership of 200 *feddans* per individual. Any excess land thereafter was seized by the state and redistributed to

²⁰ Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 20.

²¹ See Walter Laqueur, *The Middle East in Transition: Studies in Contemporary History*, vol. 9, Routledge Library Editions, History of the Middle East (London: Routledge, 2017).

²² See Doreen Warriner, *Land Reform and Development in the Middle East: A Study of Egypt, Syria, and Iraq*, 2nd ed. (Westport, CT: Greenwood Press, 1975).

landless peasants in plots of two to five *feddans*. Long-term public bonds were issued at a rate of about LE200 per *feddān* to compensate owners. For a time, certain clauses introduced the right for landowners to transfer land to family members and to sell their surplus land privately, often to lower-middle-class farmers with little or no land. Land rents were controlled and could not exceed seven times the basic land tax (the assessed value of the land, which remained untouched until 1976), a limit that in time resulted in an overall rent freeze. The relationship between tenant and owner was contracted with open-ended plot rentals that were transferable to family members. As an added precaution, tenants were registered as holders and could not be evicted under any circumstance.²³ The Reform Law further stipulated a lower limit of ownership at 5 *feddans* lower, but was never implemented.²⁴ Individual sequestrations were also made by the state, either for political reasons or in the case of the illegal detention of land. Public *waqf* land (owned by religious institutions) was nationalized and leased or redistributed (Law 152/957).²⁵

Nearly a decade after the first reform laws were instituted, the ceiling of land ownership was reduced to 100 *feddans* (Law 127/1961). The state secured even more land with a measure that prohibited foreigners from owning agricultural land and allowed whatever landholdings they had acquired to be expropriated (Law 15/1963), with still another measure mandating that all such sequestered land be transferred to public ownership (Law 150/1964). A year before Nasser's death, the maximum landholding amount was reduced to 50 *feddans* (Law 50/1969), a change that would mark the end of a land redistribution process that had seen a total of 754,487 *feddans* redistributed to 318,000 families.²⁶

The land reforms were viewed as a reasonable way to depose an oppressive ruling class and to tackle acute social issues at the same time, while also garnering support from the masses with an empowering redistributive agenda as suggested by the Officers' slogan "Justice and Sufficiency."²⁷ New tenants paid only half the amount of rent they were required to pay prior to the reforms, and because of better income distribution, living conditions as well as access to education and health services for rural populations also improved. Yet, the reforms brought about

²³ Reem Saad, "Egyptian Politics and the Tenancy Law," in *Counter-Revolution in Egypt's Countryside: Land and Farmers in the Era of Economic Reform*, ed. Ray Bush (London: Zed, 2002).

²⁴ Article 23 of the Reform Law of 1952 stipulates the following: "If the cultivable land is to be fragmented into areas of less than five *feddans* as a result of a sale, barter, inheritance, will or gift, or the like, as a means of acquisition, the concerned person must agree to whom the title deed of property will be conferred."

²⁵ John Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes* (Princeton, N.J.: Princeton University Press, 1983), 266.

²⁶ Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes*, 266.

²⁷ Richards, "Land Tenure."

only moderate success at best, considering that merely 13 percent of the arable land was redistributed to 10 percent of the rural population.²⁸ Only farmers (rural, middle-class ex-tenants) were entitled to receive land, in effect, leaving all other 'non-resident landless laborers out the reform program altogether. Scholars have argued that the top-down, state-inspired and state-led reforms ultimately served only to undermine upper classes and bestow favors on the rural middle classes.²⁹

These shortcomings notwithstanding, perhaps the most pertinent and encouraging consequences of the reforms can be assessed relative to the larger context of Egypt as a whole: big estates were eliminated, newly established farmer cooperatives guaranteed equal access to agricultural inputs at fixed prices, and land lease conditions and preemption rights protected tenants. The sum of such measures did indeed serve to enhance rural income and food production. Moreover, many layers of economic development and social change were addressed, resulting in a paradigm shift in the general perception of the state as a socially just authority. As testimony to the success of the land reforms, images of Nasser still plaster the walls of farmers' homes across Egypt. On a spatial level, the reforms reinforced an already fragmented pattern land ownership; ceiling laws did diminish the number of large estates just as they led to an increase in the number of smallholdings with a mixed tenure system of tenancy and ownership. Additionally, it must be said that Muslim inheritance laws were—and still are—partially responsible for the fragmentation of the land. According to these laws, all heirs received a due share of their heritage, and daughters inherited half the share of sons, meaning that land was subjected to perpetual subdivisions.³⁰ In view of numerous agrarian reforms, inheritance laws, constant population growth, and limited supply of farmland, Egypt had become a land of small-scale farms.³¹

Liberalization Era (1970–2011)

There are no known images of Anwar Sadat being kissed by grateful *fellahs*. Despite his proclaimed appreciation for rural values (he had emphasized that “the expression of our people (...) is the village”), Sadat for the most part positioned himself against Nasser's pro-rural

²⁸ Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes*, 267.

²⁹ Saad, "Egyptian Politics and the Tenancy Law."

³⁰ Maslahat al-Misahah and Henry George Lyons, *The Cadastral Survey of Egypt 1892–1907* (Cairo: National Print Department, 1908), 38.

³¹ Richards, "Land Tenure," 100.

policies.³² Rolling back his predecessor's socialist legacy and land reform initiatives, the ideological shift and change in economic policies ushered in by Sadat would reinforce the political strength of large landholders. With his economic liberalization program *Al-Infithah*, Sadat announced a break from the state-planned economy of Nasserism and summoned farmers to develop their land accordingly to increase Egypt's overall performance in the free market, arguing that "agriculture (...) is also in need of a strong drive so as to keep pace with the sought rates of development."³³

To this end, the ratification of Law 69/1971 abolished the state's customary custodianship of land that resulted in 147,000 *feddans* being "confiscated" and returned to dispossessed landowners.³⁴ In 1978, Sadat announced the onset of Egypt's "Green Revolution," but focus was set on developing new agricultural land rather than improving existing fertile areas. For the rural sector, the Sadat years (1970-1984) were marked by the concerted dismantling of Nasser's policy of redistributive justice, a shift that would inaugurate a long period of government neglect of the nation's existing agricultural regions. And considering the increased economic sway of the United States following the collapse of the Soviet Union, Sadat would essentially pave the way for further reforms that deviated from Nasser's earlier objectives of socializing the land.

The restoration of sequestrated land continued under Hosni Mubarak (1981-2011). From 1986 onward, markets were liberalized and agricultural strategies aimed at the production of high-value crops for export were implemented. Encouraged by USAID and the World Bank that fostered large-scale commercial farming projects, the government's aim was to integrate Egypt's agricultural sector into the global economy through capital-intensive export farming (see CASE 3: FOOD SECURITY AND INFRASTRUCTURE, TOSHKA). The process of agricultural modernization, in effect, would sideline small-scale farmers, leaving only large landowners and agribusinesses working on reclaimed land areas to benefit from state subsidies. In 1991, Egypt reached an agreement with both the IMF and World Bank to implement an Economic Reform and Structural Adjustment Program (ERSAP), including a restructuring of the financial sector as well as trade liberalization and pro-private sector measures.³⁵ Trade liberalization was touted as

³² Anwar el Sadat, *The Public Diary of President Sadat, vol. 1: The Road to War* (Leiden: Brill, 1978), 263.

³³ Anwar el Sadat, *The October Working Paper, Presented by President Mohamed Anwar El Sadat* (Cairo: Arab Republic of Egypt, Ministry of Information, State Information Service, 1974) quoted in Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes*, 123.

³⁴ Ray Bush, "Coalitions for Dispossession and Networks of Resistance? Land, Politics and Agrarian Reform in Egypt," *British Journal of Middle Eastern Studies* 38, no. 3 (2011).

³⁵ Gouda Abdel-Khalek, "Stabilization and Adjustment in Egypt: Sequencing and Sustainability," in *Counter-Revolution in Egypt's Countryside: Land and Farmers in the Era of Economic Reform*, ed. Ray Bush (London: Zed, 2002).

beneficial to agricultural production and USAID would even advise a shift in production from food crops to horticultural exports, especially in the newly reclaimed desert land, a fateful shift detrimental to those small farmers unable to make the switch to capital-intensive modes of agriculture.

In a 1996 publication issued after a conference sponsored by USAID, Youssef Wally, then-Minister of Agriculture wrote: “the agricultural sector of Egypt has been gradually transformed by shifting away from central planning and government controls to increased reliance on market forces.”³⁶ ³⁷ With regard to this wave of changes, the ratification Law 96 in 1992 would have a substantial and long-lasting impact on land tenure, considering that the law, approved after intense lobbying from landowners serving in Mubarak’s administration, overturned rent control guarantees dating back to the Nasser era. The new law stipulated that rents should be freely negotiated between landlords and tenants “according to the principle of the law of the contractors, with the consequent result of freedom of the two parties to formulate the provisions of the contract.”³⁸ At the time, those one million tenants of the country who were directly affected had no political representatives in the Parliament of Egypt. In the coverage of the events at the time, the media depicted farmers as “lazy peasants (...) abandoning the land.”³⁹ This biased misrepresentation was ultimately used to justify the ‘rightful’ return of land to ‘destitute’ owners. Defined as a “balanced law that would achieve justice for both parties (owners and tenants), and (...) should also serve the aims of economic reform,” the legislation was fully implemented in October 1997 after a five-year transition period.⁴⁰ Law 96/1992 resulted in inflated land rents that increased by as much as twenty times the original amount, leading to the mass eviction of tenants unable to pay the exorbitant sums ranging from LE200 to LE2500 per *feddan*.⁴¹ With tenancy contracts renewed annually at the discretion of landowners, tenants who had been farming the same plot for some 40 years could suddenly be evicted overnight. As of 1997, an estimated one million farmers had lost their land, the majority being small

³⁶ Lehman B. Fletcher, *Egypt's Agriculture in a Reform Era* (Ames, Iowa: Iowa State University Press, 1996), vii.

³⁷ Nicholas S. Hopkins and Kirsten Westergaard, "Directions of Change in Rural Egypt," *Digest of Middle East Studies* 8, no. 2 (1999).

³⁸ Nathalie Bernard-Maugiron et al., *Egypt and Its Laws* (Amsterdam: Springer Netherlands, 2002), 132.

³⁹ Saad, "Egyptian Politics and the Tenancy Law," 391.

⁴⁰ Bush, "More Losers Than Winners in Egypt's Countryside."

⁴¹ Saad, "Egyptian Politics and the Tenancy Law."

landholders.⁴² In the months prior to implementation of the law, violence and protests erupted in rural areas. Because rural repression was rampant and security forces most often resorted to violence and imprisonment, opposition to the law was first carried out in the form of petitions and small demonstrations, but would soon escalate into more pronounced uprisings, with fierce protests against Law 96/1992 breaking out in that year in the Fayyum and Dakahlia governorates.⁴³ Among the issues challenged in such disputes were the terms of landownership, rent hikes, tenant displacement, as well as tenure agreements.⁴⁴ The Land Center for Human Rights, a local NGO monitoring economic and social conditions of agrarian workers in Egypt, documented rural violence in 100 villages that resulted in 32 deaths between October 1997 and May 1998. Farmers were arrested, intimidated, and subjected to torture by the police.⁴⁵ In the end, the peasant uprising was crushed.⁴⁶

Farmers understood all too well that due to Mubarak's policies, Arab socialism had undoubtedly come to an end: "Now it is as if Gamal Abd el-Nasser is really dead."⁴⁷ Even as the already dire situation of small farmers deteriorated even further, rural development and poverty alleviation were of little concern to authorities, insofar as Mubarak's regime was fully absorbed in regaining control over land and shifting to an export-oriented mode of agriculture. To do so, state-owned companies dealing in arable land were privatized and farmers' cooperatives were partially dismantled; state subsidies for agricultural fertilizers were reduced and the procurement of fertilizers and seeds was left to the open market—in sum, clear indications of the state's increasing disengagement from the rural world.

In 2009, the Ministry of Agriculture and Land Reclamation, published a policy paper entitled *Sustainable Agricultural Development Strategy Towards 2030*, a document claiming to pay "special attention to helping the under-privileged social groups and reducing rural poverty."⁴⁸ As with previous land strategies, however, the core mandate of this agenda was making large

⁴² Fouad N. Ibrahim and Barbara Ibrahim, *Egypt. An Economic Geography* (London; New York: I.B. Tauris, 2003), 120.

⁴³ Ray Bush, "Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt," *Third World Quarterly* 28, no. 8 (2007).

⁴⁴ Bush, "Coalitions for Dispossession and Networks of Resistance? Land, Politics and Agrarian Reform in Egypt."

⁴⁵ Land Center for Human Rights, "Awda' Al-Fallahin Wa Qita' Al-Zira'Iyah Fi Zill Al-'Awlamah: Taqir [Conditions of the Fellahin and the Agricultural Sector under Globalization: A Report]," (Cairo: Land Center for Human Rights, 2002).

⁴⁶ Saker El Nour, "Small Farmers and the Revolution in Egypt: The Forgotten Actors," *Contemporary Arab Affairs* 8, no. 2 (2015).

⁴⁷ Saad, "Egyptian Politics and the Tenancy Law," 402.

⁴⁸ Ministry of Agriculture and Land Reclamation, *Sustainable Agricultural Development Strategy Towards 2030* (Cairo: Arab Republic of Egypt, 2009), 20.

agribusinesses more competitive on world markets rather than offering solutions for under-equipped and impoverished farmers. Combined with Law 96/1992, the modernization strategies of the Mubarak era (1984-2011) brought about damaging transformations of the rural world that would have far-reaching ramifications. Needless to say, the livelihoods of tenants were severely affected. Landless peasants unable to afford a field for sustaining their family had no other option than to sell whatever assets they still possessed. Children were withdrawn from school and child labor on large farms, which had been reduced during the Nasser years, returned. Female tenant farmers were evicted, since landlords favored men for cultivating their land and operating machinery. Subsistence farming activities increased, with farmers concentrating on food production for survival instead of cultivating cash crops. Violence against the state surged and there was a marked increase in immigration from Egypt to Arab and European countries.⁴⁹ In the long term, years of government neglect for the lives of small-scale farmers led to an increase in the flow of rural migration to cities (sometimes temporarily) and consequently raised the demand for affordable urban housing, yet another phenomenon to which the state has failed to respond (see the following section on Agriculture versus Urbanization in Greater Cairo). Although the regime aimed at consolidating property holdings by promoting the return of large estates and the mechanization of agriculture, the opposite actually occurred, with the fragmentation of arable land continuing and the numbers of smallholdings (of less than one *feddan*) increasing from 36 percent in 1990 to 43 percent in 2000.⁵⁰ This in mind, development scholar Ray Bush has argued that under the Mubarak regime, land was used as a primary vehicle for capital accumulation and that the dispossession of smallholders and land transfers privileged a crony capitalist class close to the regime.⁵¹

These four decades can be characterized by ever increasing rounds of economic liberalization and ever more drastic changes in land tenure, all of which proved to be detrimental to the majority of the country's farming population. Spearheaded by Anwar Sadat, de-Nasserization and agricultural liberalization would only be accelerated under the reign of Hosni Mubarak. Market reforms and aggressive modernization combined with the end of state subsidies and lack of investment would adversely impact rural areas, and those repeated promises of growth and prosperity would go unanswered for most. Considering that gross investment in rural sectors fell from 31 percent in 1980 to 23 percent in 1992, and again to 9 percent in 2002, growing

⁴⁹ Bush, "Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt."

⁵⁰ El Nour, "Small Farmers and the Revolution in Egypt: The Forgotten Actors."

⁵¹ Bush, "Coalitions for Dispossession and Networks of Resistance? Land, Politics and Agrarian Reform in Egypt."

discontent and distrust toward the state and private agribusiness companies understandably intensified to a degree of resentment that eventually led to the demise of the Mubarak regime^{52 53} Challenging state authority, the 1997 countryside uprisings that occurred after the implementation of Law 96/1992 were the first signs of disapproval of the regime's discriminatory economic and land policies, not to mention its brutal police apparatus. What is more, the unrest arguably foreshadowed by nearly two decades the tumultuous events of January 2011, which were undoubtedly rooted in decades of rural marginalization, broken promises, and rising inequality.

Revolution and New Presidency (2011-2013)

In January 2011, Tahrir Square was occupied for 18 days before the Mubarak regime was finally deposed. If the setting and the population involved were overwhelmingly urban, rural governorates were also represented on the square with tents (for example, from Aswan, Minufiyah, and Sohag). Demonstrations also saw populations from the rural areas around Cairo marching to Tahrir (from Giza and Qalubiya).⁵⁴ The demise of Mubarak was symbolically charged, prompting political action in the rural world. In May, while farmers demonstrated outside the prime minister's office in Cairo to protest land dispossession, the main efforts were taking place in the countryside. Across the country, the revolution was marked by numerous collective grassroots movements that had joined their efforts to reclaim land tenure. Farmers organized themselves in order to take back plots from large landowners who had evicted them. Independent—officially unrecognized—unions flourished, all objecting to corrupt state officials and the unwarranted takeover of small farms by large agricultural businesses.⁵⁵ Direct action was also taken to redistribute plots, claim access to irrigation channels, and dispute what was generally viewed as unfair property allocations.⁵⁶

Farmers also demanded institutional changes from the government, claiming, "Inadequate laws passed under Mubarak remain in place (...) We are ready to wait and see what happens under the

⁵² Habib Ayeb and Ray Bush, "Small Farmer Uprisings and Rural Neglect in Egypt and Tunisia" *Middle East Report*, no. 272 (2016), <http://www.merip.org/mer/mer272/small-farmer-uprisings-rural-neglect-egypt-tunisia>.

⁵³ Food and Agriculture Organisation, "International Investments in Agriculture in the near East. Evidence from Egypt, Morocco and Sudan," eds. Aysen Tanyeri-Abur and Nasredin Hag Elamin (Cairo: FAO Regional Office for the Near East, 2011), 31.

⁵⁴ El Nour, "Small Farmers and the Revolution in Egypt: The Forgotten Actors."

⁵⁵ Marwa Hussein, "From Liberalisation to Self-Sufficiency: Egypt Charts a New Agricultural Policy," *Al-Ahram*, April 28, 2011, <http://english.ahram.org/NewsContent/3/12/10957/Business/Economy/From-liberalisation-to-self-sufficiency-Egypt-chart.aspx>.

⁵⁶ Ayeb and Bush, "Small Farmer Uprisings and Rural Neglect in Egypt and Tunisia."

new parliament, but if it fails to deliver justice, we will return to Tahrir Square.”⁵⁷ During this brief but tumultuous period, rural populations hoped for a reversal of Mubarak’s policies, even though they were distrustful of the Muslim Brotherhood who had previously sided with landowners. In fact, after Mohammed Morsi came to power as the designated presidential candidate from the Brotherhood, the anticipated changes in tenure laws did not come about. On the contrary, when small farmers unions proposed that the Morsi government should annul Law 96/1992, Mahmud Jawdah—spokesman at the time for the Economic Committee of the Party for Freedom and Justice (the Muslim Brotherhood party)—refused to amend the law, stating instead that “it is unacceptable, intellectually or legally, for the tenant to share ownership of the land with its owner.”⁵⁸ The Muslim Brotherhood’s proposal for Egypt, the so-called “Renaissance Project,” did include points on “reconsidering the Mubarak-era privatizations of state-owned enterprises” and governmental “support for farmers”, which pertained primarily to debt cancellation for small land owners.⁵⁹ The document remains vague, however, in that the issue of land tenure is never mentioned, let alone reforms of ownership. The closest that the Morsi regime ever came to endorsing agricultural policies was with the call for an increase in the local production of wheat.⁶⁰ The state purchase price of one *ardeb* (198 kg) of wheat was raised by LE20 to a total of LE400 in order to boost local production.⁶¹ The Morsi cabinet briefly acknowledged the need for further agrarian reforms, with Muhsin al-Batran of the Ministry of Agriculture stating, “we should make it up to the peasants,” while suggesting that subsidies needed to be reinstated.⁶² ⁶³ But that promise was arguably never meant to be fulfilled, particularly considering that Egypt at the time was negotiating an IMF loan of USD 4.9 billion—one of the conditions being to reform the Egyptian subsidy system for bread, fuel, and fertilizers. Thus, the Brotherhood continued with economic reforms initiated by its predecessors. So, when Mohammed Morsi, standing amidst wheat fields in Alexandria, announced that the

⁵⁷ Serene Assir, "Farmers Struggle to Reap the Harvest of Revolution," *Al-Akhhbar*, January 21, 2012, <http://english.al-akhbar.com/node/3557>.

⁵⁸ Assir, "Farmers Struggle to Reap the Harvest of Revolution."

⁵⁹ Eric Trager, *Arab Fall: How the Muslim Brotherhood Won and Lost Egypt in 891 Days* (Washington, DC: Georgetown University Press, 2017), 153.

⁶⁰ "Seeking to Grow Cereals on African Farmland," IRIN News, October 11, 2010, <http://www.irinnews.org/news/2010/10/11>.

⁶¹ "Egypt's President Morsi Unveils Raft of Tax, Subsidy Reforms," *Abram Online*, February 25, 2013, <http://english.ahram.org/NewsContent/3/12/65573/Business/Economy/Egypt's-President-Morsi-unveils-raft-of-tax,-subsid.aspx>.

⁶² Hussein, "From Liberalisation to Self-Sufficiency: Egypt Charts a New Agricultural Policy."

⁶³ Ayeb and Bush, "Small Farmer Uprisings and Rural Neglect in Egypt and Tunisia."

grain harvest of 2013 had increased by 30 percent, farmers challenged this official figure.⁶⁴ Claiming that the government had done little to tackle corruption, water shortages, and the high prices of fuel and fertilizers, rural populations were well aware that self-sufficiency in wheat amounted to an illusory goal and unfounded political argument. The general neglect toward the rural world that had become institutionalized during the decades of the Mubarak-era was, in essence, perpetuated by the Morsi government.⁶⁵ At most, the Brotherhood's agrarian policies were characterized by indecision, deception, and continuity. The liberalization of the land market and attendant erosion of rights suffered by the farmers of Egypt were not reversed during the revolution, nor with Morsi's short-lived presidency, which ultimately left people with the impression that the "revolution was good, but that the dream – the dream of freedom, social justice and human dignity – had not been fulfilled."⁶⁶

Contemporary Situation (2013–...)

In reference to President Abdel Fattah el-Sisi's "1.5 Million Feddan Project," an April 2017 headline in the Middle Eastern newspaper *Al-Monitor* stated, "Egypt's small farmers left in the dust by Sisi's agricultural project."⁶⁷ This pithy header seems to have captured the underlying position of el-Sisi's administration concerning land tenure and rural populations. An exposé on the massive land reclamation scheme for the Farafrah, Matrouh, and New Valley governorates that was launched in December 2015, the article claims that the government's interest in reclaimed projects has actually increased. The scheme includes a "book of conditions" intended to guarantee the right of small farmers as well as young people to access the property of these 'New Lands'. Such a claim indicates that the regime continues to package land reclamation projects as *the* solution for landless farmers and jobless youths alike, a strategy it should be recalled that dates back to the Mubarak administration.⁶⁸ Very much in line with the former regime's political tactics, these particular promises were not fulfilled. For the entity in charge of land allocation, the private holding Egyptian Countryside Development Company, handed over 99 percent of the

⁶⁴ AP, "Wheat Harvest Becomes Mired in Egypt's Politics," *Arab Times*, June 15, 2013, <https://www.pressreader.com/kuwait/arab-times/20130615/281719792144879>.

⁶⁵ Yasmine Saleh, "Farmers Say Egypt's Wheat Crop Hopes Are 'A Dream,'" *Reuters*, April 15, 2013, <http://www.reuters.com/article/us-egypt-wheat/farmers-say-egypts-wheat-crop-hopes-are-a-dream-idUSBRE93E0AB20130415>.

⁶⁶ Ayeb and Bush, "Small Farmer Uprisings and Rural Neglect in Egypt and Tunisia," 1.

⁶⁷ Rami Galal, "Egypt's Small Farmers Left in the Dust by Sisi's Agricultural Project," *Al-Monitor*, April 10, 2017, <http://www.al-monitor.com/pulse/originals/2017/04/egypt-desert-lands-project-small-farmers.html>.

⁶⁸ Bush, "More Losers Than Winners in Egypt's Countryside."

new properties to large investors, including foreign ones, thereby giving them the right to choose plots, while leaving small farmers with little valuable parcels. Less than one percent of individuals who made bids for land have actually benefitted from the deal, disclosing the hollowness of official declarations. With regard to this specific case, another relevant point concerns how public investment is targeted at what is termed 'New Lands' rather than 'Old Lands'.⁶⁹ Military forces and private landowning firms are by decree the first beneficiaries of public investment, rather than farmers of the Nile Delta and the Valley.⁷⁰ The Egyptian military controls 94 percent of the country's land, which, though claimed in the name of state security, is primarily used to generate significant economic returns.⁷¹ The central disposition of the current regime shows up most pointedly in the preference given to the armed forces in land allocation and development projects, which signals an even further consolidation of military power in matters of the nation's economy, including agriculture.⁷² Capital rerouted into the Ministry of Defense and its allies deprives the national budget from returns, in turn preventing the development of a much-needed support scheme for agriculture. In the case of the "1.5 Million Feddan Project," the involvement of the military could not be more blatant. For instance, Prime Minister Ismail Sherif generously thanked troops at the inaugurating ceremony for the wheat harvest in one of the New Valley sites. Familiar neoliberal narratives surrounding the so-called 'New Lands' still abound. As phrased by Sherif, the project aims at "filling the food gap, rationalizing food imports, and setting up new agricultural communities that provide thousands of jobs to young people."⁷³ Farmers of the existing fertile 'Old Lands'—the majority—are conspicuously absent as beneficiaries of these projects. In sum, under el-Sisi, the reassessment of agricultural policies and ownership patterns regarding the existing lands has simply not taken place. Instead, profit-oriented reclamation projects have been planned for the sole purpose of cultivating export crops. Therefore, in addition to the constant erosion of state support for the rural populations (initiated via liberalization policies and market-led, export-oriented agrarian strategies), small farmers are now also excluded from the foreseen bounty of new lands and deprived of potential tenure opportunities.

⁶⁹ This distinction is prevalent in the press and literature. The term 'New Lands' refer to fields acquired via land reclamation projects, while 'Old Lands' designate the traditional Nile Valley and fertile fields in the Nile Delta.

⁷⁰ Abdel-Fattah Barayez, "This Land Is Their Land': Egypt's Military and the Economy," *Jadaliyya*, January 25, 2016, http://www.jadaliyya.com/pages/index/23671/this-land-is-their-land-_egypt-s-military-and-the#_edn5.

⁷¹ Barayez, "This Land Is Their Land': Egypt's Military and the Economy."

⁷² Marina Ottaway, "Al-Sisi's Egypt: The Military Moves on the Economy," in *Middle East Program Occasional Paper Series* (Washington D.C.: Woodrow Wilson International Center for Scholars, 2015).

⁷³ State Information Service, "Sisi Gives Go-Ahead for Wheat Harvest in 1.5-Million-Feddan Project," news release, May 5, 2016, <http://www.sis.gov.eg/Story/101251?lang=en-us>.

As of 2017, Egypt's rural population accounted for 56 million inhabitants, representing 27 percent of the total workforce that produced 63 percent of the population's food needs.⁷⁴ The combined output accounts for 11.2 percent of the gross domestic product (GDP), down from the 14 percent of 2006.⁷⁵ In terms of ownership, 90 percent of all landholders are small farmers who own fewer than 5 *feddans*, while around 9 percent own fewer than 20 *feddans*. Statistics aside, this shift in state agrarian priorities and policies has had a notable impact on urban development, particularly on the growth of so-called informal settlements on former agricultural land. In order to better understand the role of land and of fundamental land rights in Egypt, however, longstanding cultural and religious traditions must be taken into consideration.

“Land belongs to Allah, whoever leaves it uncultivated for three consecutive years will have it taken away and given to someone else.”⁷⁶ According to the Quran, Islamic law recognizes property rights, yet they can only be retained through the continuous cultivation of land. And so it follows that any landowner who leaves land fallow loses his property, which introduces a sanctioned notion of conditionality. The state represents the will of “Allah” and manages the land, yet the legal framework of land ownership (*melk*) originates in both Islamic laws and French Civil Law. Another specificity of Islamic property law is the *waqf*. This key Islamic institution and legal entity under the authority of the Ministry of Religious Endowments (*Awqaf*) owns and manages large tracks of land for the benefit of religious individuals or groups—underpinning, in principle, the concept of collectively-owned land and of inalienable property rights. The *waqf* lost its status and affiliated land to the state under the Land Reforms of 1952, but redeemed half of it under subsequent regimes. Currently, the *waqf* is ambivalent, manifesting at once a powerful landowner engaged in formal real-estate development, a merciless landlord renting dilapidated historical buildings to the poor, and, at times, an agent unwilling to sell agrarian land for informal construction.⁷⁷

Land leasing (or land holding, *hezayah*) as opposed to land ownership (*melk*) is prevalent. Originating in the nineteenth-century system involving non-farming landowners (‘absent owners’), land leasing engages a multitude of tenants and sub-tenants. Almost sixty percent of the

⁷⁴ IBRD, "Arab Republic of Egypt," ed. The World Bank (Washington D.C.: The World Bank Group, 2017).

⁷⁵ Abo Bakr El-Gendy, *CAPMAS Statistical Yearbook 2017* (Cairo: Central Agency for Public Mobilization and Statistics, 2017).

⁷⁶ Kwame S. Jomo, *Islamic Economic Alternatives: Critical Perspectives and New Directions* (Basingstoke: Palgrave Macmillan, 2014), 87.

⁷⁷ Galila El Kadi, *L'Urbanisation Spontanée au Caire*, ed. Centre d'Études et de Recherches sur l'Urbanisation du Monde Arabe, vol. 18, *Urbanisation du Monde Arabe* (Tours: URBAMA [etc.], 1987), 195.

fields are leased or semi-leased to farmers paying in hard currency for the right to farm.⁷⁸ Land holding cannot be sold nor used to guarantee a loan. Yet, the customary contract between tenant and owner must be registered at a public notary in order to transfer the taxes on land (to be paid to the owner). This constitutes a lengthy, complicated, and expensive procedure that is nevertheless necessary for selling or subdividing inherited land.⁷⁹ Regulated by Law 116/1946, records at the public notary must include the location, area, type of agricultural land, the land parcel number, name of the street, neighboring properties, and owners. Because of this particularly laborious process, recourse is often taken to a certain degree of more loose and informal procedures when handling land holdings and use rights. Additionally, there are large numbers of extremely poor farm laborers, who are employed by tenants or owners and cannot afford to lease any land—especially since the rent increases of 1997. Land leasing goes hand in hand with land fragmentation, a historically and culturally established feature of the fertile territory of Egypt. The division of land into myriad small plots or “dwarf holdings” is often cast as the core measure responsible for preventing the agricultural mechanization of—and modern investment in—the ‘Old Lands.’^{80 81}

Conclusion I

As in many other countries, agrarian land in Egypt is essential to sustain livelihoods, food security, economic well-being, as well as social status. With regard to the country’s political economy, agrarian land is foremost an economic resource, whether for cultivation or construction.⁸² A series of legal regimes and land reforms—including estate systems of agrarian administration and property laws—have configured and reconfigured Egyptian territory. Even more, class struggle, national politics, and the economy have shaped land tenure since the nineteenth century. Following a number of political regimes, economic ideologies, and institutional transformations, changes to the rural world have been brought about in successive stages, whether concerning 1) the commodification of agrarian land and the disciplining of

⁷⁸ Ibrahim and Ibrahim, *Egypt. An Economic Geography*, 118.

⁷⁹ Ahmed El-Kholei and Moujahed Achouri, "Country Study on Status of Land Tenure, Planning and Management in Oriental Near East Countries. Case of Egypt," ed. Faycel Chenini (Rome: Food and Agriculture Organization of the United Nations, 2012).

⁸⁰ Michelle Koscielski, Ingi Lotfi, and William Butterfield, "Assessment of the Agricultural Sector in Egypt," (Washington D.C.: United States Agency of International Development, 2012).

⁸¹ Cuno, *The Pasha's Peasants: Land, Society, and Economy in Lower Egypt, 1740-1858*, 210.

⁸² Heather Boyle, "The Land Problem: What Does the Future Hold for South Africa's Land Reform Program?" *Indiana International and Comparative Law Review* 11, no. 3 (2001).

populations, 2) the integration into the global economy via commodity monocultures, 3) social land redistribution and power shifts, or 4) liberalization and privatization processes, all of which have contributed to significant territorial restructurations.

Today, rural Egypt is beset by related dilemmas. On the one hand, the production of private property underway on desert land proceeds unabated. Agrarian land tenure is handed over to large businesses, which most often exacerbates the already inequitable distribution of fertile land. Moreover, the reclamation of desert lands for high-cost and low-output agriculture has figured as a favored political instrument for gaining access to global markets, redirecting revenues and compromising the national budget for the sake of private interests.

On the other hand, decades of state neglect of rural regions has led to yet another paradoxical phenomenon, whereby rural migration has brought with it poverty from the countryside to cities that lack sufficient housing provisions to absorb incoming populations. In this way, urban growth thus penetrates even further into territories once reserved for agriculture.⁸³ Of the 17 million inhabitants comprising the Greater Cairo Region, 65 percent of them live in informal housing. Most of the stock is built on former agrarian land, constructed without permits and seldom, if ever, conforming to building codes.^{84 85} This now prevalent mode of urbanization literally devours thousands of hectares of fertile fields on the periphery of Cairo, the immediate consequence of which is an increasingly precarious imbalance between urban growth and agricultural land that is becoming even more unbalanced as Cairo continues to grow.⁸⁶

Whereas vast territories have been officially handed over to private capital to convert the desert into agrarian land, another mode of spatial production is at work in the transformation of 'Old Lands' into informal urbanized areas. In light of these interrelated tendencies, the insight gained from the history of land tenure poses the open question as to what extent can capital transfers to the private sector, ownership patterns, and agriculture practices co-opted by formal and informal mechanisms organize and shape territories?

⁸³ Ali Abdel-Salam et al., "Changes in Land Use in Some Areas in Egypt," *The Egyptian Journal of Remote Sensing and Space Science* 13, no.2, (Cairo: Soil Science Department, University of Banha, 1997).

⁸⁴ David Sims, *Understanding Cairo: The Logic of a City Out of Control* (Cairo: The American University in Cairo Press, 2010).

⁸⁵ Stephen K. Mayo, *Informal Housing in Egypt: Draft* (Cambridge: Abt Associates, 1981).

⁸⁶ Charlotte Malterre-Barthes, "The Limits of Control. Informal City Versus Agricultural Land at Cairo's Fringes," *TRANS* 23, 2013.

Agriculture versus Urbanization in Greater Cairo

The historical account of land tenure and agrarian policies reveals that food production systems and rural populations are subjected to various political programs and economic ideologies. Changes during the past four decades in particular have led to the current conditions challenging the nation. Despite its key role for food security and national agendas alike, agrarian land is continuously laid open to the oft-destructive forces of urbanization.

Even with a regulated amount of fertile land of 3 million hectares, agriculture on 'Old Lands' is nevertheless extremely productive, with significant grain harvests yielded two or three times a year. This said, Egypt loses as much as 10,000 hectares of arable land every year.⁸⁷ While there are various causes cited for this annual loss, including high salinity and desertification, illegal urbanization still accounts for the most conspicuous consumption of arable land. Desert land is also being promptly urbanized, but the direct consequences on the overall food system and on agricultural practices in Egypt are comparatively less acute. Since 1995, agricultural land has been lost to informal urban expansion at an ever-accelerating rate within the Nile Delta, the Nile Valley, and the Greater Cairo Region (GCR). In order to analyze this issue, the historical development, the factors and mechanisms of rapid urbanization on agrarian land, and the legal aspects and governmental responses are examined. Accordingly, the agents and forces at work involved in land-use changes are also examined as is the physical fabric resulting from new forms of informal housing production—the latter analyzed at the scale of buildings as well as large-scale urban clusters, and their respective effects on the organization of territory.

History, Factors, Mechanisms, and Governmental Responses

1) A History of Informal Urban Growth

High-rise concrete and brick infill construction sitting in fields are a common sight as one cruises along Cairo's peripheral Ring Road. Considered informal because they are built on former agrarian land, these housing settlements are spontaneous, having been erected without planning nor permit. The pace of illegal construction on fertile areas on the capital's fringes has accelerated since the 2011 revolution, and, to reiterate, over 60 percent of Cairo's inhabitants live in informal housing.⁸⁸ In the greater Cairo area, with its population of approximately 20 million, rapid and uncontrolled urban sprawl has taken a dramatic turn as it continues to expand on agrarian land.

⁸⁷ Humanitarian News and Analysis IRIN, "Egypt: Desertification Threat to Local Food Production," *Humanitarian News and Analysis*, July 11, 2011, <http://www.irinnews.org/report.aspx?reportid=93193>.

⁸⁸ Amira Howeidy et al., *Cairo's Informal Areas between Urban Challenges and Hidden Potentials: Facts.Voices.Visions*, eds. Regina Kipper and Marion Fischer (Cairo: Egyptian-German Participatory Development Programme in Urban Areas (GTZ), 2009).

The chronology of Cairo's informal growth has been well studied up until 2011. In *Understanding Cairo*, David Sims claims that "in 1950 there were virtually no informal settlements around Cairo." The first development on agricultural land appeared in the early 1960s following President Gamal Nasser's national industrialization policies. An influx of rural migrants sought work in Cairo and built houses adjacent to public work opportunities.⁸⁹ Ananya Roy and Nezar AlSayyad indicate in *Urban Informality* that large tracks of agrarian land were bought and illegally subdivided for housing in the late 1960s to accommodate those workers involved in the construction of Nasr City.⁹⁰ Public housing schemes only offered a fraction of what was needed, and even these inadequate schemes were discontinued after the 1967 war.⁹¹ Fueled both by rural migration and the influx of refugees from the Suez Canal Zone, housing demand grew steadily and the shortage of affordable housing became a chronic affliction of the Egyptian capital.

In 1970, encroachments on privately-owned farmland were identified near villages north of Cairo. At the time, new construction was mainly expanding existing rural settlements on fertile land on the city's periphery (i.e., Boulaq al-Dakrouf, Munira, Shubra al-Kheima, Matariya). In her chronological account of informal settlements, Sarah Sabry notes that "80 percent of the housing built in Cairo in the 1970s was informal in some aspect."⁹² This informal urbanization picked up pace following Sadat's *Al-Infithah*. Millions of Egyptian males relocated to the Gulf, sending remittances back to their families at home. These savings were invested in the so-called *ashwa'iyyat* in that property in the formal market remained financially and technically out of reach. Despite Sadat's famous pledge to provide every citizen with a home, both public and private formal investment shifted to cater to upper and middle-income classes. Governmental policies were focused on desert development, the logic being that "these vast deserts constitute strategic vacuums which ought not to be neglected."⁹³ ⁹⁴ Unable to afford and gain access to public or private housing, the demand for a place to live by lower-income populations was

⁸⁹ Sims, *Understanding Cairo: The Logic of a City Out of Control*, 96.

⁹⁰ Ananya Roy and Nezar AlSayyad, *Urban Informality: Transnational Perspectives from the Middle East, Latin America, and South Asia* (Lanham, Md.: Lexington Books, 2004), 180.

⁹¹ Mahmoud Abdel-Fadil, *The Political Economy of Nasserism* (Cambridge: Cambridge University Press, 1980), 131.

⁹² Sarah Sabry, "An Introduction to Informal Housing in Cairo," in *Housing Cairo: The Informal Response*, eds. Marc Angéilil and Charlotte Malterre-Barthes (Berlin: Ruby Press, 2016), 253.

⁹³ "Food for every mouth, a house for every individual, and prosperity for all," in Sean F. McMahon, *Crisis and Class War in Egypt: Social Reproduction, Factional Realignments and the Global Political Economy* (London, Zed Books Ltd, 2017).

⁹⁴ Sadat, *The October Working Paper, Presented by President Mohamed Anwar El Sadat*, 78.

routinely left unattended, inevitably leading to an increase in illicit forms of housing construction that contributed to the commodification of agrarian land as well as the consolidation of an informal real estate market.

Under the Mubarak government, public capital was invested heavily in desert cities (i.e., roads, infrastructures). No significant housing solutions for the majority were successfully implemented. As less foreign remittances came back into the country and as demographic growth and rural migration flows decreased in the 1980s, the construction of illegal settlements decelerated, only to pick up pace again in the following decade. Despite strict measures against spontaneous urbanization (see the section 4) *Legal Status of Urban Informality and Governmental Responses*), Cairo's informal districts grew steadily—reaching a rate of 3.5 percent a year during the late 1990s.⁹⁵ The 2000s saw increased densification as well as vertical and horizontal expansion of existing areas rather than the build-up of new areas.⁹⁶

The speed of illegal constructions built on fertile land at the fringes of cities quickened after the 2011 revolution.⁹⁷ Illicit, post-revolution development took place even faster than previously, most likely due to the power vacuum left by the fall of the Mubarak government. Contractors grew confident during the short period of the SCAF transitional government because the administration essentially remained oblivious to the issue. Undoubtedly, contractors were also emboldened during the brief term of Morsi, who actually supported informal areas from where it had drawn political support, in no time setting off a speculative building boom along the Cairo Ring Road.⁹⁸ Notwithstanding the fact that the right to adequate housing had been added to the 2012 Egyptian Constitution and that the amended 2014 Constitution addressed for the first time informal housing, little was done officially to alleviate unbridled urban growth and consequently, construction continued unabated.⁹⁹

This was all supposed to change in 2016, when President el-Sisi pledged to “end the problem of informal housing within two years,” although this appeared to be no more than mere

⁹⁵ Howeidy et al., *Cairo's Informal Areas between Urban Challenges and Hidden Potentials: Facts.Voices.Visions*, 19.

⁹⁶ Eric Denis and Marion Sejourne, "Isis: Information System for Informal Settlements," ed. Ministry of Planning (Cairo: GTZ, CEDEJ, 2002).

⁹⁷ Charlotte Malterre-Barthes, "Housing Cairo. From Small-Scale Informal Housing Construction to Semi-Professional Speculative Urban Schemes," in *NO/LOW COST HOUSING* (ETHZ, Zürich: Architecture Department, 2016).

⁹⁸ See Bernard Rougier et al., *Egypt's Revolutions: Politics, Religion, and Social Movements* (New York: Palgrave Macmillan, 2016).

⁹⁹ "The Right to Adequate Housing in the Egyptian Constitution," *Tadamun*, accessed May 8, 2018, <http://www.tadamun.co/2013/10/07/the-right-to-adequate-housing-in-the-egyptian-constitution/?lang=en#.Wgm2wEdryAx>.

conjecture.¹⁰⁰ For illegal urbanization on agrarian land has, in truth, continued unhindered as the flagrant reality of urbanization in Egypt. There is—as of 2018—no post-2011 assessment of informal growth for the Greater Cairo Region. The present study identifies aspects of urban growth with fieldwork data and by compiling several GIS images of an area to measure ongoing development chronologically, revealing that the extent of encroachment on agrarian land has continued since 2011.^{101 102}

2) *Factors Supporting Informal Housing Demand*

Why precisely is agrarian land around Cairo consumed for informal construction? The answer to this question resides in the correlating factors that support informal housing demand: push-and-pull dynamics of migration, political geography and demography, social motives, economic incentives, administrative and economic policies, and governmental shortcomings.

Push Factors

Rural migration is often viewed as one of the many causes of informal urbanization. However, from questionable national agrarian policies to the lack of agricultural investment by post-Nasser governments, there are many other related factors involved in the resettlement of rural populations to cities. One factor is the small size of plots that makes them insufficient for sustaining a smallholder's household, with 66 percent of these plots being smaller than a *feddan*.¹⁰³ The rent increases stemming from Law 96/1992 also reduces income. Poor farmers are excluded from participating in modern agribusinesses and 'New Lands' tenure opportunities, a fact resulting in the general lack of any worthwhile future perspective. This is particularly problematic because the rate of employment per acre had already reached a saturation point by the mid-1970s.¹⁰⁴ The traditional agriculture sector is not able to provide ample employment to absorb rural demographic growth. Thus, this growth—combined with a lack of investment—drives unemployment numbers up. The urban-rural gap in human development (measured by differences in poverty, literacy,

¹⁰⁰ "Egypt's President Vows to End Problem of Informal Housing Within Two Years," *Egyptian Streets*, May 30, 2016, <https://egyptianstreets.com/2016/05/30/egypts-president-vows-to-end-problem-of-informal-housing-within-two-years/>.

¹⁰¹ Google Earth imagery, 2011-2016, Ard-el-Lewa. See Appendix C.

¹⁰² Chris Webster, "Urban Morphological Fingerprints," *Environment and Planning B*, no. 22 (1995).

¹⁰³ See M. N. Nofal, "A Brief History of Egyptian Agriculture, 1813-1992," in *Egyptian Agriculture Profile*, ed. Tahani Abdel Hakim, Options Méditerranéennes : Série B, Études Et Recherches (Montpellier: CIHEAM, 1995).

¹⁰⁴ Mohamed Mahmoud El Sioufi, "Urbanization of Agricultural Land: Informal Settlements of Cairo," Master diss., (Massachusetts Institute of Technology, 1981), 8.

female literacy, education, and access to piped water) remains important. Rural areas suffer from poor primary and secondary educational facilities, lack of access to health care, shortage of medical staff, and less modern infrastructure (e.g. transportation, sewage, and electricity networks).¹⁰⁵ These inequalities translate into a rural population excluded from national wealth redistribution and forced to migrate to urban centers as the only viable option for subsistence.¹⁰⁶

Pull Factors

“Cairo is Egypt and Egypt is Cairo,” so the popular saying goes.¹⁰⁷ The geographically central position of the city within national territory results in a politically overbearing state run from the capital by a bloated bureaucratic apparatus. Cairo is the *locus* of power. The Presidential palace, the Parliament, all ministries and official instances are in Cairo. Heart of the transport infrastructure, where all train lines and roads of the nation converge, Cairo remains the unrivaled center of the national economy and of state institutions. The capital has attracted migrants from Upper Egypt, the Nile Valley, and has motivated intra-urban relocation (e.g. from Alexandria, Ismailia, Port Said) continuously since the 1970s.¹⁰⁸ This in mind, family ties facilitate movements between city and countryside, as village communities recombine in urban areas.¹⁰⁹ Access to subsidized food and bread is a further incentive. Migrants, for example, argue that work in their respective village does not allow them to afford a sufficient amount of food supplies: “One can buy neither flour, nor butter, nor oil.”¹¹⁰ With many facilities and infrastructure lacking in the countryside, the city is supposedly an employment pool for administrative, unskilled construction and industrial jobs, all of which offer better pay and more business opportunities. But the truth is that the city fails in its proverbial promise of employment, with the formal sector unable to cope with the growing numbers of job seekers.¹¹¹ As a matter of fact, more actual work opportunities exist in the informal sector, yet the forms of employment that are available tend to pay low wages,

¹⁰⁵ Ministry of Planning & Local Development UNDP Egypt, "Egypt Human Development Report-Choosing Our Future: Towards a New Social Contract," in *Arab Human Development Reports*, eds. Mahmoud El Sherif, Sahar Tawila et al. (New York: United Nations Development Programme, 2005).

¹⁰⁶ Taher Osman, Prasanna Divigalpitiya, and Takafumi Arima, "Quantifying the Driving Forces of Informal Urbanization in the Western Part of the Greater Cairo Metropolitan Region," *Environments* 3, no.2, (2016).

¹⁰⁷ Sims, *Understanding Cairo: The Logic of a City Out of Control*, 25.

¹⁰⁸ Abdel-Fadil, *The Political Economy of Nasserism*, 24.

¹⁰⁹ Malterre-Barthes, "A Story of Construction."

¹¹⁰ Ayman Zohry, "Rural-to-Urban Labor Migration: A Study of Upper Egyptian Laborers in Cairo" (PhD diss., University of Sussex, 2002), 123.

¹¹¹ Abdel-Fadil, *The Political Economy of Nasserism*, 24.

yield little in terms of output, and offer no social protection or legal contract, all of which results in a net transfer of rural poverty to the urban realm.¹¹² Although rural migrants no longer counted as the main factor of growth after 1996, Cairo still draws in a considerable population of low-income newcomers, contributing to a demographic growth of 2.3 percent per year, which in turn increased the demand for affordable housing.^{113 114}

Public Housing Responses

How has the state responded to this continuous and pressing need? An overview of state-subsidized programs initiated by Law 206/1951 show a legacy of public housing, including the Masakin al-Ummal factory workers' units in Imbaba (1951-1955), projects in Helwan (1952), al-Zawya al-Hamra (1960), Nasr City (1967-1974), Salam City (1981), Giza and Qalyubiya (1981-2005), as well as programs such as Mubarak's Youth Housing Program (1997-2003) and el-Sisi's plans to build one million affordable homes today's 'one-million-homes' schemes.¹¹⁵ The shift of political and economic ideologies, from Arab socialism to the state's neoliberal agenda has unavoidably influenced housing policies, their accompanying—at times contradictory—discourses, and the changing procedural mechanisms governments rely on to produce affordable homes. The inadequate provision of affordable housing betrays a drift from a paternalistic welfare state toward institutionalized practices of public disengagement. This is the consequence of having at first discarded state enterprises through privatization and then later having sacrificed state functions to serve military interests.¹¹⁶ As much as public housing policies reveal about the transformation of the state at the national scale and shifts in economic ideologies at the global scale, their interrelated shortcomings disclose all the more blatantly the still unaddressed task of housing the majority.

Handing over Imbaba's public housing ownership contracts in 1955, President Nasser told the crowd "I am happy to see you now with the contracts to own your homes. This homeland has become your property, what was in the past reserved to a small class of despotic

¹¹² Rougier et al., *Egypt's Revolutions: Politics, Religion, and Social Movements*, 75.

¹¹³ Asef Bayat and Eric Denis, "Who Is Afraid of *Ashwaiyyat*? Urban Change and Politics in Egypt," *Environment and Urbanization* 12, no. 2 (2000).

¹¹⁴ CAPMAS, *Vital Statistics*, (Cairo: Central Agency for Public Mobilization and Statistics, 2017).

¹¹⁵ Sims, *Understanding Cairo: The Logic of a City Out of Control*, 50.

¹¹⁶ Ottaway, "Al-Sisi's Egypt: The Military Moves on the Economy."

exploiters.”¹¹⁷ This was no arbitrary choice of words, for the redistribution of nationalized land in form of public housing was meant to offer convincing proof of the state’s commitment to housing. The provision of public services was also intended to reinforce Nasser’s electoral base.¹¹⁸ Doubtlessly, affordable housing emerged as an opportune propaganda tool to warrant state intervention and implementation of its social justice policies. Serving this very agenda while also addressing the housing question, Minister of Housing Ezzat Salama announced a rapidly-buildable housing scheme, *masakin sha’biya*, i.e. ‘the people’s housing’.¹¹⁹ Public sector contracting firms were mobilized to build ‘popular houses’ in each governorate. A total of 92,000 low-cost units were built for the poorer classes between 1960 and 1967, which, though notable, was still insufficient relative to the wide-ranging demand for affordable housing at the time.¹²⁰

A passage from *The October Working Paper* written by President Sadat in 1974 reads, “While encouraging general investment in housing, the State has to give priority to low-cost dwellings in urban and rural areas.”¹²¹ With his own discourse echoing the Nasserite welfare narrative, Sadat acknowledged that a principal task of the state is to provide housing for its people. Yet, hindsight has verified that said commitment remained largely rhetorical. It is under his government that public housing programs were impaired by inadequate underfunding and eventually transferred to the private sector. But even this transference failed to deliver, insofar as investors spied profit opportunities in mid- and upscale housing instead, particularly in desert urban development. Public programs aimed at tackling the issue of housing for lower-income classes likewise proved largely insufficient.¹²² It is also under Sadat that the determination to urbanize the desert as solution to the housing issue was formalized as state policy with the 1974-new-town program—incidentally, a planning policy that prevails to this day.¹²³

Government spending steadily decreased from the 1990s onward. In 1994, however, 70 percent of all housing constructed in Egypt was still produced by the public sector and 30 percent

¹¹⁷ Gamal Abdel Nasser, "President Gamal Abdel Nasser's Speech at the Celebration of the Distribution of Contracts for the Ownership of Public Housing in Imbaba 24/7/1955" (Alexandria: Bibliotheca Alexandrina, the Gamal Abdel Nasser Foundation, 1955).

¹¹⁸ See Abdel-Fadil, *The Political Economy of Nasserism*.

¹¹⁹ Milad M. Hanna, "Real Estate Rights in Urban Egypt: The Changing Sociopolitical Winds" (paper presented at the Property, Social Structure, and Law in the Modern Middle East Conference, Rockefeller Foundation Center, Bellagio, Italy, 1985).

¹²⁰ Ibrahim and Ibrahim, *Egypt. An Economic Geography*, 218.

¹²¹ Sadat, *The October Working Paper, Presented by President Mohamed Anwar El Sadat*, 76.

¹²² Sims, *Understanding Cairo: The Logic of a City Out of Control*, 168.

¹²³ See Anwar Sadat, *The October Working Paper, Presented by President Mohamed Anwar El Sadat* (Cairo: Arab Republic of Egypt, Ministry of Information, State Information Service, 1974).

by private companies, numbers that by 2010 had reversed, illustrated by a sharp decrease in the production of low-income and accordingly less profitable units. In 2002, for example, 13,487 affordable housing units were built, in comparison to the 1,254 realized in 2010—figures confirming that the Egyptian economy, for all intents and purposes, had been given over to privatization.¹²⁴ ¹²⁵ The government was selling its shares in state-owned enterprises on the Cairo stock market and, in effect, disengaged from obligations such as public housing construction. Such activity only changed in the last decade of the Mubarak administration, when public housing was rediscovered as a valuable political asset prior to the first presidential election in 2005.¹²⁶

The National Housing Program (NHP, 2005-2012) was announced during Hosni Mubarak's electoral campaign. It aimed create 500,000 subsidized units located mostly in the desert new towns around Cairo.¹²⁷ Epitomizing the state's abdication of its housing obligations to profit-driven companies with strong ties to the government, public agencies (NUCA, governorates, *Awqaf*) were responsible for building 311,000 units and private contractors (e.g. Degla, ORASCOM) the remaining 189,000 dwellings.¹²⁸ It must be said that only a portion of the intended units—about 65 percent—were completed, of which only 8 percent were sufficiently priced for the poorest populations.¹²⁹ ¹³⁰

Overall, such programs have failed to achieve their declared goals for the very reason that they have relied on flawed public-private partnership schemes and dubious constellations of actors whose interests are profit-driven rather than socially-motivated, the delivery of affordable housing predictably having given way to the over-production of middle- and upper-class housing.¹³¹ ¹³² Yet, the public provision of cheap housing has remained central to political discourse.

¹²⁴ Bel Trew, "Multi-Billion Dollar Project Will Not Solve Egypt's Housing Crisis," *Al-Monitor*, March 25, 2014, <https://www.al-monitor.com/pulse/ru/originals/2014/03/egypt-housing-uae-arabtec-shortage.html>.

¹²⁵ Trew, "Multi-Billion Dollar Project Will Not Solve Egypt's Housing Crisis".

¹²⁶ Yahia Shawkat, "Mubarak's Promise. Social Justice and the National Housing Programme: Affordable Homes or Political Gain?" *Égypte/Monde arabe* 11, no. 1 (2014).

¹²⁷ Alexander Dziadosz, "Egypt Housing Project on Track for 500,000 Units," *Thomson Reuters*, August 25, 2010, <http://www.reuters.com/article/ozatp-housing-egypt-20100825-idAFJOE67O0K920100825>.

¹²⁸ Sameh Wahba et al., "Next Step Recommendations for Affordable Housing Policy and the National Housing Program: Mortgaged-Linked Subsidies and Housing Supply Considerations," (Cairo: The World Bank, 2008).

¹²⁹ Shawkat, "Mubarak's Promise. Social Justice and the National Housing Programme: Affordable Homes or Political Gain?"

¹³⁰ "Social Housing between Old Policies and Future Opportunities" news release, December 7, 2014, <https://eipr.org/en/press/2014/12/social-housing-between-old-policies-and-future-opportunities>.

¹³¹ Orascom Development, "Haram City, 6th of October, Egypt," Orascom Development Holding AG, accessed May 5, 2018, <https://www.orascomdh.com/en/destinations/operating-destinations/harram-city.html>.

Following the 2011 revolution, the right to adequate housing was written in the 2012 Egyptian constitution during Morsi's brief presidency, with article 68 stating, "Adequate housing, clean water, and healthy food are guaranteed rights." The cornerstone of the state national housing plan are social justice, the encouragement of individual initiative, and housing cooperatives; the state uses state land for purposes of construction if doing so advances the public good and preserves the rights of future generations."¹³³ The 2014 constitution added the state's obligation to provide a "comprehensive urban planning framework for cities and villages."¹³⁴ Meanwhile, the National Housing Program, originally initiated by Mubarak, remained in place as state policy for el-Sisi's government. Moreover, the designated limit for low-income was set at EGP 3710 (EU417) per month, a measure that finally liquidated the pretense of "affordable" housing and openly revealed that the NHP was never intended for the poor in the first place.¹³⁵

Concurrently, a series of plans for 'one-million-homes' for low and medium-income classes have been announced successively since 2011. Feeding into the ongoing political narrative concerning state housing provision to the needy population, the Social Housing Project was launched in 2012, the objective being to construct one million units until 2017; in total, only 100,000 were completed in 2016.¹³⁶ Another project for 'one-million-homes' was presented during el-Sisi's election campaign in 2014. "For Egypt's Youth" was a partnership between the state, the armed forces, and Dubai-based investor Arabtec, the latter investing USD 21 billion in the joint venture.¹³⁷ Tellingly, the desert land was initially offered by the military to the respective construction company for free—a gesture indicative of the army's stronghold over public assets. Despite this 25 percent cost savings (a direct loss for the national budget), the selling price of flats

¹³² The example of Haram City, part of the National Housing Program, exposes the limits of social housing projects entrusted to private investors. In 2007, the Ministry of Housing commissioned the private company Orascom Housing Communities (OHC) to construct 70,000 units for low-income households, to be completed by 2011. On 840 hectares of public desert land, the New Urban Communities Authority (NUCA) provided infrastructure and services, free of charge, to operate profit-driven Haram City. The price range for residential units was between EGP 140.000 and EGP 200.000 (at the time, the pound was pegged to the US dollar; it has floated since 1989 and was worth roughly USD 0.12 at the time of the survey), an unaffordable price for the lower-income populations. Today, only a fifth of the planned area is built and completed, inhabited mostly by middle-income classes with private transportation.

¹³³ Tadamun, "The Right to Adequate Housing in the Egyptian Constitution".

¹³⁴ Ibid.

¹³⁵ Shawkat, "Mubarak's Promise. Social Justice and the National Housing Programme: Affordable Homes or Political Gain?"

¹³⁶ "Ministry of Housing Secures Loans of EGP3bn for Social Housing Fund," *Daily News Egypt*, February 1, 2016, <https://dailynewsegypt.com/2016/02/01/ministry-of-housing-secures-loans-of-egp-3bn-for-social-housing-fund/>.

¹³⁷ "Sisi Campaign Pledges to Build One Million Housing Units," *Mada Masr*, March 9, 2014, <https://www.madamasr.com/en/2014/03/09/news/u/sisi-campaign-pledges-to-build-one-million-housing-units/>.

was set at around LE200,000, an amount admittedly beyond the means of most.¹³⁸ With the project mired in difficulties, the construction target was reduced to 100,000 units in El-Obour and Al-Badr after the land offer was retracted and Arabtec beset by internal conflicts. Yet again in 2015, another mass housing project was announced that promised the construction of 650,000 units by 2018.¹³⁹ ¹⁴⁰ At any rate and barring other like setbacks, the government and the Ministry of Housing will apparently contract private companies and finance the unnamed project.¹⁴¹

The Myth of a Housing Shortage

Irrespective of chronic state disregard for the issue of affordable housing, the provision of adequate social housing continues to be declared as a key task of the government within the broader official narrative concerning “Egypt’s urban housing crisis.”¹⁴² References made to an acute shortage of dwelling units in Cairo that are used to justify more construction and further desert development have repeatedly proven to be inaccurate. The ratio of vacancies in public housing projects in both the formal and informal sectors was 20 percent as of 2017.¹⁴³

Numerous public housing units stand unoccupied, but remain inaccessible to those who need them most simply because they are too expensive.¹⁴⁴ ¹⁴⁵ Most of these vacant units are also

¹³⁸ Isabel Esterman, "After Year-Long Wait, Arabtec Reaches Deal with Egypt on Mega-Housing Project," *Mada Masr*, April 2, 2015, <https://www.madamasr.com/en/2015/04/02/feature/economy/after-year-long-wait-arabtec-reaches-deal-with-egypt-on-mega-housing-project/>.

¹³⁹ Robert Barron, "Ministry Announces More Plans to Solve Egypt’s Urban Housing Crises," *Mada Masr*, January 3, 2016, <https://www.madamasr.com/en/2016/01/03/feature/economy/ministry-announces-more-plans-to-solve-egypts-urban-housing-crises/>.

¹⁴⁰ "Egypt Targets New 656,000 Affordable Housing Units in 2 1/2 Years: Sisi," *Abram Online*, February 24, 2016, <http://english.ahram.org.eg/NewsContent/3/0/188441/Business/0/Egypt-targets-new-, -affordable-housing-units-in---.aspx>.

¹⁴¹ Lin Noueihed and Michael Georgy, "Egypt to Build One Million Homes for Poor to Help Ease Shortage: Minister," *Reuters* December 9, 2015, <https://www.reuters.com/article/us-egypt-housing/egypt-to-build-one-million-homes-for-poor-to-help-ease-shortage-minister-idUSKBN0TS14620151209>.

¹⁴² Achment Gonim and Hossam Abougabal, "Resolving Egypt’s Housing Crisis Crucial to Long-Term Stability,"

Middle East Institute, July 27, 2016, <http://www.mei.edu/content/article/resolving-egypt-s-housing-crisis-crucial-long-term-stability>.

¹⁴³ See El-Gendy, *CAPMAS Statistical Yearbook 2017*.

¹⁴⁴ Poorest households have a monthly income of EGP 542 (indicatively EUR 61 in 2014) and can afford to pay about 25 percent of their income to rent (about EGP 142 per month). However, official housing programs define low-income by a monthly income of EGP 1388. The systems that grant tenure to subsidized units vary, yet most have as precondition a EGP 4500 minimum down payment and monthly rent starting with LE150. Furthermore, units are often tied to mortgages, and households are dependent on their qualification to access bank loans. To qualify, most banks require a steady monthly income of EGP 605 minimum, excluding those earning less, unemployed, or without a formal or government job.

¹⁴⁵ David Sims, Azem Kamal, and Doris Solomon, "Housing Study for Urban Egypt," ed. BearingPoint Inc. (Washington, D.C.: U.S. Agency for International Development 2008).

unattainable for the 40 percent of the population employed in the informal economy due to hurdles that come with the allocation processes. An opaque and corrupt lottery system works to perpetuate ingrained injustices, with officials often receiving more than one public housing unit, or the sum of available units if paid discreetly in cash. To make matters even more difficult, authorized identification and registration documents, proof of formal employment, and a clean police record are all required to access a public unit, documents that surely are hard to obtain for many in precarious situations. Spatially, public housing units are often unsuited for the actual needs of inhabitants. Some barely comply with Egyptian building codes that require a minimum of 7.5 square meters per habitable room.¹⁴⁶ Public housing schemes are handed over to tenants with unfinished interiors and infrastructure. What is more, it can take up to 4 years after its 'completion' until a building is connected to water and electricity services. Most housing units built in desert areas are located quite a distance from employment centers and schools, which, in any case, remain out of reach for the bulk of families without private transportation, bearing in mind that only 7.3 percent of the population own a car.¹⁴⁷

While many public housing units stay unoccupied, private upscale units remain empty as well. This can be attributed in part to a series of "byzantine collection of (rent-control) laws" that date from the early 20th century.¹⁴⁸ The right of landlords to evacuate tenants or raise rents, for example, was only abolished after the First World War (Dwelling Premises Act, Decree 151/1941, Bill 121/1947). During the Nasser era, laws reinforcing rent control were ratified (Law 199/1952, Law 55/1958, Law 168/1961, Law 7/1965). A decree was passed allowing for the inheritance of rented units, which allowed controlled rental rates to be continued across generations. Viewed as the urban equivalent of the Agrarian Reforms, the rent freeze was part of the Nasserite wealth redistribution system. Depriving landlords and units owners' of their intake of rents, costs of living for the urban middle-classes were substantially reduced as inflation increased. Until 1977, tenants were allowed to re-rent or exchange their unit without approval from the landlord. This, combined with the inheritability of leases, marked the near-elimination of landlords' rights over their property. Laws passed under Sadat sought to minimize complications associated with the legal maze around rent control, allowing, for instance, a 10 to 20 percent increase in rent prices and tax benefits for rental income (e.g. Law 136/1981). After

¹⁴⁶ Shawkat, "Mubarak's Promise. Social Justice and the National Housing Programme: Affordable Homes or Political Gain?"

¹⁴⁷ Fatma El-Zanaty and Ann Way, "Egypt Demographic and Health Survey 2008," ed. Macro International, El-Zanaty and Associates (Cairo: Ministry of Health, USAID, 2009), 24.

¹⁴⁸ Betsy Birns McCall, "The Effects of Rent Control in Egypt: Part I," *Arab Law Quarterly* 3, no. 2 (1988).

maintaining the bulk of the aforementioned laws for over two decades, the Mubarak administration passed Rent Law 4/1996 and Law 106/1996. Units erected from that date onward were exempted from rent control, and 5-year contracts became the standard for all subsequent rental transactions.¹⁴⁹ ¹⁵⁰ All other units remain under the rent control system, which still applies to all formal and informal dwellings built prior to 1996. But what is left of the rent control system actually fails keep rental prices down because there are still ways to circumvent the regulations. The most common is “Key money.” Key money (*rholu rigl*) is an up-front, advance down payment amounting to months or even years of rent that is conditional for accessing a rent-controlled unit.¹⁵¹

Decades of rent control policies deterred the private sector from building units for the rental market. In the wake of liberalization policies and attendant dismantling of the welfare state, both private and public sector abandoned construction for the rental housing market, turning instead to more lucrative building contracts for the property market. Meanwhile, tenants covet their rent-controlled units situated in prime locations, even if those units remain unoccupied. Rent control has also resulted in a reluctance on behalf of landlords to offer units on the rental market, for fear of being unable to reclaim the property. Wary of the banking system, middle- and upper-classes tend to consistently invest in post-1996 private property—mostly upscale neighborhoods in outlying desert cities. Units are deliberately kept empty, either for speculative purposes (waiting for an increase in value to resell the property) or in anticipation of family changes (i.e., wedding of children, relocation).

Vacancy on the informal market is not unheard of, and at times is quite visible. Empty units, for example, can be seen in the brick and concrete high-rises towering over the Cairo Ring Road, being noticeable due to their hollow window openings without frames. Apartments above the 6th floor in speculative 15-storey buildings remain unsold, primarily because frequent electric power cuts render the lifts inoperative. Anyway, better options for cheaper flats are abundant, suggesting a likely surplus of informally-built units. Additionally, a patent mistrust of financial institutions cuts across all classes of society. Real estate investment on the grey market—even with precarious tenure—is thus the only option to invest cash savings. Therefore, many residents

¹⁴⁹ Manal El-Batran and Christian Arandel, "A Shelter of Their Own: Informal Settlement Expansion in Greater Cairo and Government Responses," *Environment and Urbanization* 10, no. 1 (1998).

¹⁵⁰ Salma Mansour, "New Law, Old Problems: The Egyptian Rent Control Dilemma," *The Chronicles* 1 (Spring 2010).

¹⁵¹ McCall, "The Effects of Rent Control in Egypt: Part I."

of informal areas possess more than one flat.¹⁵² As rent control also applies to informal units built prior to 1997, owners likewise prefer to keep flats unoccupied, waiting for their children to eventually marry and move in.

Even as 20 percent of available housing units stand empty, the demand for affordable housing remains high and constant. On the formal rental market, existing units are expensive, inaccessible, or simply unavailable.¹⁵³ Lower- and middle-class families, undocumented populations, and young married couples (41.6 percent of the total demand) are shut out from the formal housing market and experience the shortage of affordable units most acutely. They turn to the only alternative available: informal housing.¹⁵⁴ On average, the stock of informal units is 74 percent cheaper than legal units.¹⁵⁵ The number of vacancies notwithstanding and considering a yearly construction rate of 1.8 million new 'informal' flats, the informal private sector still supplies the majority of housing units, a third of which cater to very low- and low-income classes.¹⁵⁶

3) *Building Mechanisms*

Despite their apparent 'informality', the mechanisms that consolidate informal urbanization—especially of agrarian land—follow tacit, practice-based rules.¹⁵⁷ This is to say that informal construction, while beyond the purview of official planning and building regulations, is in fact remarkably well regulated, and has thus evolved into a market sector in its own right. What are the requisite operations, protocols, and set of rules for initiating the change from cultivated to urban land?

¹⁵² Fieldwork, 2015, Ard-el-Lewa, Cairo. See Appendix C.

¹⁵³ El-Batran and Arandel, "A Shelter of Their Own: Informal Settlement Expansion in Greater Cairo and Government Responses."

¹⁵⁴ "[Re]Imagining Urban Housing Demand," *Tadamun*, accessed May 5, 2018, <http://www.tadamun.co/2017/03/27/reimagining-urban-housing-demand/?lang=en#.Wi1nxVVryAw>.

¹⁵⁵ Eric Denis, "The Commodification of the Ashwa'iyat: Urban Land, Housing Market Unification, and De Soto's Interventions in Egypt," in *Popular Housing and Urban Land Tenure in the Middle East: Case Studies from Egypt, Syria, Jordan, Lebanon, and Turkey*, eds. Myriam Ababsa, Baudouin Dupret, and Eric Denis (Cairo: American University in Cairo Press, 2012).

¹⁵⁶ "Social Housing between Old Policies and Future Opportunities" news release, December 7, 2014, <https://eipr.org/en/press/2014/12/social-housing-between-old-policies-and-future-opportunities>.

¹⁵⁷ Parts of this research have already been published in Malterre-Barthes, "Housing Cairo. From Small-Scale Informal Housing Construction to Semi-Professional Speculative Urban Schemes," in *NO/LOW COST HOUSING* (ETHZ, Zürich: Architecture Department, 2016).

Selling the Plots

Sprayed in white on the red brick wall of an informal area in Cairo, the phone number of a broker advertises a unit for sale. This rather impromptu mode of marketing is common in these neighborhoods, given that the majority of such property transactions are arranged and organized via word of mouth contacts. Owners subdivide their plots in direct collaboration with local brokers. Changing land use from agriculture to informal housing generates a 200 per cent profit.¹⁵⁸ Farmer-owners of agrarian land close to existing and growing urban areas can hardly resist the pressure to sell the land for building construction.¹⁵⁹ Financial incentives often trump the need or desire to maintain their land for farming. This is especially the case if those agrarian plots in the vicinity of newly constructed buildings have become less productive. In these deteriorating conditions, owners of small plots might even find cultivation comparatively unprofitable. As for tenants, agricultural modernization in Egypt has not benefitted them in the least, and so there is little incentive to keep their farmland if an owner wants to sell it. Farmers of modest means, urban landlords, or urbanized peasants sell their plots by single *qirat*, or two, or more (one twenty-fourth of a *feddan*, in average 120 square meters). Insofar as part of the existing irrigation canal is converted into an access road for the newly built plots, water does not reach the rest of the field, in effect, bringing an end to agrarian practices—unless a separate well allows for further irrigation. The buyers of the plots are rural migrants, inhabitants of other *ashwa'iyat*, low-paid urban workers from Cairo looking for affordable accommodation (owner-builder), or local small- and middle-size developers. The cost of farmland earmarked for illegal urbanization spiraled upward from an average of EGP 5 per square meter in the 1970s, to EGP 50 in 1981, to EGP 500 in 2010, and reaching approximately EGP 1500 in 2015.^{160 161 162 163}

Financing Plot and Construction

The financing of the purchase of a plot and the construction costs for the first story of housing buildings is made through savings (i.e. cash, gold, jewelry), remittances, collective

¹⁵⁸ Malterre-Barthes, "Housing Cairo. From Small-Scale Informal Housing Construction to Semi-Professional Speculative Urban Schemes," in *NO/LOW COST HOUSING* (ETHZ, Zürich: Architecture Department, 2016).

¹⁵⁹ The end of seasonal floods also released hundreds of hectares of land that had previously been deemed unsuitable for potential new construction.

¹⁶⁰ El Sioufi, "Urbanization of Agricultural Land: Informal Settlements of Cairo," 23.

¹⁶¹ El Kadi, *L'Urbanisation Spontanée au Caire*, vol. 18, 267.

¹⁶² Sims, *Understanding Cairo: The Logic of a City Out of Control*, 119.

¹⁶³ Malterre-Barthes, "A Story of Construction."

pooling of resources within an extended family or a community (i.e. *gamaya*), personal loans, or by selling farmland in the countryside.¹⁶⁴ In rare cases, the plot is even purchased via an informal credit system that requires a down payment of 50 percent of the cost, the remainder to be settled over 2 to 4 years with a 20 percent interest rate colloquially known as “waiting money.”¹⁶⁵ “Key money” from prospective renters may also be collected in advance of construction and used to finance incremental expansion.¹⁶⁶ For small developers engaged in speculative construction, the capital may derive from previous real estate operations (i.e., selling of another building or units) or from an informal business alliance.¹⁶⁷ All such transactions are made with cash, with formal financial arrangements such as mortgages and bank loans seldom used in the process. If a building is constructed incrementally as the case may be, then the financing of additional floors is made on the basis of accrued savings or incoming rent payments from existing units.

Building a Unit

Piles of red bricks are carefully stacked in front of a building under construction, and a worker is tossing blocks up one by one to another worker on the second floor of an unfinished structure, while the generator-powered mortar mixer is heard whirring in the background. Building activities of informal dwellings, kept as they were as discreet affairs under Mubarak, now take place openly in plain sight. Before 2011, maneuvers to conceal illicit construction from the government were prevalent (i.e., night work, roadblocks, secluding walls, sentinels).¹⁶⁸ Given that the informal construction process takes place publicly for all to see, a project can be executed as expediently as one floor per month.¹⁶⁹ This is due in no small part to straightforward construction protocols. The new owner of a plot either chooses to hire a local contractor to construct a building on his land (most often the case for owner-builders), or supervises the construction himself with local workers (to expedite development of a tract of land). There is

¹⁶⁴ A *gamaya* is a group savings association, a social mechanism that relies on collecting a fixed monthly sum of money from each member over the course of one or two years. See Sarah Eldefrawi, "Impact of Physical Structure of Informal Settlements on the Social Integration of Residents," paper presented at the *International RC21 Conference 2013* (Cairo, 2013).

¹⁶⁵ Reinhard Goethert, *Kairo: Zur Leistungsfähigkeit Inoffizieller Stadtrandentwicklung*, eds. Gerhard Curdes and Gerhard Fehl, vol. 17, Politik Und Planung (Köln: Deutscher Gemeindeverlag [etc.], 1986), 85.

¹⁶⁶ El Sioufi, "Urbanization of Agricultural Land: Informal Settlements of Cairo," 25.

¹⁶⁷ Malterre-Barthes, "A Story of Construction."

¹⁶⁸ Sims, *Understanding Cairo: The Logic of a City Out of Control*.

¹⁶⁹ Fieldwork, 2013, Mariotiyah, Greater Cairo. See Appendix C.

almost no case of self-construction. Initially, the buyer might request that a contractor erect a single-story building, one room of which the buyer occupies personally, leaving the other rooms to be rented to other tenants. After saving incoming revenue for eight to ten years, another floor might be added, followed by a third, and so forth. Construction costs follow the inflation of land prices, which rose from approximately EGP 50 to EGP 100 per square meter in 1980, from EGP 80 to EGP 150 in 1990, and up to EGP 400 per square meter in 2015.^{170 171}

Accessing Services

Communities or groups of individuals self-organize in such a way as to connect their homes to existing public infrastructure. For instance, in order to connect to the water utility grid, one needs to excavate a road to access public water and sewer lines, expose existing pipes and connect the informal area with an extension pipe-work that is normally financed by residents themselves.¹⁷² The same laborious protocol holds for connecting a single building to such a pipe. Needless to say in this context, all such actions are performed without permits. Connection is greatly facilitated if the dwelling is located close to water networks that run under Cairo's main utility lines, the majority of which are laid in proximity to public housing and administration offices, mosques, and schools.¹⁷³ Even when this work is accomplished, shortages are frequent, with some areas receiving water supply only three hours per day.¹⁷⁴ Inhabitants of units that are not connected to the public provision system rely on water purchased from serviced public fountains, connections to other neighbors, or must resort to paying a water vendor with a lorry to fill tanks in their flats. Admittedly, such survival strategies prove to be more costly, less reliable, and of poorer quality than services from the public network.¹⁷⁵

While almost all informal dwellings have sanitation facilities (i.e., toilets and bathrooms that at times are shared), only 20 percent are connected to the sewage system and function with a collector tank or pool located beneath the house—an offhand solution that increases the risk of

¹⁷⁰ Goethert, *Kairo: Zur Leistungsfähigkeit Inoffizieller Stadtrandentwicklung*, 17, 86.

¹⁷¹ Malterre-Barthes, "A Story of Construction."

¹⁷² A building developer might undertake some of the connecting work, but often lets his tenants or unit owners connect to the infrastructure network, fit plumbing, and pay for a pump to bring pressured water to the flats.

¹⁷³ Because of the sacred role of water in Muslim faith, religious buildings are almost always connected to the public network by governmental services and therefore constitute crucial access facilities in informal areas.

¹⁷⁴ United Nations Human Settlements Programme, *Cairo a City in Transition*, ed. The American University in Cairo, 2 vols., Cities & Citizens Series (Nairobi: UN-Habitat, 2011), 51.

¹⁷⁵ The water from canals used for remaining agrarian practices is unfit for human consumption.

foundation damage in case of leaks.¹⁷⁶ The monthly cost of sewage water collection by special trucks belonging to public authorities is charged directly to the inhabitants. Formal access to the public water and sewage system in informal settlements is possible and can even be requested. Still, the process is extremely bureaucratic and sluggish, and when services are eventually provided, they are excessively expensive. The connection of a neighborhood to formal infrastructure often results in steep increases in rent to offset the ‘upgrade’ in the value of served areas, so the logic goes.¹⁷⁷

Access to the electricity network is prevalent throughout informal districts, albeit of a different quality. Until the formal network has reached the respective area and official meters installed in buildings, it is common practice to illegally tap into the grid with a ‘flying’ outlet hung on existing high-voltage lines, a tactic often levied with a stiff fine from the electric company or countered outright with frequent power cuts.¹⁷⁸ Public streetlights are nonexistent in many informal areas, which, at times, are compensated for by lamps installed on building facades by inhabitants.¹⁷⁹

Correspondingly, streets—the physical armature for transportation, buried water networks, lighting, drainage, and sewage systems—also endure chronic neglect from authorities. Untarred roads and lack of drainage is the norm. Street paving comes last, if at all, often only on the occasion of formal upgrading efforts involving, for instance, the formalization of water and sewage networks—telltale changes signaling the consolidation of a neighborhood. Small rickshaws, the stray private car, minivans, scooters, and animal-powered carriages service the informal neighborhoods, keeping in mind that taxis, as a rule, do not enter informal areas and promptly stop where the asphalt ends. Most informal areas are located close to the city and thus are relatively easy to reach by default because they have been bypassed by formal road network planning and have inadequate access to main roads that are connected to the public transport system. And so, these communities grow off of the formal systems of the city proper in their direct vicinity, with the protracted lack of public involvement resulting in self-organized, makeshift solutions. A case in point is that during the 2011 Revolution, the community of Ard-

¹⁷⁶ Goethert, *Kairo: Zur Leistungsfähigkeit Inoffizieller Stadtrandentwicklung*, 17, 120.

¹⁷⁷ Howeidy et al., *Cairo's Informal Areas between Urban Challenges and Hidden Potentials: Facts.Voices.Visions*, 81.

¹⁷⁸ United Nations Human Settlements Programme, *Cairo: A City in Transition*, 84.

¹⁷⁹ Fieldwork, 2015, Ard-el-Lewa, Cairo. See Appendix C.

el-Lewa bordering the Ring Road rented road equipment machinery and implemented access ramps linking the area to Cairo's main thoroughfare.¹⁸⁰

Garbage collection is largely left to the private informal sector. Successful self-organized maintenance of narrow residential alleys stops at the main roads, where waste collectors (local small and medium enterprises, or *zabaleen*, a waste-collecting community) sort the valuable non-organic waste that is then traded.¹⁸¹ Because garbage collection is based on financial incentives, trash tends to pile up in areas where the waste value is too low, leading to the formation of garbage hills on vacant lots. This non-valuable waste that ideally should be managed by public services is usually burned, thus creating an all too common pollution hazard for informal areas.

4) Legal Status of Urban Informality and Governmental Responses

From where does the status of *informal* housing stem? Illegal housing, by definition, contravenes formal legal rules. Although the construction or encroachment on agrarian land constitutes the main violation of the law, it is typically not the only infringement (i.e., disrespect for building codes, lack of property deeds registration). The state and its numerous institutions have decreed a legion of laws, measures, declarations, urban planning strategies, and policies to combat informal urban growth. It is this legal apparatus that the extra-legal construction of affordable housing flatly defies.

Illegality as Legacy of Agrarian Land Tenure

The precarious status of illegal construction on land reserved for agriculture originates—and contests—a long legacy of land property registration procedures and cadastral surveys. From the 1717 landholding survey by the Ottomans to the British 'Great Land Map of Egypt' of 1900, documents established, through what Timothy Mitchell has called "the knowledge and command of space," tedious, complex, and procedural property transfer and recording processes.¹⁸² Under British rule, cultivated land had to be registered under an owner that was taxed for his property. This remains the parameter on which modern legislative framework for the current property registration system in Egypt is based. Two laws issued in 1946 and 1964 enacted this underlying parameter. Based on individual ownership, Deed Law 114 compels every owner of every plot to be

¹⁸⁰ Charlotte Malterre-Barthes, "Just Another Neighborhood," in *Housing Cairo: The Informal Response*, eds. Marc Angélil and Charlotte Malterre-Barthes (Berlin: Ruby Press, 2016).

¹⁸¹ Howeidy et al., *Cairo's Informal Areas between Urban Challenges and Hidden Potentials: Facts.Voices.Visions*.

¹⁸² Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*, 90.

registered at the notary. Title Law 142 corresponds to the paperwork related to the property itself. On hand from its offices located across the country, the Ministry of Justice (*Shahr al-'Aqari*) manages property registration. The Egyptian Survey Authority is in charge of the cadastral mapping system and property surveying.¹⁸³

A legacy of these disciplining and taxation protocols, every transaction involving land transfer (i.e., guaranteeing protection to the owner, identifying the property limits and status, and tax payment) must be registered at the *Shahr al-'Aqari* to attain legal status. Plot acquisition today is a reasonably simple process where buyer and seller sign a preliminary contract specifying location, size, and price of the land plot in the presence of two witnesses. It must be said, however, that this contract remains illegitimate until it is officially recorded in the public registry. The complex procedures for the legalization of land acquisition and construction are well-documented, as for instance reconstructed by Marion Séjourné in "Inhabitants' Daily Practices to Obtain Legal Status for Their Homes and Security of Tenure: Egypt."¹⁸⁴ First, several documents must be completed in order to file an application at the *Shahr al-'Aqari* (i.e., request form, primary contract, receipts of property tax by both former and current owner). This file is certified afterward by a clerk and then forwarded to the Survey Authority. There, an official records the land surface and location, inspects the site, and sends back a report. The report provides the basis for examining the legal aspects of the property transaction and determining if the ownership claim is legitimate. If this is indeed the case, the request is approved and the file is sent back to the owner with a provisional contract to be signed by both parties—seller and buyer—in front of a *Shahr al-'Aqari* official. When this process is completed, the contract is finally valid for official registration. The agency retains the original version of the contract and issues a copy of the title deed to the owner. With this copy, the owner can apply for a building permit. The process is as arduous, expensive, and, in short, discouraging. It thus comes as no surprise that very few landowners have actually gone through the entire procedure.

A similar process is required for registering a building on farmland. A constructed property is only eligible for registration if it is situated within a recognized building zone—not agrarian land—and if the seller is registered as the owner at the *Shahr al-'Aqari* (i.e., the extended procedure above). Hernando De Soto calculates in "Dead Capital and the Poor" that the protocol to legally buy and register a plot on which to build requires in Egypt 77 bureaucratic procedures involving 31

¹⁸³ Sims, *Understanding Cairo: The Logic of a City Out of Control*, 152.

¹⁸⁴ Marion Séjourné, "Inhabitants' Daily Practices to Obtain Legal Status for Their Homes and Security of Tenure: Egypt," in *Popular Housing and Urban Land Tenure in the Middle East: Case Studies from Egypt, Syria, Jordan, Lebanon, and Turkey*, eds. Myriam Ababsa, Baudouin Dupret, and Eric Denis (Cairo: American University in Cairo Press, 2012).

public entities and can take from 6 up to 14 years.¹⁸⁵ Hence, the ‘lawlessness’ attributed to informal areas cannot be considered apart from the legal framework that regulates their status. Grounded in complex protocols of land ownership and taxation, the contemporary processes of legalizing tenure emerge as a bureaucratic hydra or what David Sims calls the “shadows of bureaucracy,” corroborating the fact that so many buildings remain illegal.¹⁸⁶ At times, the informal nature of these constructions stems from cumulative causes: not only are structures built on land zoned exclusively for agricultural production without permit (73 percent), but many plots (56 percent) or buildings (38 percent) are unregistered by the public registry.¹⁸⁷

Legislating the Protection of Agrarian Land

A battery of laws, military decrees, and planning codes has made it virtually impossible to build legally on agrarian land. First, Laws 49 and 42/1940 were passed to regulate construction. Plot subdivision for construction purposes without previous approval of planning authorities (*tanzim*) was prohibited.¹⁸⁸ Laws 53 and 59/1966—amended several times—declared any conversion of agricultural land into housing settlements as illegal.¹⁸⁹ However, the state’s awareness of the looming danger brought about by the urbanization of areas reserved for food production was only registered in the 1970s with Agricultural Law 1/1978. This piece of legislation stipulates that all agricultural land is by default non-developable, and is thus exempt from the control of local authorities.¹⁹⁰ In order to be granted an exceptional permit for subdividing and building on farmland, an owner must first prove that his land cannot be cultivated.¹⁹¹ This prohibition in mind, there are a few types of buildings that are legal: farm extensions to accommodate family members, facilities for farming (e.g., poultry farms), or for housing farm-employees. Yet unsurprisingly, permits for such structures are seldom granted and as a result, few owners ever apply. If the request

¹⁸⁵ Hernando de Soto, "Dead Capital and the Poor," *SAIS Review* 21, 1 (2001).

¹⁸⁶ Sims, *Understanding Cairo: The Logic of a City Out of Control*, 122.

¹⁸⁷ Mayo, *Informal Housing in Egypt: Draft*, 28.

¹⁸⁸ The Joint Housing Teams, "Important Laws and Regulations Regarding Land, Housing, and Urban Development in the Arab Republic of Egypt," (Cairo: Ministry of Housing and Reconstruction, Ministry of Planning (Arab Republic of Egypt) with Office of Housing Agency for International Development (USA), 1977), 137.

¹⁸⁹ Marion Séjourné, "The History of Informal Settlements," in *Cairo's Informal Areas between Urban Challenges and Hidden Potentials: Facts.Voices.Visions*, eds. Regina Kipper and Marion Fischer (Cairo: Egyptian-German Participatory Development Programme in Urban Areas, (GTZ), 2009).

¹⁹⁰ The Joint Housing Teams, "Important Laws and Regulations Regarding Land, Housing, and Urban Development in the Arab Republic of Egypt," 137.

¹⁹¹ Mayo, *Informal Housing in Egypt: Draft*, 40.

to build on agrarian land is approved, then said construction must then comply with Egypt's Unified Building Code, which defines housing unit standards, street width, percentage of plot occupancy, and heights (Law 29/1966, Law 106/1976, Law 119/2008).¹⁹² ¹⁹³ ¹⁹⁴ In the 1980s, another set of legal instruments was issued and is still enforced. Law 116/1983 manifests the principal measure taken to protect agrarian land: it states that any action taken (by communities or individuals) to subdivide land for construction and any building on agrarian land is prohibited. It also stipulates that fallow lands are categorically agrarian and are to be protected as such. The law, nevertheless, exempts plots within the city borders from these regulations, claiming for those land parcels the special status of "Urban growth boundaries". These parcels were defined in January 1981 and precisely delineated via aerial photography in 1985 by the Ministry of Agriculture and the Ministry of Housing Utilities and Urban Communities.¹⁹⁵ This delineation of the city boundaries essentially condemned all remaining agrarian pockets (*motkallilat*) within that zone to rampant urbanization, while, in principle, discouraging urban growth beyond. The earthquake of 1992, which saw the collapse of many illegally constructed buildings, forced the government to act. A radical legal instrument was ushered in with the ratification of Military Decrees 1 and 7/1996. The decrees prohibited any urban encroachment on agrarian land, violations of which would face hefty fines amounting from EGP 10,000 to EGP 50,000 and a jail sentence lasting from 2 to 5 years.¹⁹⁶ Though intended as absolute injunctions against unlawful urban growth, the decrees did not succeed. Some experts claim that they even had the opposite effect of boosting unauthorized urbanization, as developers rushed to build before the decrees went into effect and enlarge existing buildings via vertical expansion. The two decrees essentially signaled that informality had been officially recognized, even sanctioned in some cases, insofar as the legislation legalized those illegal settlements built on agrarian land prior to 1996.¹⁹⁷ Accordingly, the Military Decrees were

¹⁹² The Joint Housing Teams, "Important Laws and Regulations Regarding Land, Housing, and Urban Development in the Arab Republic of Egypt."

¹⁹³ The Minister of Housing and Public Utilities, "Executive Regulations on Building Standards Law," ed. the Arab Republic of Egypt (Cairo, 1962).

¹⁹⁴ Tadamun, "[Re]Imagining Urban Housing Demand."

¹⁹⁵ "Coming up Short: Egyptian Government Approaches to Informal Areas," *Tadamun*, September 16, 2014, <http://www.tadamun.co/2014/09/16/coming-short-government-approaches-informal-areas/?lang=en#.Wik4blVryAw>.

¹⁹⁶ Ayman Ibrahim and Kamel El-Hefnawi, "Protecting' Agricultural Land from Urbanization or 'Managing' the Conflict between Informal Urban Growth While Meeting the Demands of the Communities (Lessons Learnt from the Egyptian Policy Reforms)," paper presented at the *Third Urban Research Symposium on Land Development, Urban Policy and Poverty Reduction* (Brasilia, Brazil: World Bank Institute of Applied Economic Research (IPEA) Brasilia, 2005).

¹⁹⁷ Ahmed Soliman and Hernando de Soto, *A Possible Way Out: Formalizing Housing Informality in Egyptian Cities* (Lanham, Md.: University Press of America, 2004), 114.

abolished in 2004. They were succeeded by several other laws that concluded the sum of legal measures taken to protect agrarian land from being urbanized, with Law 4/1994, for instance, stipulating that Egyptian Environmental Agency Affairs (EEAA) is to propose planning documents excluding agrarian land from developments projects.

All such prohibitive measures notwithstanding, the illegal construction on privately owned agrarian land continues. Laws are not enforced and regulations are ignored, except when they are invoked by unscrupulous officials to extort hush money from residents. It goes without saying that given the endemic corruption in Egypt, building codes are not respected either, if for no other reason than they simply do not allow for the type of housing construction affordable for those populations living in informal neighborhoods. The land prices of unbuilt areas within the designated urban growth boundaries have skyrocketed. The rigid legal framework put into place to prohibit the conversion of agrarian land into urbanized areas has in fact proven to be counterproductive, spawning as it has the opposite of its original objectives.

State Interventions Against Informal Housing Settlements

During the 'bread riots' of 1977, rioters—"thieves" and "communists" according to President Sadat—were said to originate from the informal area of 'Ishash al-Turguman in Bulaq.¹⁹⁸ From then on, Sadat considered these areas and their inhabitants to be hostile to *Al-Infitaḥ*' and, by correlation, a threat to upper- and ruling classes. Mentioned by Mike Davis in *Planet of Slums*, this seminal incident illustrates Sadat's inherent aversion to spontaneous settlements.¹⁹⁹ In the name of security and modernity, a part of the denounced area was cleared and its occupants evicted. This physical materialization of policies left little doubt as to how the government viewed informal areas in general.²⁰⁰ In fact, coercive and interventionist measures against informal urban growth have been taken ever since. Eviction, demolition, resettlement, rehousing, and upgrading programs reveal the disposition of successive regimes regarding urban informality.²⁰¹ The official response to the issue took a dramatic turn fifteen years later with the siege of Imbaba in 1992 that was carried out under the Mubarak administration. For five weeks, the government cracked down on the targeted informal neighborhood with full military force. Admittedly, Imbaba was plagued with

¹⁹⁸ Raymond William Baker, *Sadat and After: Struggles for Egypt's Political Soul* (London: Tauris, 1990), 120.

¹⁹⁹ Mike Davis, *Planet of Slums* (London: Verso, 2006), 110.

²⁰⁰ See Farha Ghannam, *Remaking the Modern: Space, Relocation, and the Politics of Identity in a Global Cairo* (Berkeley, Calif.: Regents of the University of California, 2003).

²⁰¹ Tadamun, "Coming up Short: Egyptian Government Approaches to Informal Areas."

inter-secular conflicts as a rising Islamist militia (*Gama'at al-Islamiyyah*, Islamic League) had brazenly challenged the state's authority. But what was perceived as a hostile takeover in the making did not happen overnight.

In one of the first academic accounts of the event, Eric Denis claimed that this high-profile crackdown brought the hitherto unacknowledged informality of Cairo into the limelight, the intervention having gained even world attention due to its sheer scope and broad media coverage.²⁰² Imbaba would in this way become recognized as a representative gauge of informality. Following the lead of Denis, Diane Singerman also later analyzed this state orchestrated incursion in *Cairo Contested*, citing its underlying motivation as stemming from radical insurgents who had taken advantage of the power vacuum left in the wake of state neglect and had gained considerable power by providing much-needed social services to needy inhabitants.²⁰³ The heavy-handed response to the Imbaba crisis was no doubt given added weight as a sign of government resolve to defend national interests, especially considering the tacit, but mounting disdain for this particular area, if not for informal settlements in general. And the entrenched scorn for the *ashwa'iyyat* would become ever more pronounced after Imbaba was brandished a disordered and dangerous growth within the heart of Egypt, a stigma that lingers to this day. Whether expressed or not, authorities as well as many Egyptians still abhor informal areas. In 2010, Sabry Hafez wrote a virulent critique, claiming that extreme density and "over-crowding [...] has resulted in the collapse of normal social boundaries. [...] Incest has become widespread. Previously eradicated diseases such as tuberculosis and smallpox are now epidemics."²⁰⁴ Recently, one could read in a popular online outlet that "Egypt's informal settlements are widely regarded as burdensome eyesores."²⁰⁵

In distinction to its often brutal, politically motivated campaigns, the state has also devised interventionist schemes to counter illegal urban growth. Notable among these is the *tabzim* strategy ('containment') by the General Organization for Physical Planning (GOPP, a public agency under the Ministry of Housing) aimed at containing the spread of informality by strictly controlling the urbanization of agrarian land adjacent to existing informal communities. Said containment was to be achieved "by providing planned areas on the peripheries of those settlements, that enable them

²⁰² See Eric Denis, "La mise en scène des 'ashwaiyyât'. Premier acte: Imbâba, décembre 1992," *Égypte/Monde arabe* 20 (1994).

²⁰³ See Diane Singerman, *Cairo Contested: Governance, Urban Space, and Global Modernity* (Cairo: American University in Cairo Press, 2009).

²⁰⁴ Sabry Hafez, "The New Egyptian Novel. Urban Transformation and Narrative Form," *New Left Review*, no. 64 (2010), 48.

²⁰⁵ Egyptian Streets, "Egyptian Informal Settlements to Be Displayed at Architecture Exhibit in Venice," *Egyptian Streets*, March 5, 2016, <https://egyptianstreets.com/2016/03/05/egyptian-informal-settlements-to-be-displayed-at-architecture-exhibit-in-venice/>.

to grow formally and in a planned manner.”²⁰⁶ The project, implemented from 2004 to 2008, was first directed at developing plans for neighborhoods, but then turned into an upgrading program providing urban services such as electricity, water, sewage and street paving. This accomplished, the program, however, did not support citizens in their effort to secure tenure and was implemented without any consultation process with local inhabitants. The undertaking was part of the “Integrated Development Strategy for Eliminating Informal Settlements in Egypt,” which—as its name clearly admits—divulged the administration’s inherent contempt for this widespread mode of urbanization.²⁰⁷

The 2008 rockslide on the Moqattam cliffs in Cairo that damaged an informal settlement and killed 100 residents prompted the formation of two governmental entities: the Supreme Council for Urban Planning and Development (SCUPD) and the Informal Settlements Development Fund (ISDF). The SCUPD was headed by the Prime Minister who oversaw the ministries of defense, investment, and housing. The board was specialized “in the adoption of policies for urban planning and development and inter-ministerial coordination”.²⁰⁸ The ISDF has been in charge of defining ‘unsafe areas’ and was given the mandate to contend with them consequently.²⁰⁹ Constituting a rather obscure institution that failed to communicate its findings and conclusions, ISDF instituted measures that have been criticized for being top-down, discriminatory, and inefficient.²¹⁰ Lack of funding and coordination among agencies has plagued many of its operations. Some communities evicted without resettlement provisions were forced once again to seek homes in the informal housing market. Besides, rehousing efforts were often viewed as an indicator of impending gentrification meant to drive out original inhabitants unable to afford the new flats. The demolition of buildings and ensuing resettlement of populations in remote areas led those who were displaced to move back to informal areas. Such clearances have been conducted with little consideration for the well-being of the inhabitants or, for that matter, the structural soundness of neighboring buildings, with rubble often left on site (i.e., Maadi demolition

²⁰⁶ Ahmed El Maghraby, "Integrated Development Strategy for Eliminating Informal Settlements in Egypt," *Quarterly Newsletter VI* (2009), accessed May 4, 2018, <http://www.pema.gov.eg/FileUpload/Publication/Files/141.pdf>.

²⁰⁷ Marwa A. Khalifa, "Evolution of Informal Settlements Upgrading Strategies in Egypt: From Negligence to Participatory Development," *Ain Shams Engineering Journal* 6, no. 4 (2015).

²⁰⁸ Presidential decree 298/2008, in Yahia Shawkat, "Government Failure to Upgrade Informal Settlements in Egypt: A Brief History," *Open Democracy*, November 23, 2015, <https://www.opendemocracy.net/north-africa-west-asia/yahia-shawkat/government-failure-upgrade-informal-settlements-egypt-brief-history>.

²⁰⁹ Presidential decree 305/2008.

²¹⁰ El-Batran, Manal and Arandel, "A Shelter of Their Own: Informal Settlement Expansion in Greater Cairo and Government Responses."

campaign).^{211 212 213} All told, not only have the majority of these measures actually brought harm to targeted populations, but they have also failed to reduce informal housing growth, suggesting that neither pre-emptive nor coercive approaches really succeed in protecting agrarian land from encroachment.

Urban Planning Strategies to Protect Agrarian Land

The Egyptian state has also attempted to curb informal growth through urban planning strategies. It must be recalled that no official action was undertaken to hinder early encroachments on agrarian land, insofar as authorities considered these cases of rural housing which was unaffected by urban regulations. However, as the resulting loss of valuable agrarian land became more evident, planners began to explore possible ways to divert this form of growth to alternative locations. Galila El-Kadi argues that the successive master plans of 1970 and 1983—the most recent developed with the French public urban agency Institut d'Aménagement Urbain et Régional de l'Ile de France—have been drafted with the increasing loss of agrarian land specifically in mind.²¹⁴ Having been initiated with the Greater Cairo Region Master Scheme in 1969 to redistribute populations and deter urban development on agrarian land, the new towns program occasioned the construction of satellite cities outside of Cairo. Although this program was rooted in a national discourse concerning desert and land reclamation (examined in CASE 3: FOOD SECURITY AND INFRASTRUCTURE, TOSHKHA) and was further enhanced by extensive public financial incentives offered by the Mubarak administration, the new satellite towns were unconvincing in their intended role as a deterrent to informal urban growth, as they only absorb 14 percent of Cairo's population and mostly middle- and upper-class citizens.²¹⁵

The Ring Road, part of the 1983 masterplan—modeled on the Boulevard 'Périphérique' in Paris—was built around Cairo between 1983 and 2007. Even though it was conceived as a physical barrier against further urban sprawl, the 72-kilometer bypass has done little to prevent

²¹¹ Zoi Alexandropoulou and Marilena Fotopoulou, "War on Informality: Governmental Policies against 'Ashwa'iyyat' in *Housing Cairo: The Informal Response*, eds. Marc Angélil and Charlotte Malterre-Barthes (Berlin: Ruby Press, 2016).

²¹² In 2014, the Maadi demolition campaign exemplified the hostility and violence of such an act, with twenty-two illegally constructed buildings demolished. Not only were residents evicted without notice or rehousing options, but also the authorities ignored all procedural safeguards and, reportedly, a child was killed during the process.

²¹³ Ali Abdel Mohsen, "Maadi Demolition Campaign Turns Fatal," *Mada Masr*, April, 8, 2014, <https://www.madamasr.com/en/2014/04/08/feature/economy/maadi-demolition-campaign-turns-fatal/>.

²¹⁴ El Kadi, *L'Urbanisation Spontanée au Caire*, 18.

²¹⁵ Dona J. Stewart, "Cities in the Desert: The Egyptian New-Town Program," *Annals of the Association of American Geographers* 86, no. 3 (1996).

more encroachment on agrarian land. On the contrary. By providing much-needed access to the transportation network, it has actually functioned as a fortuitous conduit for informal growth. The highway has not only facilitated construction on remaining arable land within the city, but has also offered connections to outlying districts and thus, accelerated expansion far beyond this constructed perimeter.²¹⁶

With respect to planning, current administrations have not substantially deviated from those previous master plans promoting the urbanization of desert land as a fix of sorts to counter informal growth on agrarian land. Grounded in a neoliberal mindset, this approach reflected the government's underlying objective to accelerate economic growth. Desert real estate development was thus hailed as a panacea for all urban ills, while the more urgent task of devising feasible planning strategies for informal areas remained sidelined. Even the glimpse of hope offered by the transformation of the ISDF (Informal Settlements Development Fund) in a Ministry of Urban Development and Informal Areas in July 2014 during el-Sisi's first presidential term was short-lived. Headed by Laila Iskander, the ministry declared, for example, citizen participation as being essential to its (i.e., Maspero triangle development project) and set out to tackle the economic and social inequities that drive informal urban growth.²¹⁷ As promising as such agenda might have been and before any work to this end could commence, the ISDF was promptly dissolved as a distinct governmental entity in 2015 and subsequently integrated into the Ministry of Housing that had just introduced the more enticing prospect of a "New Capital" project—a massive desert development along the Suez Canal entailing the relocation all administrative entities.²¹⁸

But there remains a modicum of hope, insofar as some local and international experts have called for a more considered and balanced approach to managing social and spatial imbalances. On the one hand, they have proposed the introduction of planning and legalization measures in informal areas as a means to control rampant urban growth. On the other hand, they appeal for more support of conventional agrarian practices, which might not only increase crop yields and thus bolster more self-sufficient modes of farming, but might also preserve agrarian land that, in the long-term, could lead to a more manageable equilibrium between rural and urban areas.²¹⁹

²¹⁶ Google Earth imagery, 2007-2016, Greater Cairo Region. See Appendix C.

²¹⁷ Kareem Ibrahim, "Urbanization, Informal Areas and the New Cabinet," *Mada Masr*, September 20, 2015, <https://www.madamasr.com/en/2015/09/20/opinion/u/urbanization-informal-areas-and-the-new-cabinet/>.

²¹⁸ Shawkat, "Government Failure to Upgrade Informal Settlements in Egypt: A Brief History."

²¹⁹ El-Hefnawi, "'Protecting' Agricultural Land from Urbanization or 'Managing' the Conflict between Informal Urban Growth While Meeting the Demands of the Communities (Lessons Learnt from the Egyptian Policy Reforms)."

Conclusion II

Despite assertions of official narratives and the gravity of socio-spatial disparities notwithstanding, there would seem to be no genuine or lasting interest in the decisive issue of national food production, whether measured out in the routine aloofness of authorities or in the always anxious resolve of urban lower classes to find a place to live where possible. This troubling conclusion seems unavoidable, given the fact that, for all intents and purposes, officials seem to have abandoned informal settlements altogether, leaving large populations to their own devices in consuming whatever agrarian land remains available. Granted, prominent desert development and prestigious land reclamation projects have been promoted as alternative schemes for expansion to counteract the unruliness of informal urban growth, but such schemes have shown themselves for what they really are, namely, ever more conduits for capital accumulation. And yet, after so many top-down declarations, proposals, and counter-models, not to mention decades of sustained neglect of the issue, the political, economic, and social ambivalence of informal areas persists.

On the one hand, the slow path to legalization and de facto recognition of informal areas initiated in the 1990s as well as the efforts to unlock informal capital as advocated by Hernando de Soto all point to the opportune prospect of linking the country's economic assets with the promotion of democratic principles.²²⁰ However, this approach addressed by Eric Denis in his article "The Commodification of the *Ashwa'iyyat*: Urban Land, Housing Market Unification, and de Soto's Interventions in Egypt," has been scrutinized for promoting private-interest initiatives and endorsing dogmatic conviction in market forces as appealing, even necessary, alternatives to relying on the state's provision of services.²²¹

On the other side, the sheer lack of any form of governmental self-critique concerning the failures of successive regimes to earnestly address any aspects of socio-spatial imbalances, whether rural- or urban-based, has undermined any claim for democracy. Authorities have only reacted on a stopgap, case-by-case basis to avert unrest. Although the inherent economic potential of informal areas might be evident, and even though several scholars have made a convincing case for legalization and tenure as fundamental necessities for existence, the current regime has yet to signal any intent to legalize and regulate informal areas.²²² Truth be told, authorities simply remain

²²⁰ de Soto, "Dead Capital and the Poor."

²²¹ Denis, "The Commodification of the *Ashwa'iyyat*: Urban Land, Housing Market Unification, and De Soto's Interventions in Egypt."

²²² Agnès Deboulet, "Secure Land Tenure? Stakes and Contradictions of Land Titling and Upgrading Policies in the Global Middle East and Egypt," in *Cairo Contested: Governance, Urban Space, and Global Modernity*, ed. Diane Singerman (Cairo: American University in Cairo Press, 2009).

unwilling to explore possibilities for providing affordable housing alternatives. Moreover, support (legal or financial) for farming populations and local agrarian practices that might improve productivity, increase revenues, and thus reduce the incentive for selling farmland is nonexistent. Concisely, the current administration relies entirely on a laissez-faire strategy that—to say the least—has not necessarily proven successful for previous administrations.

Under these circumstances, those neoliberal principles reinstated under Mubarak, and partly disrupted by the 2011 revolution, are still in force, and are actually being reinforced by the nation's ongoing restructuration to suit ever-fluctuating market imperatives. And with the desert still being flaunted as the final frontier of urbanization, it seems that the state will remain at the service of capital accumulation.

Three Farmers, a Developer, and All the Other Agents

Studies of informal urbanization often approach their subject from a strictly urban perspective. The countryside is reduced to backdrop, the mere stage upon which the growth of cities takes place.²²³ Such a point of view limits an understanding of the urbanization of hinterland. The mechanisms of informal urban production illuminated the structural forces (i.e., socio-economic factors, land tenure protocols, and government responses) that facilitate the transformation from agrarian to urban land-use. To comprehend the correlations between global and local food production, land-use, and urbanization processes, an examination of the agents involved in commodity production, including those who partake in its destruction, trace a narrative pertaining to how urban expansion operates against productive landscapes.

1) Agents of Food Production

Haj Abd Elrahman owns his land, a privilege that guarantees security of tenure.²²⁴ Together with his family, he farms 3 *feddans* in Mahmoudiyah, an area of Cairo enclosed within the Ring Road. Along with those of a few neighbors, his fields constitute the last remaining green patches in an almost entirely urbanized area. Still, the landscape appears to be pastoral at first glance, with its green fields, palm trees, and water channels. A closer look, however, reveals tall concrete-frame and brick buildings towering in the background and trash-clogged irrigation waterways. Haj Abd Elrahman inherited the farm (the building and fields) from his parents and grandparents. A part of their land was confiscated under Nasser's Agrarian Reforms that

²²³ Neil Brenner, *Critique of Urbanization: Selected Essays*, Bauwelt Fundamente (Basel: Birkhäuser Gütersloh, 2017), 217.

²²⁴ Fieldwork, 2013, Mariotiyah, Greater Cairo. See Appendix C. Interview A.

profoundly changed Egyptian agriculture. The farmer and his family breed cattle, produce food and fodder, and mainly cultivate guava, trefoil (clover or Egyptian bersim, *Trifolium alexandrinum* used as fodder), and corn, all of which generates much-needed income. In this sense, Abd Elrahman's farming practices are characteristic of local agriculture. Because it requires little labor, clover remains the most cultivated crop—accounting for a fourth of the entire harvest nationwide.²²⁵ Although small- and medium-sized landholders often cultivate wheat for self-sustenance, the decline in soil and water quality has forced farmers like Abd Elrahman to abandon wheat cultivation on these plots.²²⁶ The family must thus farm sustenance crops for their own consumption (i.e., wheat and vegetables) on another piece of land located outside of the city. While wheat and barley were once the main field crops here, along with other valued vegetables and fruits (i.e. tomatoes, cucumber, herbs, and eggplants), the farmer points out that the proximity of human settlements has had adverse effects on overall agricultural productivity. Even with a new well and a pump to obtain ground water for the irrigation of the fields, the soil is less productive due to increased pollution by nearby settlements.

This local case of a farmer and his field reveals how urbanization entangles small-scale farming with precarious patterns of inhabitation that infringe on food production systems. According to Abd Elrahman, perceptible urban growth appeared in the area at the end of the 1970s. Construction boomed after January 2011. He repeatedly declines offers to buy his plot for urbanization, hoping to keep the land for his many children should they ever “want to build on it in the future,”²²⁷ disclosing in its candor another more generous sense of land value. But he and his family remain well aware of the voracious spread of urbanization and the looming threat it poses to their very livelihood, which might explain their rather fatalistic anxieties concerning questions of food sustenance. The consequences of impulsive urbanization are hard to ignore, as blatant as they already are in the adverse climate and environmental changes rendered on local contexts, be it in the measurable degradation of productive landscapes, ecosystems, and waterways, or in the impending decline in overall food production.

Rabee is Haj Abd Elrahman's neighbor. His situation is even more precarious. Born on the very plot farmed by his parents before him, he does not own the land, but has been a tenant on a yearly contractual basis for 45 years. The plots, roughly 3.5 *feddans* flanked on two sides by

²²⁵ Helen Chapin Metz, "Egypt: A Country Study," (Washington: GPO for the Library of Congress, 1990).

²²⁶ Julian McGill et al., "Egypt Wheat Sector Review," in *Country Highlights*, ed. FAO Investment Centre (Rome: The Food and Agriculture Organization of the United Nations, The European Bank for Reconstruction and Development, 2015).

²²⁷ Fieldwork, 2013, Mariotiyah, Greater Cairo. See Appendix C. Interview A.

new buildings, belong to a cinema company (Studio Misr Co.) which leases the land. Like his neighbor, Rabee used to grow wheat and vegetables (i.e. okra and tomatoes), yet had to switch to clover a decade ago when the quantity and quality of supplied water declined. He no longer relies on existing irrigation canals, having opted to dig a well instead. While adhering to the national cultivation calendar, he primarily cultivates fodder to feed some 20 buffaloes on his land and sells whatever surplus is yielded.²²⁸ Rabee began to notice changes around 2003, just after the completion of the bordering Ring Road. As the area was urbanized, owners evicted tenants and sold their land. A tenant himself, Rabee is aware that if the landowner ever wishes to sell, he and his family would have to leave without compensation, a fact he rightfully attributes to the Mubarak Law 96/1992. He admits that previous and current governments have not expressed interest in the farming population and thus conclude, "There is no use for [farmers] anymore."²²⁹

Rabee's story could be that of any of the thousands of tenants who are remain dependent solely on the good will of landowners to keep farming and maintain a modest livelihood. Illustrating how the growth of cities is intertwined with long-term economic pathways and ideologies, this situation might at first appear to be a direct consequence of the spatial extension of the city. In reality, this situation arose from the revocation of the Nasser laws protecting the rents of farming tenants. This neoliberal move dating back to the Mubarak era has, in truth, facilitated the acceleration of urbanization. By lifting the protection of tenants and allowing owners to fully control agrarian land tenure, Law 96/1992 essentially removed all impediments to the transformation of arable land into construction zones.²³⁰ As the pace of urbanization picks up speed, and as a result of the harmful conditions brought about by the density of neighboring buildings, agrarian land is becoming less profitable for agriculture and more lucrative as a commodity for sale. The systemic mechanisms driving this tendency are implacable and tenants have no say in this process, who anyway, in most cases, are ultimately evicted. The effects of this vicious cycle percolate ever further into socio-economic realms. Farms provide work and guarantee sustenance for entire families (i.e. women, children, the elderly, and extended kinship). Farming populations have proven their ability to adapt to precarious circumstances, at times even moving to desert land reclamation farms or to other employment opportunities where possible.

²²⁸ A feddan produces 7 tons of fodder per harvest every 40 days and 63 tons a year. As a buffalo consumes 25 kilograms a day and 9 tons a year, a feddan can sustain 7 buffalos for a year.

²²⁹ Fieldwork, 2013, Mariotiyah, Greater Cairo. See Appendix C. Interview B.

²³⁰ "Often, [landowners] would like to sell more land but cannot because they are unable to remove the tenants who have been farming the land for many years." in The Joint Land Policy Team, "Urban Land Use in Egypt," (Cairo: Ministry of Housing and Reconstruction (Arab Republic of Egypt) with Office of Housing Agency for International Development (USA), 1977), 95.

But as the whatever available land for farming becomes rarer and thus more difficult to access, most semi-rural populations, if expelled, have no other option than to seek both shelter and employment in the informal urban belt around Cairo, thus further fueling the disparaging forces of urbanization.

This situation is also reflected in Haj Mohamed's own circumstances. The 72-year old farmer tends 1.5 *feddans* with his wife in the almost entirely urbanized district of Ard-el-Lewa just within the circumference of the Ring Road. He inherited the landholding title from his parents, who were also tenants on the same land. Haj Mohamed's family has farmed these plots for over a century. In this area, construction appeared in the late 1970s and steadily increased from 2000 onward, as adjacent buildings gradually encircled his plot. He previously rented 2.5 additional *feddans* in another area, but was evicted for construction purposes. The present plot has the typical *feddan* form of 100 meters long by 15 meters wide, surrounded on three sides by blind brick facades.²³¹ A well with a pump supplies ground water, as all former irrigation channels have been subsequently filled and turned into roads. The farmer only grows clover, insofar as bad water quality, litter, shade cast by buildings, as well as neighborhood theft have prevented him from cultivating the land as he had done previously.²³² The clover is sold as animal feed in the neighborhood for the goats and cattle that, as a matter of course, are kept on the ground floor of buildings. Haj Mohamed argues that even under these circumstances, cultivation is still profitable, but that input costs have increased (e.g., seeds, fertilizers, fuel for the irrigation pump), and that the rent price is rising every year, thereby reducing overall benefits. The average rental prices of a *feddan* in the area are now EGP 4000/year on a yearly contractual basis, ten times the amount in 2014.²³³ The farmer's sons do not farm and instead have informal jobs. As have so many others, he has resigned himself to being at the mercy of his landlord, knowing that soaring real estate values in the area will eventually prompt the owner to sell the land and in turn evict him. Haj Mohamed also reminisces about a time when laws once protected tenants, and when the cultivation of wheat and vegetables was both profitable and sufficient for sustaining a family. This predicament is compounded by a range of conditions that have become as distressful as they are commonplace, with those farming the land (tenants as well as owners) constantly pressured by

²³¹ Malterre-Barthes, "Receding Rurality."

²³² Fieldwork, 2015, Ard-el-Lewa, Cairo. See Appendix C. Interview C.

²³³ Annabelle Daburon, "Urban and Peri-Urban Milk Producers of Cairo City: An Efficiency Focus" Report (Université Montpellier 2, 2012), 13.

the onslaught of urbanization, while also facing soil infertility and poor water quality, land use uncertainties, threats to self-sustenance, and the increasing vulnerability of status.

2) *Input and Institutional Agents*

Farmers are dependent on input agents for the provision of seeds and fertilizers, which is partially the responsibility of public institutions. Agriculture cooperatives and farmer associations partake in commodity production and the management of agricultural land and, by extension, the managing of populations, the farmer-associations, for instance, being registered with the Ministry of Agriculture and Land Reclamation (MALR).²³⁴ At a governmental level, MALR administers policies for agriculture and food production, while managing as well a myriad of other governmental agencies (i.e., sub-departments of Agricultural Services and Agricultural Extension).²³⁵ For their part, agriculture cooperatives are government-owned and operate under the authority of local governorates following the directives of the MALR.²³⁶ Financed by the Principal Bank for Development and Agricultural Credit (PBDAC) since 1976, cooperatives under the Central Administration for Agricultural Credit (active in the 'Old Lands') provide farmers with subsidized fertilizers, sell seeds, rent agricultural machinery and storage facilities, purchase and sell harvests to governmental entities, and, in theory, are authorized to export products, though not directly. Cooperative membership is mandatory in order for farmers to be eligible for subsidized fertilizers.

As mechanisms of control over food production and farmer populations, cooperatives were also subject to state regulation, economic reforms, as well as agrarian policies. The first cooperatives began receiving funding in 1909 and, firmly in the hands of landowners, were reformed under the Arab socialist regime in accordance with Law 317/1956. A supervised state instrument of agrarian reforms introduced after 1952, cooperatives controlled irrigation, drainage, and crop culture (for instance, to restrain cotton culture and ensure soil fertility). Under the Ministry of Agricultural Reform, their task was to gather the harvest (mostly wheat) and sell it

²³⁴ Koscielski, Lotfi, and Butterfield, "Assessment of the Agricultural Sector in Egypt."

²³⁵ Under the authority of MALR, the Central Administration for Seed Examination, Seed Production, Land Protection, Agricultural Cooperation, Agricultural Quarantine, Horticulture and Agricultural Crops, Lands and Water, Afforestation, Plants and Environment are among the entities that operate in a compartmented manner. See Yasmine Khodary, "Governance Assessment of the Agricultural Sector in Egypt Agricultural Extension and Cooperation," (Cairo: CARE International in Egypt, 2016).

²³⁶ There are three types of structure, each governed by a separate entity. In most of the 'Old Lands,' the Central Administration for Agricultural Credit (CAAD) regulates and audits cooperatives, with the Central Agricultural Cooperatives Union (CACUN). Those born of the redistributed land nationalized by Law 178/1952 of the Agrarian Reforms are under the authority of the General Authority for Agrarian Reform (GAAR), while the Division for Reclaimed Lands (DVL) manages the cooperatives on reclaimed desert lands.

back to governmental agencies at a fixed price. Additionally, cooperatives provided subsidized seeds and fertilizers. Under Sadat, Law 117/1976 was implemented for the purpose of creating village banks, which served to undermine the accrued power of cooperatives. In any case, scholars have argued that cooperatives had already failed in their original mandate to support all farmers equally.²³⁷ Capitalizing on the semi-feudal system, richer farmers controlled the associations, while membership was barred to illiterate farmers and a place on the board only went to owners of up to 15 *feddans*. Wealthy landowners were able to use cooperatives to access key goods like special mechanized tools that were unattainable for the poorest tenants. With Law 122/1980 (amended by Law 122/1981), cooperatives were entrusted with the rather vague mandate of implementing the government's policies and "improve agriculture."²³⁸ This directive was clarified by the Vision for Agricultural Co-operative Society in 2001 (Ministerial Decree 1658/2001) issued by the Cooperative Reform Committee, which intended to turn the cooperative into an "economic enterprise (...) working [within the framework of the] market economy."²³⁹ In 2014, the Law 124/2014 ("Cooperatives' Act" or "Agricultural Cooperation Act") was passed, modifying Law 122/1981.²⁴⁰ The amendment permits shareholding companies to contribute to projects undertaken by cooperatives and allows them to establish profit-oriented shareholding companies. Under the guise of financing cooperative-development goals, private seed and fertilizer companies enjoy direct access to the agricultural sector via the 7,000 cooperatives and their 18 million registered members. By opening up these cooperatives to private investors, the Agricultural Cooperation Act also obliterates the need for the government to fund them. Once the political agent for assisting and controlling farmers, cooperatives today have been stripped of their institutional power and amount to little more than a vehicle for market integration and liberalization of the agricultural sector.²⁴¹

It must be noted that seed and fertilizer constitute major agricultural inputs. Currently, private and foreign companies have entered the increasingly profitable local seed market, importing stocks from wherever available, including Denmark, France, Holland, Japan, the UK,

²³⁷ See Graham Dyer and Terry J. Byres, *Class, State, and Agricultural Productivity in Egypt: A Study of the Inverse Relationship between Farm Size and Land Productivity* (Oxfordshire, England; New York, New York: Routledge, 2013).

²³⁸ Booz Allen Hamilton, "Egypt Agriculture Cooperatives," Business report (Cairo: Institutional Modernisation Center, 2008), 10.

²³⁹ Ibid.

²⁴⁰ The Egyptian Center for Economic Studies, "Updates on Strategic Economic Measures & Legislations in Egypt," in *Reform Bulletin* (Cairo: ECES, 2015), 5.

²⁴¹ "Egypt's Farmers: Sowing the Seeds of an Agricultural Revolution," *ILO*, February 7, 2013, http://www.ilo.org/global/about-the-ilo/newsroom/features/WCMS_204313/lang--en/index.htm.

and the USA. Moreover, Egypt approved the cultivation of Genetically Modified Crops (GMCs), including genetically modified maize seeds ('Ageeb'), produced by Monsanto and distributed via its local partner, Fine Seeds.²⁴² However, many farmers had maintained their own supplies over the seasons (i.e., Egyptian clover, barley, wheat, and fava beans) and only purchased the foreign seeds when necessary at the last minute, thus temporarily easing the added burden of competitively priced imports.²⁴³

As for fertilizers, nearly the entire sector is privately owned except for the Abu Qir nitrogen plant, which is still 90 percent publicly owned. The Egyptian fertilizer industry is in the hands of foreign companies (apart from Egyptian firms AlexFert and Mopco): Belaruskali (Russia, Ukraine), OCP (Morocco), Mosaic Agrium (Cargill-owned, U.S.A.), ADM, E.I. Du Pont De Nemours & Company and CF Industries Holdings (U.S.A.), Yara International (Norway), Potash Corporation of Saskatchewan (Canada), Bayer Crop Science (Germany), and Sasol (South Africa).²⁴⁴ International grain traders are also involved in the fertilizer business in Egypt (Bunge, ADM, and Cargill), along with seed companies such as Monsanto and Syngenta.²⁴⁵ The presence of multinational companies that are deeply involved in other sectors of the global food system says much about the degree to which local food production has become intricately entangled in global economies. This is illustrated, for instance, by affiliations between the fertilizer and natural gas industries. The Egyptian Natural Gas Holding Company (EGAS) provides local fertilizer facilities with cheap natural gas, which is the main input necessary to produce urea, or nitrogen fertilizer.²⁴⁶ In return, producers are compelled to sell their produce to agriculture cooperatives at lower-than-market prices. Private producers stand to generate substantial profits from this system, considering that the rest of produce is exported and sold at higher prices.²⁴⁷ The correlation between natural resources and the production and use of

²⁴² Naglaa A. Abdallah, "GM Crops in Africa: Challenges in Egypt," *GM Crops & Food: Biotechnology in Agriculture and the Food Chain* 1, no. 3 (2010).

²⁴³ Magdi Madcour and Abdul Munim Abou Zeid, "Egypt: Country Report to the FAO International Technical Conference on Plant Genetic Resources," in *Country Report* (Leipzig: Food and Agriculture Organization, 1996).

²⁴⁴ Mordor Intelligence, "Egypt Agrochemicals Market," in *Egypt Market Shares, Forecasts and Trends (2017 – 2022)*, (Hyderabad: Mordor Intelligence, 2017).

²⁴⁵ Monsanto Company, "About Mining Operations," accessed May 3, 2018, <http://www.monsanto.com/soda-springs/pages/about-mining-operations.aspx>.

²⁴⁶ Mohamed Abdel, "EGAS to Prioritise Pumping Gas in Summer to Fertiliser Factories for Local Market," *Daily News Egypt*, June 6, 2015, <http://www.dailynewsegypt.com/2015/06/06/egas-to-prioritise-pumping-gas-in-summer-to-fertiliser-factories-for-local-market/>.

²⁴⁷ Patrick Werr, "Fertilizers Industry Highlights Egypt's Need to Streamline Subsidies," *The National*, February 1, 2017, <https://www.thenational.ae/business/patrick-werr-fertilizers-industry-highlights-egypt-s-need-to-streamline-subsidies-1.58999>.

commercial fertilizers is yet another indicator of the link between local food production and complex geopolitical power relations, indicating once again entanglements among ideological orientations, economic policies, geopolitical spaces, territories of urbanization, and productive hinterlands.

At the local level and from an agricultural policy perspective, the Directorate of Agriculture (DA) is the primary public agent involved in the protection of agrarian land. The Directorate of Agriculture conveys the authority of the MALR at a governorate level (i.e. a governorate corresponds to a province). The DA monitors and arbitrates in cases involving illegal construction on fertile land, but does not adhere to this mandate, for various reasons. Underfunded, the DA is Cairo-based and it delegates local staff and police to deal with actual situations on the ground. And as is too often the case, low-paid personnel have proven to be more inclined to collect payoffs than to enforce this or that statute. Even worse, the DA is not computerized and is generally ill-equipped to take on the tasks of surveying, let alone combating, uninhibited urbanization.²⁴⁸ The rather peculiar fact that the Ministry of Agriculture administers urban development rather than the Ministry of Housing or the GOPP is also quite telling of just how difficult it is in this context to protect agrarian land.

The chronic underfunding of such agencies indicates not only a lack of political will vis-à-vis encroachment, but also, and perhaps even more critical, the general disengagement of the state with respect to uncontrolled urban growth. Thus, the limited ability of regulators to monitor urban development can be primarily attributed to the liberalization of economic policies, which has not only stripped the state of its executive powers, but also has legitimized the neglect of building on agrarian land and disregard for farmers' rights. Food production, land development, and financial agencies have provided the impetus for the deep changes experienced in the agricultural sector. Foreign institutions facilitated corporate bids to gain control of agricultural systems and repurpose them for capital accumulation; all the while making the case that more open international trade would improve domestic access to food. Both Timothy Mitchell and Ray Bush have asserted that foreign agents have driven the economic reform of Egyptian agriculture.²⁴⁹ ²⁵⁰ The FAO (Food and Agricultural Organization), USAID (United States Agency for International Development), IFPRI (International Food Policy Research Institute,

²⁴⁸ El-Hefnawi, "'Protecting' Agricultural Land from Urbanization or 'Managing' the Conflict between Informal Urban Growth While Meeting the Demands of the Communities (Lessons Learnt from the Egyptian Policy Reforms)."

²⁴⁹ Mitchell, "The Object of Development/Fixing the Economy."

²⁵⁰ Ray Bush, "Uprisings without Agrarian Questions," in *Development Challenges and Solutions after the Arab Spring*, ed. Ali Kadri (London: Palgrave Macmillan UK, 2016).

Washington-based), and IFAD (International Fund for Agricultural Development, FAO-related) all contributed to the dismantling of Egypt's local food production system and impelled the nation instead to increase international trade and imports.²⁵¹ One might think that the transformative mechanisms initiated by *Al-Infitaḥ* peaked during Mubarak with land destitution laws and declined in intensity after his demise. Yet, the concerted dismantling of the local food system is still ongoing. None of the post-Mubarak administrations have conducted a reassessment of the national agricultural sector's dependency on foreign actors. As a matter of fact, food policy is still based on the 2009 *Sustainable Agricultural Development Strategy Towards 2030*.²⁵² Recent documents published by FAO advise that Egypt is not to rely on its food production system. Rather, the country should take the world market "as a reliable and predictable source of supplies of basic food stuffs."²⁵³ What becomes quite evident are the ways in which institutional agents like FAO and USAID influence national policies, whether through policy advice, direct project funding, technological imports, or via exerted pressure on the national budget. For decades, USAID had direct influence on MALR's policies.²⁵⁴ Today, along with five other programs, USAID funds Egyptian farmers (i.e., through technological imports, know-how, and education programs) to shift from sustenance production to cash crops for export, "using a market-driven approach" through the "Feed the Future Egypt-Food Security and Agribusiness Support" project.²⁵⁵

In the case of cooperatives, the disempowerment of these state-structures was advocated by various agencies. The FAO, for instance, in collaboration with MARL, conducts workshops labeled "Support to the Reform of the Law Governing the Agricultural Cooperatives in Egypt." The FAO adamantly argues that market-driven agriculture benefits farmers. The openly stated goals are to "assist farmers in consolidating fragmented agricultural holdings, providing them with technical advice, educating them on best agricultural practices, helping them stockpile produce, and connecting them with markets."²⁵⁶

²⁵¹ Bush, "Uprisings without Agrarian Questions."

²⁵² Ministry of Agriculture and Land Reclamation, *Sustainable Agricultural Development Strategy Towards 2030*.

²⁵³ Food and Agricultural Organization, "Food Security in the near East and North Africa Region: Issues and Policy Options," (Cairo: FAO, 2013), 7.

²⁵⁴ Bush, "Uprisings without Agrarian Questions."

²⁵⁵ United States Agency for International Development, "Agriculture and Food Security," USAID, accessed May 3, 2018, <https://www.usaid.gov/egypt/agriculture-and-food-security>.

²⁵⁶ "FAO Egypt and Ministry of Agriculture, Launch the Project 'Support to Cooperatives Reforms in Egypt,'" Food and Agriculture Organisation, August 22, 2016, <http://www.fao.org/neareast/news/view/en/c/430231/>.

A core conflict of interests has arisen between agents involved in food production, struggling farmers on the one hand, and institutional agents adhering to a neoliberal agenda on the other, a conflict it must be said that even further exacerbates the standoff between national agrarian policies and the local food system. The politicization of land is further aggravated by the dismantling of protection laws and support structures like cooperatives. To this must be added the ever-increasing loss of agrarian land to urbanization processes. The ratification of Law 96/1992, rent increases, rising costs of inputs, debt, inefficient cooperatives, and lack of state support for rural food producers can all be attributed to the neoliberal shift advocated by international agencies and liberal regimes alike, who, in creating tense physical conditions that mirror the prevalent forces acting upon space, aim to engender a situation where capitalist urbanization can thrive above all else.

3) *Agents of Urbanization*

At the other end of the spectrum, the main agents directly involved in urbanization are landowners, prospective customers, real estate and land brokers, and small- and medium size developers. Haj Gad Marwan is one such small developer.²⁵⁷ As a young construction worker, he relocated from Upper Egypt to the Gulf in the wake of Sadat's *Al-Infitah*. He began sending home remittances after having secured a plot of agrarian land in Ard-el-Lewa at the edge of the newly constructed upscale district of Mohandesseen in Cairo. Considering that the plot was not being farmed and was thus considered barren (*Bour*), he bought the land via a *gamaya* that had acquired farmland with a legal subdivision license for EGP 2 per square meter (USD 5).^{258 259} At the time, it was possible to secure some sort of permit for land subdivision, an authorization nearly impossible to obtain today. Marwan acquired 196 square meters on the main street for EGP 7 per square meter.

The *gamaya* hired planning engineers to draw a street grid in compliance with official urban rules that specified a street width of ten meters for main roads and eight for secondary roads. Insofar as he was employed in the Gulf, Marwan hired a local contractor to erect a five-story building on his plot, keeping in mind that as a concrete-form worker, the local contractor had gathered sufficient construction experience in the Gulf region and thus opted to hire

²⁵⁷ Parts of this interview were published in Marc Angéilil and Charlotte Malterre-Barthes, *Housing Cairo: The Informal Response* (Berlin: Ruby Press, 2016).

²⁵⁸ A *gamaya* is a rotating savings-and-credit association (ROSCA) based on balanced reciprocity, a popular form of informal finance in which all members are both savers and borrowers.

²⁵⁹ At the time, the pound was pegged to the US dollar; it floated from 1989 to 2015.

unskilled day laborers (*farwa'lia*) and keep costs to a minimum. The client transferred monthly funds to a cousin, who paid the contractor in cash—EGP 16,000 per floor. Prior to building, they had agreed on the number of units: three 60-square-meter apartments per floor, each with two bedrooms and a living room, over five stores, the construction of which was executed without drawings of any kind and took only eight months to complete. When completed, the fifteen apartments were rented for EGP 10 per month. The building was only later connected to the public sewage system after Haj Gad Marwan decided to live there in 1991, when nearly half of the area had already been developed.

In the same year, he decided to construct a new, larger building in the same area to accommodate his family who had moved to Cairo from Upper Egypt. Still active, the *gamaya* had reduced the originally specified width of streets from ten to eight meters. Taking advantage of this loosened building code and using the revenue generated by rents, Haj Gad Marwan built a more substantial nine-story structure with two flats per floor, which he later handed over to his brother, who now occupies it with his family.²⁶⁰ Continuing his activity as developer with three other business partners and with the help of a local broker, Marwan purchased four adjacent plots, two overlooking the main street that sit back-to-back with two others facing a seven-meter-wide alley. The merging of the plots allowed for the construction of a 500-square-meter volume with three facades, roughly equivalent to 4 *qirats*. Noteworthy in this case is the fact that he bought the agricultural land for about EGP 1400 (USD 200) per square meter from one owner, land that at the time of the purchase was still being cultivated. Before the transaction, the landowner offered compensation to the farmers to vacate the land and then proceeded to subdivide it, with a local lawyer drafting the contract. The land cost EGP 713000 (USD 100,000), an amount that was equally divided among the four business partners who made their payments via lump-sum bank transfers. Each partner also contributed EGP 445,000 toward construction, which totaled some EGP 1 million (USD 250,000). After deducting setbacks of 3.5 meters from each side of the street, the constructed area of the plot covered 400 square meters. Marwan commissioned an engineer to assess the structure, while he supervised the construction site. Since he employed no permanent staff, workers were hired without fixed contracts for specific tasks, while the raw construction materials were purchased locally. The building was 'completed' in the relatively short span of a year and is now a ten-story building with an elevator shaft. The first five stores are reserved for commercial use and the remaining five are made up of residential units, with four apartments per floor, of which two overlook a street. Each partner

²⁶⁰ Malterre-Barthes, "A Story of Construction."

owns a quarter share of the commercial floors, one residential floor, and a flat, with each share in total worth roughly EGP1 million. Meant as a sign of good faith that some local developers are also ‘owner-builders’, one of the partners will duly move into a unit in the building to demonstrate its structural safety to potential clients before eventually moving to a newer building.

A buyer has already offered EGP 1 million (USD 150,000) for the commercial spaces. The value of the apartments varies from EGP 133,000 (USD 18,700) for a 90-square-meter flat with 3 bedrooms, a reception room, and a balcony to EGP 160,000 (USD 22,500) for the largest flats facing the main street. Marwan made payoffs to state agents to have the building connected to utility networks. Yet, at the time of the survey, water supply was still missing. In terms of tenure, the building is considered illegal because it has been constructed on agrarian land and, since only the change-of-ownership contract required a notary public certification, is not properly registered according to sanctioned procedures. Considering the sums that can be made, informal construction can be quite lucrative indeed. But in light of such cases, perhaps the moniker ‘informality’ itself must be called into question in that so-called ‘informal’ processes of spatial production do not differ substantially from those of the ‘formal’ market, especially given the increasingly strong ties between informal housing production and the formal construction industry.

4) Construction Input Agents

To procure construction materials, informal contractors like Marwan rely on local wholesalers (often owner-builders acting as distributors to complement their income). These suppliers acquire materials from a variety of sources, either directly from factories, resellers, or existing construction and demolition sites. In informal areas, construction supply stores are modest, open-air walled yards, where bricks, sand, cement, reinforcing bars, and other like materials are stockpiled under constant surveillance.²⁶¹ The prices are negotiated at the store.

Since ongoing urban production on agrarian land drives has led to a steady demand for cement, steel, and bricks, local contractors rely on industries that at times are linked to the global financial market. Concrete (i.e., cement and ready-mix concrete) is the material of choice for ceilings, stairs, and pillars and is procured from local producers, with the cement industry as a whole generally turning a blind eye to the illegal status of informal urbanization.

Reinforced concrete was introduced as a construction method to Egypt in the 1890s. From the 1930s onward, the material became prevalent in public works (i.e., the Imbaba Bridge

²⁶¹ Fieldwork, 2015, Ard-el-Lewa, Cairo. See Appendix C.

by foreign engineering firm Baume & Merpent and the Museum of Egyptian Antiquities by the office of François Hennebique).²⁶² International companies, however, were involved from the outset in developing and operating cement plants in Egypt.^{263 264 265} Even if most foreign firms did lose assets during the Nasser era, private international companies nevertheless now control 90 percent of the cement industry in Egypt,²⁶⁶ among them key players in the construction sector. Dominating the national market, the Egyptian Cement Company (LafargeHolcim, France/Switzerland), followed by Suez Cement (Italcementi/HeidelbergCement, Germany), Assuit Cement (Cemex, Mexico), and the Amreyah Cement Company (Cimpor, Portugal) entered the Egyptian market through state sell-offs between the mid-1990s and 2000s in the wake of the Toshka Project, which drastically increased the nation's demand for cement.^{267 268} For instance, Suez Cement—formerly a public asset with plants at Suez and Kattameya—was privatized in 2001, now controlling Torah Portland Cement and Helwan Cement (Helwan plant) and owned by HeidelbergCement (via its subsidiary Italcementi). Other players include Alexandria Portland Cement (Titan Group, Greece), Misr Beni-Suef Company, Misr Cement-Qena, Sinai White Cement (Aalborg Portland Group), the South Valley Cement Company (Orascom), and the Arabian Cement Company. A series of grand projects initiated by the government (i.e. Suez Canal Free Zone extension, Golden Triangle, and New Capital) increased production capacity from 50 million tons in 2010 to 70 million tons as of 2014, although demand and consumption are expected to increase even more in the coming years, taking into consideration that the consumption of cement per capita is 780 kilograms a year.²⁶⁹ No data is

²⁶² Mercedes Volait, "Egypt (1914-1954): Global Architecture before Globalization," in *Architecture from the Arab World (1914-2014): A Selection*, ed. George Arbid (Beirut: The Ministry of Culture in collaboration with the Arab Center for Architecture, 2014).

²⁶³ See Claudine Piaton, Ezio Godoli, and David Peycerè, *Building Beyond the Mediterranean: Studying the Archives of European Business (1860-1970)* (Arles: Honoré Clair, 2012).

²⁶⁴ For instance, Ernst Schmidheiny, founder of the company Holderbank (later to become Holcim), bought a factory in 1926, founding "the Société Égyptienne de Ciment Portland Tourah-le Caire."

²⁶⁵ Holcim, "100 Years of Holcim: Decade 1 (1912 to 1921)," in *Annual Report 2011 Holcim Ltd*, accessed May 7, 2017, https://www.lafargeholcim.com/sites/lafargeholcim.com/files/atoms/files/holcim_annual_report_2011-en.pdf

²⁶⁶ Timothy Mitchell, "No Factories, No Problems: The Logic of Neo-Liberalism in Egypt," *Review of African Political Economy* 26, no. 82 (1999).

²⁶⁷ Nasser Mohamed Darwish, "Concrete Construction Industry." Paper presented at the Cement Based Materials and Civil Infrastructure International Workshop, NED University of Engineering & Tech. Karachi, Karachi, 2007.

²⁶⁸ Lafarge, "Cement," LafargeHolcim, accessed May 7, 2018, <http://www.lafarge.com.eg/wps/portal/eg/en/2-Cement>.

²⁶⁹ Zawya, "Egyptian Cement Sector Poised for Concrete Growth" *HSBC Global Connections* 2016, June 16, 2016, <https://globalconnections.hsbc.com/uae/en/articles/egyptian-cement-sector-poised-concrete-growth>.

currently available to assess the informal demand for cement or the amount of cement sold to agents on the informal building market.²⁷⁰

An average informally-constructed, five-story building with a gross floor area of 400 square meters requires 230 cubic square meters of concrete—corresponding to circa 2.8 tons of cement per square meter—and 20,000 kilograms of steel reinforcing bars.^{271 272} It has been estimated that 180,000 units are produced every year, in both formal and informal sectors.²⁷³ According to CAPMAS, approximately 50 percent of construction takes place within the informal sector. This would amount to 86,400 units produced informally every year requiring a total of 19 million tons of cement.²⁷⁴ In 2010, Walid Gamaleldin, then-president of the Chamber of Building Materials Industries, acknowledged that “informal housing drives demand.”^{275 276} According to a 2015 business report, the post-2011 resilience of an industry faced with factory strikes, hikes in gas prices (cement companies rely on natural gas and coal to produce clinker), fuel shortages, power cuts, and currency devaluation was attributed to the high prices of cement as well as a marked increase in construction activity in the informal sector.²⁷⁷ Although such figures often prove unreliable, there is little doubt that informal construction is an important driving force of the cement industry in particular and the formal construction sector in general.

Because steel is used as reinforcement in construction, domestic producers may also be counted as relevant actors of urbanization. Rebar for construction accounts for 80 percent of the industry demand in Egypt.²⁷⁸ Blast furnaces powered with coke, natural gas, and electricity were constructed under Nasser using foreign technology (the Steel Mill at Helwan, 1958).²⁷⁹ Today

²⁷⁰ Khaled Hamza and Khaled Bolbol, "Egypt's Cement Sector," (Cairo: Sigma Capital, 2015).

²⁷¹ See Appendix C.

²⁷² On average and considering the varying proportions and materials with different physical properties in concrete mixtures, the production of a cubic meter of concrete requires circa 400 kilograms of ingredients (e.g. 50 kilograms of cement, 115 kg of sand, 209 kg of aggregate, and 30 liters of water).

²⁷³ Soliman and de Soto, *A Possible Way Out: Formalizing Housing Informality in Egyptian Cities*, 81.

²⁷⁴ Ahmed Fathy Abdelhamid, "Informal Sector Measurement in Egyptian Economy," ed. United Nations Economic Commission for Africa (Cairo: CAPMAS, 2014).

²⁷⁵ Reuters Staff, "Egypt Cement Demand up on Cash Economy, Housing," *Reuters*, February 18, 2010, <https://www.reuters.com/article/egypt-cement-idAFLDE61F1HT20100218>.

²⁷⁶ See Jeannie Lynn Sowers, *Environmental Politics in Egypt: Activists, Experts and the State* (London: Routledge, 2014).

²⁷⁷ Hamza and Bolbol, "Egypt's Cement Sector."

²⁷⁸ Tarek H. Selim, "Monopoly: The Case of Egyptian Steel," *Journal of Business Case Studies* 2, no. 3 (2006).

²⁷⁹ See Ibrahim and Ibrahim, *Egypt. An Economic Geography*.

the steel sector is dominated by private local businesses.²⁸⁰ The two key players are El Ezz Steel Rebars and Beshay Steel and Solb Misr, alongside smaller companies like Alexandria National Iron and Steel.²⁸¹ Imported steel is generally cheaper than locally produced steel, which in any case cannot satisfy demand. Again, few studies have been carried out on the impact of informal urban growth on the steel industry. It is perhaps less directly relevant because the majority of the steel reinforcing bars used in informal constructions is recycled from demolished buildings.²⁸²

Brick is omnipresent as a construction material, both for formal and informal housing, being used for exterior walls, facades, and interior partitions as well. Red clay brick—sometimes recycled—is preferred in informal areas, but when necessary, sandstone brick and cement brick are also used.²⁸³ After the Aswan Dam prevented floods and stopped Nile silt from covering the Delta, the Egyptian brick industry lost its traditional basic raw material. To replace the conventional red bricks made of Nile mud, small factories resorted to buying existing agrarian land, and excavated until groundwater was reached, eliminating in the process all of the primary layers of fertile earth. Galila el-Kadi in *L'Urbanisation Spontanée au Caire* explains how this very practice constituted the first phase of the urbanization process, precipitating the general unproductiveness of the land over time.²⁸⁴ Fired mud bricks (red in color) made from Nile silt and produced in small illegal kilns were used in informal construction until the mid-1990s. In 1982, the government banned the method, as well as any further excavation (Law 48/1982).²⁸⁵

Still, in its reliance on combustion for production (i.e., diesel and natural gas), the brick sector is considered to be a small-scale, hazardous, and unregulated industry with a highly negative impact on health and the environment.²⁸⁶ The lack of studies and business assessments is perhaps indicative of the sector's general lack of profitability. Instead, numerous NGO reports

²⁸⁰ See Gouda Abdel-Khalek, *Stabilization and Adjustment in Egypt: Reform or De-Industrialization?* (Cheltenham; Northampton, MA: Edward Elgar, 2001).

²⁸¹ Selim, "Monopoly: The Case of Egyptian Steel."

²⁸² Moustafa Abdel Khalek Mourad, "The Need for a New Approach: Analysis of the Built Environment of Informal Settlements and Public Housing Policy in Egypt," Master diss. (Massachusetts Institute of Technology, 1983).

²⁸³ Hisham Amr Bahgat, "Housing Generation in the Informal Sector in Egypt," PhD diss. (University of California, 1984), 181.

²⁸⁴ El Kadi, *L'urbanisation Spontanée au Caire*, 18, 207.

²⁸⁵ Manal Rashad and M. A. Ismail, "Environmental-Impact Assessment of Hydro-Power in Egypt," *Applied Energy* 65, no. 1 (2000).

²⁸⁶ Mourad, "The Need for a New Approach : Analysis of the Built Environment of Informal Settlements and Public Housing Policy in Egypt."

have addressed the appalling working conditions at the 10,000 factories located south of Cairo.²⁸⁷ With a million workers, many of which are temporarily employed, unregistered, and underage, brick making appears to be a locally rooted, informal-sector industry.^{288 289}

Landowners, farmers, developers, engineers, community associations, contractors, workers, brokers, private financial institutions, construction material agents, resellers, public regulators, buyers, and tenants, all have played and still play their respective part in the subdivision of land and development of agrarian plots for building. Those actors who allow, facilitate, and drive urban encroachment on agrarian land are usually either individuals, owners of small informal 'firms', local authorities, or players from global industries.

Scholarly work on the transformation of the productive landscape and the actors enabling such forms of urbanization has generally foregrounded particular themes. Preoccupied by urban conditions, few of the most relevant works on informal growth (i.e., David Sims's *Understanding Cairo*, Reinhard Goethert's *Kairo: Zur Leistungsfähigkeit Inoffizieller Stadtrandentwicklung*, or Ahmed Soliman's "Tilting at Sphinxes: Locating Urban Informality in Egyptian Cities") address the disappearance of agrarian land as a relevant and worrisome matter (i.e., Galila el-Kadi in *L'Urbanisation Spontanée au Caire*) and most often as but a side-effect or consequence of urbanization.²⁹⁰ David Sims is even ironic about people deploring "the unacceptable loss of Egypt's precious agricultural land" and argues that the destruction of agrarian land is offset by land reclamation.²⁹¹ While perhaps understandable due to the urban bias of the aforementioned studies, what the omission of rural actors reveals is an underestimation of the loss of agrarian land. Such a mindset also sustains prevailing liberal strategies of rural development. Against the backdrop of increasing urbanization of the hinterland, the destruction of the domestic food production system, the gradual disappearance of the peasantry, and the increased reliance on global food markets remain generally unquestioned.

²⁸⁷ Arab Trade Union Confederation, "Egypt: Ten Thousand Children Bury Their Dreams in Brick Factories," August 7, 2016, <http://www.arabtradeunion.org/en/content/egypt-ten-thousand-children-bury-their-dreams-brick-factories>.

²⁸⁸ Mageb Abouel Dahab, "Child Labour: A Fact of Life in Egypt's Brick Factories," *Middle East Eye*, March 6, 2015, <http://www.middleeasteye.net/in-depth/features/child-labour-fact-life-egypts-brick-factories-1079867304>.

²⁸⁹ Jano Charbel, "In the Dangerous Profession of Brick-Making, Talk of Organizing," *Egypt Independent*, February 13, 2012, <http://www.egyptindependent.com/dangerous-profession-brick-making-talk-organizing/>.

²⁹⁰ Sims, *Understanding Cairo: The Logic of a City Out of Control*, 126; Goethert, *Kairo: Zur Leistungsfähigkeit Inoffizieller Stadtrandentwicklung*, 17, 85; Ahmed Soliman, "Tilting at Sphinxes: Locating Urban Informality in Egyptian Cities," in *Urban Informality: Transnational Perspectives from the Middle East, Latin America, and South Asia*, eds. Ananya Roy and Nezar AlSayyad (Lanham, Md.: Lexington Books, 2004), 184; El Kadi, *L'urbanisation Spontanée au Caire*, 18.

²⁹¹ Sims, *Understanding Cairo: The Logic of a City Out of Control*, 135.

Conclusion III

What the portraits of “three farmers, a developer and all the other agents” underscore is the vicious yet ambiguous character of informal urbanization. For instance, some of the respective agents are simultaneously victims of and directly accountable for the destruction of agrarian land and the construction of affordable housing. On the one hand, a majority of small farmers have been subjected to the inherent violence of economic liberalization, having lost their land and source of livelihood to market logics as casualties of a deteriorating local food system. On the other hand, small developers responsible for urban production have only responded to the needs of those poor populations abandoned by the state. Both groups have suffered from the state’s failures in accommodating the most basic needs of its people. And the strains inherent to the government-people interplay become spatially apparent as well. Between those agrarian land users engaged in commodity production vital for national food security and those urban dwellers involved in “post-planning” production of the built environment, a “silent violence of accumulation” has taken place, which has significantly transformed the production of space at architectural and territorial scales.²⁹²

Impacts on Space and their Consequences.

“Do not sell your land.” What might sound like a distressed call to preserve a vital resource is in fact the slogan of a recent initiative devised to persuade farmers to retain landownership and cultivate their fields.²⁹³ For them to achieve this goal, cultivators receive financial and technical backing. Taking into account the hardships facing the Egyptian agricultural sector and the urgent need to support farmers and their spatial assets, the initiative would seem to have come at an opportune time. Still, the fact that the project has been launched by the Union of Producers and Exporters of Horticultural Crops in conjunction with the Ministry of Agriculture and Land Reclamation (MALR) means that whatever aid is promised has already been inscribed in the 2009 *Sustainable Agricultural Development Strategy Towards 2030*.²⁹⁴ Financed by the European Union, the program favors cash crops over sustenance crops, in line with international donor policies on agriculture. This cast strongly advocates Egypt’s reliance on global food trade to compensate for the ongoing destruction of fertile land. According

²⁹² Brenner, *Critique of Urbanization: Selected Essays*, 220.

²⁹³ Menna Farouk, "Egypt Launches Initiative to Keep Farmers from Bailing on Their Land," *Al Monitor*, June 6, 2017, <https://www.al-monitor.com/pulse/originals/2017/06/egypt-farmers-government-prevent-abandoning-agriculture.html>.

²⁹⁴ Ministry of Agriculture and Land Reclamation, *Sustainable Agricultural Development Strategy Towards 2030*.

to a 2015 report by MALR, 25,000 hectares have been lost to informal urbanization since 2011.²⁹⁵ These facts are intertwined in a multi-scalar way. Initiatives like “Do not sell your land” are grounded in deceitful narratives about national agriculture and food policies that in turn are nested within globally circulated neoliberal doctrines. In effect, spaces of local food production are economically, ideologically, and physically under attack. Serving to demonstrate how the political economy of food systems and the organization of space reciprocally affect each other at various levels, the destruction of the Egyptian food production landscape has taken a palpably transformative turn for the worst. The spatial outcomes of informal growth on agrarian land must accordingly be addressed from several perspectives, including architectural typologies (*Architectural Scale*), settlement forms (*Urban Scale*), their impact on territorial organization (*Territorial Scale*)—all to varying degrees connected to national and global frames of reference (*Transnational Scale*).²⁹⁶

1) *Architectural Scale*

Agrarian land is subdivided, sold, and built upon. The distinctive architectural typologies that emerge follow property lines and financial logic. The often-untidy array of actors, protocols, and related variables produces physical structures with homogenous standards and uniform aesthetics. Specific subdivisions and plot sizes, identical building structures, similar interior layout and circulation, comparable volumes and an unvarying materiality define the architecture of informality in Egypt.

Subdivisions of the Agriculture Land

Egypt’s renowned irrigation system establishes the morphological configuration of the terrain. A continuous hierarchized grid of water channels stretches throughout the fertile Nile Valley and Nile Delta. Although the flooding irrigation method that dictated the construction of these canals is ancient and was rendered obsolete by the Aswan Dam, the system is still largely in place. Built or upgraded at the end of the nineteenth century in accordance with national development policies and directives for economic growth, the sizeable feeder canals (*rayahs*) remain operative. Branching from the barrages on the Nile (e.g., New Kalabiya, Asfon, Nage Hammade, Ibrahimiah and its secondary canals, Bahr Yusuf and Giza), these canals in turn are

²⁹⁵ Al-Masry Al-Youm, “1.3 Million Encroachments on Agricultural Land,” *Egypt Independent*, June 28, 2015, <http://www.egyptindependent.com/13-million-encroachments-agricultural-land/>.

²⁹⁶ See Andrew Herod and Melissa W. Wright, *Geographies of Power: Placing Scale* (Malden: Blackwell Pub., 2002).

subdivided into thousands of smaller secondary waterways, totaling some 32,000 kilometers length.²⁹⁷ Each secondary canal (7 to 25 meters wide) enables the irrigation of 1,000 to 10,000 *feddans* (420 to 4200 hectares). The tertiary channels (*meskas*) are 3 to 5 meters wide, privately owned, and serve areas of 42 to 190 *feddans* (20 to 80 hectares), with smaller irrigation ditches as narrow as 60 centimeters in width irrigating individual fields.²⁹⁸ Paths follow canal banks and dikes, allowing access to the farmland. This is the common setting within which the property lines of the Egyptian agricultural unit, the *feddan* in the end determining urban expansion on agrarian land. The *feddan* is a narrow strip of farmland, 100–300 meters long and 6–17 meters wide. Its slim linear shape originated in the subdivision process (see the section on Agrarian Policies and Land Tenure) that required each field to be connected to a road and to a water channel for crop irrigation. Over centuries, (the *feddan* appeared in 700 A.C.) the strips slimmed to as small as 6 meters wide, even though 15 meters is still the average dimension. Their geometrical shape (rectangular mostly) makes land subdivision easy. Subdivisions units of the *feddan* include the *qirat* (one twenty-fourth of a *feddan*), the *sabm* (one twenty-fourth of the *qirat*), the *habba* (one-third of a *qirat*), and the *daniq* (one-sixth of a *qirat*). A *feddan* is divisible in 18, 20, 22, 24, or 30 *qirats*, which comprise the rectangular delimitations for cultivation purposes—to plant different crops, for instance—or to sublet parts of the field to other farmers. The common subdivision process is thus embedded in traditional agricultural practice. The typical size of a plot is 10-12 by 12-14 meters, that is, an average of 120-140 square meters, and rarely reaches 180 square meters. A consensual agreement between buyers is made regarding a setback of 1.5 to 2.5 meters that is left to create an access road. A circulation strip of 4 to 6 meters runs all along the *feddan* from one end to the other, creating what will later be the only public space in the unlikely form of an ‘urban canyon’, so to speak. In this regard, agricultural space can be said to prefigure its own forms of urbanization, for this subdivided rural layout gives rise to the telltale architecture of informality in this context, determining its orientation, proportions, and circulation patterns as well.

Building Typologies and Aesthetics

The construction system of most buildings is based on a skeleton frame (columns, beam, and slabs) made from reinforced concrete that is poured on site (often using ready-mix concrete) and filled in with unplastered red brick. Foundations measure a maximum of 2 meters deep.

²⁹⁷ Godfrey Sykes, "Agriculture in the Nile Valley," *The Plant World* 17, no. 3 (1914).

²⁹⁸ al-Misahah and Lyons, *The Cadastral Survey of Egypt 1892-1907*, 41.

Columns (25 by 25 centimeters on average, with the exception of piers of up to 1 meter in length on the ground floor) are arranged in a regular pattern on all floors, with columns thinning according to building height. Roofs are flat, with exposed reinforcement bars, and at times crowned with a light, wooden pigeon tower. The simple grid structure allows for great technical freedom in the organization of interior spaces. Depending on the solvency of the owner-builder or client, diverse qualities and types of materials are used. Material choices can also change throughout the construction process, particularly in view of a building's incremental growth.

At first, on a *qirat* (10-17 meters by 10-17 meters), the construction single-story houses and low multi-story units were the norm. The respective building footprints varied from 75 to 125 square meters, with one or two small apartments per floor in average 6-floor structures. Today, buildings occupy the entire plot, save for the requisite 1.5 to 2.5 meters left for the streets, with the typical one-street-façade and three-blind-party-wall scheme a sure sign that more neighboring buildings will soon follow. Interior shafts (1,5 meter by 60 centimeters) along the blind façades and in the interiors of the buildings provide natural ventilation and light. Entrances are provided by narrow openings on the front façade that lead to the stairs. The staircase is either centrally located or along one sidewall. Davis Sims identified this typology as the “classical informal,” characterized by simple brick-and-concrete buildings of one to 7 floors—the maximum acceptable height that can be accessed without an elevator.²⁹⁹ Also recognized by Hisham Bahgat in “Housing Generation in the Informal Sector in Egypt” as a standard (*bayt*), this typology is still prevalent in most areas.³⁰⁰ Buildings, comprising units of 60-75 square meters each, are often commissioned for an extended family—for example, an elderly couple and their son's family living in two apartments on one floor. The structure is left open on the roof for future expansion. There are countless variations of this type (i.e., *aimara*, a multi-family residential type of 3 to 6 stories and *rab'a*, a collective form of housing units for low-income families built around a common passageway).³⁰¹

Housing in Egypt is officially classified according to 5 categories with regard to unit size: low-cost (*munkhafid al-taklifa*, 45 square meter units, 1-2 rooms), economic (*iktisadi*, 60 square meters, 2-3 rooms), average (*mutawassit*, 90 square meters, 3-4 rooms), above average (*foq al-mutawassit*, 100 square meters, 4 rooms and more), and luxury (*fakher*, units over 125-140 square

²⁹⁹ Sims, *Understanding Cairo: The Logic of a City Out of Control*, 105.

³⁰⁰ Bahgat, "Housing Generation in the Informal Sector in Egypt."

³⁰¹ *Ibid.*, 214.

meters). All such categories can be found in informal areas, albeit 55 percent of households live in the 'economic' unit type.³⁰²

This said, the 'traditional' typology has evolved into speculative one-off towers constructed by developers or groups of small investors. The tower typology appeared in the mid-1990s, mainly on the fringes of Cairo. The building has a much larger footprint, averaging from 250 up to 1,500 square meters (six *qirats*), with larger apartments and several units per floor. Unlike the plain appearance of the brick and concrete construction of the simple types, towers are plastered and painted in bright colors to facilitate the sale and rental of units.³⁰³ Buildings have up to 15 floors, and when inhabited, are equipped with elevators. After the January 2011 events and the collapse of the then-ruling government, contractors became more emboldened to pursue speculative illegal construction. High towers with balconies and ornamental facades appeared along Cairo's Ring Road.³⁰⁴ This new typology exemplifies the how techniques of the formal sector market have been appropriated locally, with contractors and investors increasingly engaging in the production of a real estate stock to be sold 'informally' and in plain sight, thereby manifesting an advanced form of speculative informality, if there ever was one.

Avoiding the term *vernacular*, Galila el-Kadi claims that the architecture of informality constitutes a "hybrid" culturally situated between rural and modern architecture. Early informal construction borrowed from the single, low brick constructions characteristic of rural buildings. Interior room distribution, wooden windows, loggias, recesses and balconies, as well as vertical extensions, however, are determined by more modern construction techniques. For privacy reasons, openings are fitted with lattices, wooden shutters, louvers, and the like. At times, brick facades are decorated with ornamental elements: cornices, railings, arched windows, religious symbols, round balconies, and balustrades. Walls are rarely plastered, but can be vividly colored (occasionally only around one window or story). In entrances and on verandas, the floors have concrete or stone surfaces. Ornamentation represents either a form of personal appropriation or a form of added value—the latter especially used for speculative buildings.

In sum, it becomes clear that the architecture of informality is anything but chaotic (*ashwa'iyyat* in Arabic). Following agricultural subdivision and irrigation patterns, buildings are standardized in terms of their dimensions, materiality, structure, internal organization, and

³⁰² Sameh Wahba, "Analysis of Housing Supply Mechanisms - Arab Republic of Egypt," in *Sustainable Development Department, Middle East and North Africa* (Washington: The World Bank, 2007).

³⁰³ Maria Kouvari and Heechul Jung, "A New Vernacular. Typology, Construction, and Aesthetics" in *Housing Cairo: The Informal Response*, eds. Marc Angéilil and Charlotte Malterre-Barthes (Berlin: Ruby Press, 2016).

³⁰⁴ Fieldwork, 2014, Ard-el-Lewa, Greater Cairo. See Appendix C.

alignment. Yet the flexible and adaptive mode of construction allows for a large range of different housing layouts. The noticeable variations (e.g., in height, corner arrangements, and the surfaces of facades) appear to be a response to an increasingly formalized market demand. Insofar as middle-class populations turn to informal housing and ever more capital is being invested in construction one can only assume that informal urbanization will undoubtedly persist.

2) *Urban Scale*

Facilitated by the ongoing transformation of agricultural into urban land, the proliferation of the qirat typology has produced a new form of built environment around Cairo. Following the given grid of *feddans*, this regular and efficient form of incremental urban growth adheres to the logic of a time-honored water distribution infrastructure that had its origins in cultivating the land. Urban form, in other words, follows irrigation infrastructure—as default grid, structure, or system—upon which other networks are superimposed (i.e. streets, water utilities, and sewer lines). Within such a framework, building after building continue to be constructed, incrementally and according to a set of precisely defined rules, while forming, overall, a kind of machine for urbanization that operates at an unprecedented scale. Today, informal Cairo represents 40 to 60 percent of the total surface of the metropolitan area.³⁰⁵

Urban Forms

Water canals are transformed into streets—a relatively straightforward operation leading to a specific urban structure for settlements on former fertile land. Guided by different factors (i.e., proximity to a formal neighborhood, availability of land, remoteness from authorities—see the section *Informal Growth on Agrarian Land: History, Factors, and Governmental Responses*), horizontal expansion occurs first by way of a few constructed *qirats* here and there, followed by clusters of houses, from which ultimately a settlement emerges. As more plots are sold by the *feddan* and buildings constructed, the balance between farmland and urbanized areas is destabilized in favor of more and more urbanization, with the proportion of vacant *qirats* decreases. For tenants or farmer-owners, this imbalance results in a predictable decrease in productivity for cultivated fields accompanied by the mounting pressure to sell. Still, a few pockets of agrarian practices (e.g. 3 *qirats* minimum) can endure for years among clusters of buildings. Eventually, unconstructed plots surrounded by construction become a veritable *terrain vague* of trash piles, parking lots, or sports fields that are rented by the hour—that is, until these pockets too are built upon.

³⁰⁵ Shaimaa Al-Aee, "40% of Egypt's Housing Is Informal: Deputy Housing Minister," *Daily News Egypt*, April 10, 2017, <https://dailynewsegypt.com/2017/04/10/621607/>.

While an area is undergoing sporadic horizontal expansion, vertical growth also occurs. New stores are continuously added to existing low buildings, increasing the density of the area. As entire *feddans* are given over to new construction that, following the linear plot dimensions, can rise to 6 stores and more, so-called 'urban canyons' are formed by the resulting 5-meter wide alleys that are as long as 200 meters. These 'canyons' constitute the urban counterpart and physical materialization of the *feddan*, connecting to two roads at either end that were previously water canals as well. This transmutation of a former (formal) irrigation system into a new (informal) circulation system is by now a manifest reality. According to researcher Dina Shehayeb, this particular arrangement functions as a security and safety measure.³⁰⁶ Being only accessible through their ends, locals can easily monitor most streets and thus immediately detect any strangers in the neighborhoods. While these narrow alleys have been condemned as dangerously impractical for traffic (i.e., ambulances and fire engines) and adverse to civil 'security' (i.e., police and military vehicles), the fact that motorized transport cannot enter many settlements means less pollution, noise, and threat to pedestrians. Car traffic is thus minimal, as most transport modes are limited to the main axes that were formerly the larger irrigation channels.

One of the most problematic consequences of these hyper-optimized urbanizing processes is the full occupancy of plots. Because investors and clients have limited investment capital, and because planning rules are not respected, plots are fully built upon their availability. Public space tends to be reduced to a minimum in order to maximize inhabitable and saleable floor area. In the absence of planning oversight, public or green spaces are surrendered to rather unforgiving building practices, where every vacant plot is slated to be sold and opened up to more building. Furthermore, this entrepreneurial type of development has begun to supplant what was once an incremental development process aimed strictly at the production of affordable housing. This growing tendency to optimize available agrarian land for the maximum volume of construction is quite visible in the urban form: subdivisions of up to four *qirats* for one building have appeared more frequently, especially along the main roads. Even if non-residential use has increased, the dearth of available land also limits the provision of much-needed amenities such as public schools and other like facilities. Such are the limits of an urban environment produced without state control and with limited private capital.

³⁰⁶ Dina Shehayeb, "Advantages of Living in Informal Settlements," in *Cairo's Informal Areas between Urban Challenges and Hidden Potentials* (Cairo: GTZ 2009).

Public Infrastructure

Although usually taken for granted as given services, access to potable water, sewage, energy, and street networks is still a privilege of those citizens who inhabit the city proper.³⁰⁷ Dwellers of the so-called *ashwa'iyyat*, however, are neither acknowledged as citizens, nor are their districts considered to be part of the 'traditional' city. Law 119/2008 actually forbids the connection of illegal buildings to public water and electricity networks.³⁰⁸ These isolated areas are thus simply ignored and remain beyond the reach of official infrastructure grids.

Yet, public infrastructure systems are key to the process of urbanization, defining among other things the degree of modernization, property rights, and legitimacy of people's status. Highly political, the long-term, large-scale material investments made to construct public service networks are central to shaping territorial organization, insofar as such networks comprise "a combination of economic, infrastructural and institutional-regulatory practices."³⁰⁹ Despite having an efficiently produced and affordable housing stock, these districts still suffer from having little or no access to municipal infrastructure. Residents are thus forced to rely on community-organized, self-built structures, all of which are improvised, expensive, and at times dangerous. When public infrastructure systems that are routinely installed—using state funds—in new formal desert districts are finally brought to these informal areas, inhabitants must pay for them, revealing the profound inequality of treatment among different localities. A "negative redistribution" of sorts is at work, as poorer populations are routinely overcharged for services they do not even receive.³¹⁰ Considering that only an insignificant fraction of public spending is dedicated to servicing informal neighborhoods, which incidentally are home to the majority, it can be argued that the state has essentially abandoned its obligation to govern and relies instead on private capital and the growing informal economy to sustain services in those areas it does not legally recognize.

As it happens, the lack of public infrastructure is one of the most contentious issues concerning informal neighborhoods. The ordinary but efficient production of affordable housing units undertaken by local communities, with their own practice-based and negotiated rules

³⁰⁷ See Stephen Graham and Simon Marvin, *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition* (London: Routledge, 2009).

³⁰⁸ "Unified Building Law No. 119/2008 and Its Executive Regulations," eds. Ministry of Trade and Industry (MTI) & General Organization for Government Printing Offices (GOGPO) (Cairo: Amiria Press, 2009).

³⁰⁹ E. Swyngedouw, "Communication, Mobility and the Struggle for Power over Space," in *Transport and Communications Innovation in Europe*, eds. George Giannopoulos and Andrew Gillespie (London: Belhaven Press, 1993), 310.

³¹⁰ Graham and Marvin, *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, 132.

enforced, cannot fully compensate for the absence of public services. Infrastructure networks, including public services such as hospitals and schools, are deficient in areas that have little or no political influence. Eventually, a modicum of service provisions does reach informal areas, but often with much delay. Such shortcomings, along with the blatant discrimination confronted on a daily basis, were certainly at the root of the political unrest in 2011 that, not surprisingly, found much resonance in informal parts of the city. Sparked by high food prices that burdened familial budgets already strained by high living costs, the outspoken protests from these neighborhoods in particular suggested that there was a limit to what could be tolerated in terms of state disengagement and that enough was indeed enough.

3) Territorial Scale

A dual mechanism is at work in the transformation of local land use, with major implications at the larger, territorial level. The effects of the annihilation of agrarian land by informal urbanization go beyond the situated spatial realm where it occurs. For instance, environmental degradation is a far-reaching consequence of urbanization. Although the general public and authorities alike disapprove of the spaces of informality, and keeping it mind that those spaces are designated as illegal, the *ashwa'iyyat* manifest an enigmatic condition, to say the least. Occurring within a national state, yet taking place beyond any legal jurisdiction, informal urbanization remodels the space it occupies beyond governmental reach. But when these spaces are assimilated into larger national and global dynamics, however, the architecture and urban forms produced and inhabited by ostracized populations becomes instrumental in shaping territorial organization and swaying political agency for better or worse.

Environment

The gradual loss of the several-meter-deep Nile sediment layer began in the 1970s with the cumulative damages caused by chemical fertilizers, salination, and the operations of the brick industry. Today, peri-urban agrarian land is mainly lost due to the illegally built settlements. The media repeatedly cites the destruction of “valuable agrarian land” in its routine condemnation of informal neighborhoods. This disapproving narrative is so ingrained and so pervasive as to naturalize the enduring social and spatial injustices suffered by informal areas.³¹¹ In reality, there is no public sympathy for the fate of the rural population or for that of the local food system. In fact,

³¹¹ Steven Viney, "The State of Urban Planning and Informal Areas after the Egyptian Revolution," *Egypt Independent*, March 17, 2013, <http://www.egyptindependent.com/news/state-urban-planning-and-informal-areas-after-egyptian-revolution>.

the peasantry in general figures as the primary culprit of social and spatial decline and is accordingly blamed for agro-ecological destruction. Such representations are deeply embedded in a dismissive national imaginary that bears negatively on the lower classes, regardless of whether they have roots in rural regions or come from the *ashwa'iyyat*. The obvious must be admitted, however, that both formal and informal processes of urbanization degrade the environment at a territorial scale: precious fertile soil is turned into bricks and lost; subterranean drinking water is polluted by seepage from sewage tanks, which also affects the surrounding soil; and, air pollution and harmful fumes emanate from burning garbage, to name but a few of the main ills of rampant urban growth. Regardless of the fact that such problems are endemic to all forms of urbanization, it is inevitably the informal dwellers that are the first and most severely affected by environmental hazards.

There are other indirect impacts linked to the construction industry and processes of urbanization. For instance, the brick industry that supplies informal construction sites is habitually blamed primarily for the smog in Cairo. It is important to note, however, that brick kilns generate 10 times fewer emissions than cement plants.³¹² As with power plants, cement plants are powered by extensive amounts of fossil fuels, and their combined emissions (i.e., CO₂, lead, and nitrogen) actually contribute to a greater amount of air pollution in the Greater Cairo Area. So, informal construction cannot be held solely responsible for the sum of negative environmental impacts. The co-contributors must be sought elsewhere, namely, in those high-profile public infrastructure and private projects in desert cities as well tourist resorts, which, in truth, are likewise principal drivers of the construction material industry.³¹³

Organization of Territory

Over time, soil is converted into bricks, fields into settlements, water channels into streets, and consequently, the greenery disappears, along with the means of sustenance, opportunities for employment, and the practices associated with rural lifestyles. Without state protection, farmer-tenants of peri-urban areas are chased away, as urban landowners move to sell their rural assets. Agrarian land is replaced by illegally built homes and a prevalent logic of accumulation. From farming units and plots to the overall morphology of the land, activities that once defined national territories of food production are vanishing. The disappearance of material practices that used to shape the organization of space signals profound transformations that have been long

³¹² Mounir Labib, "The Impact of Pollution from Power Plants, Cement Plants, Brick Kilns in the Greater Cairo and the Implementation of Control Strategies," ed. European Environment Agency (Cairo: Climate Change Central Department, Egyptian Environmental Affairs Agency, 2011).

³¹³ Zawya, "Egyptian Cement Sector Poised for Concrete Growth."

underway. Centuries of coercive power determining how the land is cultivated have expedited the state's administrative and geographical control of territory. But the standing order that regiments resources, economic policy-making, political disciplining, and management of the local food production system has been regularly contested. Perhaps due to chronic negligence and inefficiency, the authority of the state has been compromised by the changes in land use that have occurred, for all intents and purposes, off the official radar, as it were. In fact, a thorough reconfiguration of territory has been ongoing for decades, not only in physical terms, but in economic, social, and political terms as well, which provides insight for understanding the new landscape of power that emerged with the so-called 'siege of Imbaba' in 1992.

The brutal overreaction of the state to its loss of power over agrarian-lands-turned-informal-settlements stems in large part from the withdrawal of governmental authority in the first place. In legal terms, Law 1/1978 legislated the demise of administrative and territorial sovereignty over constructed agrarian land by stipulating that fields would henceforth be considered non-developable, and thus exempted from the control of local urban authorities.³¹⁴ In the absence of regulatory oversight, the task of recording, controlling, and curbing urbanization on agrarian land was duly assigned to the Department of Agriculture (DA) under MALR. As underprepared as it was underfunded, the DA was ill-prepared to manage urban sprawl of such magnitude, which not only underscored the fallout of state inattention to uncontrolled urban growth, but also the sheer lack of will to govern the full extent of the public realm. As a result, power shifted to collective urban groups, including religious and ethnic constituencies of various sorts (i.e., religious, ethnic, and occupational).³¹⁵ The urban fabric that supplanted land for food production is implicated in this process of readjustment, insofar as the interplay of political and economic decision-making has a direct impact on the organization of territory. Concisely, when agricultural activities cease, territories defined by human use are entirely reshaped and redefined.

Territorial reconfiguration has led to entrenched segregation and social polarization. Political parties, governmental agencies, parliamentarians, and average upper-middle-class Egyptians have been active in the habitual stigmatization of informal areas. So lodged in a national mindset as problematic socio-spatial territories, informal settlements are at best considered a nuisance and eyesore by most, a negligible part of a given order. Informal areas are typically portrayed as places that facilitate the destruction of agricultural land because they are

³¹⁴ Séjourné, "The History of Informal Settlements."

³¹⁵ Diane Singerman, "The Siege of Imbaba, Egypt's Internal 'Order,' and the Criminalization of Politics," in *Cairo Contested: Governance, Urban Space, and Global Modernity* (Cairo: American University in Cairo Press, 2009).

plagued with poor living conditions, high density, overpopulation, religious extremism, and criminal activity. Thus, the accepted definition of an ‘informal’ area has come to designate a territory which is not only without value, but also dangerous. Such stigmas notwithstanding, informal areas—their architectural aesthetic and urban forms included—are for entire communities identity-forming agents. After the 1992 Imbaba events, international institutions have promoted their liberalizing agendas to rehabilitate informal settlements.³¹⁶ Research projects and reports made a case in favor of finally addressing the ‘informal’ housing questions, in some cases even pointing to potential profits that could be made when formalizing the informal sector.³¹⁷ Yet, negative perceptions remain prevalent.

It should thus come as no surprise that, due to decades of institutional neglect and public contempt, new spaces of negotiation and resistance emerged within the contested neighborhoods that, in enabling imperiled populations to express their dissent, would prove instrumental in triggering the events of 2011. Various sources note that young crowds walked from the informal district of Bulaq al-Dakroun down Nahia Street, the first of many such demonstrations that would continue to Tahrir Square, the epicenter of protests that would eventually bring down the Mubarak regime.³¹⁸ The youth of Ard-el-Lewa, Imbaba, and Mit’Uqba—informal areas built over agrarian land during the past three decades—took to the streets. Emerging from these repressed territories to criticize unjust urban practices and socio-economic dispossession, their slogans effectively linked sustenance to democracy and social justice (bread, freedom, social justice: *aīsh, hurriyya, ‘adāla igtimā’iyya*).³¹⁹ By standing up to routine injustices and demonstrating ability to rouse collective action, the precarious spatial order of the *ashwa’iyyat* offered a platform for contestation and the formation of political agency.

³¹⁶ Agnès Deboulet, "The Dictatorship of the Straight Line and the Myth of Social Disorder - Revisiting Informality in Cairo," in *Cairo Contested: Governance, Urban Space, and Global Modernity*, ed. Diane Singerman (Cairo: American University in Cairo Press, 2009).

³¹⁷ Soliman and de Soto, *A Possible Way Out: Formalizing Housing Informality in Egyptian Cities*.

³¹⁸ Khaled Adham, "Maqamat'imraniya: Navigating the Virtual and Real Urban Cartographies of the Egyptian," in *Beyond the Square: Urbanism and the Arab Uprisings*, eds. Deen Sharp and Claire Panetta (New York City: U505 Terreform, 2016).

³¹⁹ Amira Mittermaier, "Bread, Freedom, Social Justice: The Egyptian Uprising and a Sufi Khidma," *Cultural Anthropology* 1, no. 29 (2014).

4) *Transnational (Global) Scale*

One way to examine the destruction of Egyptian's productive hinterland on a transnational scale is to consider the political and economic practices governing global commodity flows. With regard to questions of governance and urban development, of local food systems, and of national food policies, not to mention of international global trade and logistic flows, one must ask how the ever-competitive practices concerning land use have affected the dynamic relations between resource distribution and the organization of space.

Less Land, More Dependency

The reduction of areas planted with wheat is a direct consequence of the loss of agrarian land, which in turn has negatively impacted the livelihoods of farmers. In most peri-urban zones, cultivators have shifted from wheat cultivation to the production of animal fodder. In 2015, for example, the cultivation wheat accounted for 47 percent of all agrarian land use in the country.³²⁰ Earlier in that year, government officials announced that the state would purchase local wheat at a price higher than international market rates. In 2017, a similar announcement was made "to encourage farmers to increase the area planted to wheat and, in effect, discourage [them] from switching to other crops."³²¹ Concurrently, the government increased the price of subsidized fertilizers by 48 percent, inciting widespread discontent among farmers.^{322 323} Accordingly, wheat cultivation fluctuates every year, depending on state policies. This indicates that the financial incentives provided to farm wheat for the local market are inconsistent. The resulting instability prompts cultivators in peri-urban areas to cultivate a more stable crop like clover and in the long term sell their land.

Wheat production is important because Egyptians are among the main consumers of wheat globally, considering that bread is the staple diet. The growing urban population relies on state-sponsored food assistance programs (i.e., bread subsidies, see CASE 1) for food security and in turn, these subventions play an essential role in securing political stability. Despite the doggedness of official narratives regarding self-sustenance, state intervention to this end has repeatedly failed to

³²⁰ McGill et al., "Egypt Wheat Sector Review."

³²¹ Ibid.

³²² Reuters Staff, "Egypt to Buy Wheat from Local Farmers at Global Prices Next Season," *Reuters*, November 4, 2017, <https://www.reuters.com/article/us-egypt-wheat/egypt-to-buy-wheat-from-local-farmers-at-global-prices-next-season-idUSKBN1D40SK>.

³²³ "Agriculture Ministry Raises Price of Subsidized Fertilizer to EGP 2,959 Per Tonne," *Enterprise*, January 16, 2017, <https://enterprise.press/stories/2017/01/16/agriculture-ministry-raises-price-of-subsidized-fertilizer-to-egp-2959-per-tonne/>.

achieve set targets of domestic food production.³²⁴ Hence, Egypt remains the world's largest importer of wheat.³²⁵ There are also historical grounds for elucidating Egypt's institutionalized dependency on foreign grain imports (see the section on food aid and *Institutional agents*). Yet, the sheer magnitude of this dependency (i.e., wheat imports for 2017/18 were at 12 million tons, 9 percent above the average for the last five years, versus 8 million tons locally produced) suggests that both the urbanization of agrarian land and the global political economy of food are responsible for Egypt's predicament.³²⁶

Impacting grain circulation across space and time, informal growth on fertile land exemplifies how a local spatial practice can have repercussions via commodity flows to become a phenomenon with global consequences. This is to say that the very loss of *feddans* in Egypt must be viewed from a geopolitical perspective, insofar as construction on a single *qirat* automatically increases dependency on wheat imports, while subjecting a land to the often-impulsive transactions of the world market. With this focal shift, two wide-ranging consequences can be formulated.

First, the less Egypt produces, the more the country becomes entangled in the machinations of global food trading. Decades of policy-making promoting the importation of grain has facilitated the elimination of local food production systems, which has had a palpable impact on remote geographic areas of production and exchange, whether in the Black Sea region, the United States, or Egypt, as well as on transportation infrastructure and flows worldwide (see CASE 1).³²⁷ Such transformations bear on all agents involved in the grain chain from input to production, trading, processing to distribution that, by extension, have an influence on the ways in which space is organized.

Second, grain reliance consolidates the spatial order of uneven power hierarchies between 'core wealthy countries and poor 'peripheral' societies, generally in the Global South. The transformation of local food production systems through informal urbanization contributes to the geopolitical consolidation of today's world food order.

But the competition over land use in Egypt that pits the spread of urbanization against the upkeep of agricultural production should not blind us to the reciprocal impact of global forces on local realms. For the destruction of domestic food production systems is also determined by national

³²⁴ Hussein, "From Liberalisation to Self-Sufficiency: Egypt Charts a New Agricultural Policy."

³²⁵ McGill et al., "Egypt Wheat Sector Review."

³²⁶ Food and Agriculture Organization, "Country Brief on Egypt," in *Global Information and Early Warning System on Food and Agriculture*, ed. FAO GIEWS (Rome: FAO, 2017).

³²⁷ Harriet Friedmann, "Distance and Durability: Shaky Foundations of the World Food Economy," *Third World Quarterly*, 132 (1992).

agriculture policies that take their cue from international agencies. The 2009 *Sustainable Agricultural Development Strategy Towards 2030*, for example, calls for the cultivation of cash crops instead of sustenance crops like wheat and maize.³²⁸ On hand from a succession of domestic agrarian policies, themselves the product of global economic, ideological, and social forces, the empowering capacity of self-sustenance is taken away from local populations, transformed into economic power that is relinquished to global agro-food corporations and institutions. It can thus be argued that processes of urbanization in Egypt embody the dynamic interrelations between local policies and practices of land use and the political economy of the global food order.

Commentary: Receding Rurality, Fostering Dissent

In *The Urban Revolution*, Henri Lefebvre stated: “the long dominant agrarian (...) becomes subordinate to an urban reality.”³²⁹ Although addressing a different context, Lefebvre’s understanding of urban transformation, as well as the unbalanced development of urban and rural spheres, provides a substantive framework for understanding current changes in Cairo’s food production landscape.

As the present case study shows, Cairo is undergoing a spatially explicit yet socially ambiguous process: the destruction of local agriculture and rural livelihoods by self-organizing groups who are building much-needed affordable housing. Revealing complex socio-spatial relations of urbanization, the competition for land use mirrors several conflicting factors, including land commodification, declining rurality, and urban dissent.

Firstly, the transfer from rural to urban land ownership suggests that land commodification is key to this transformation. From the sale of khedivial land to privileged owners in the 19th century to the reclamation of land by the socialist state to the benefit of smallholders and middle-classes in the mid-20th century, landownership is now informally transferred to essentially landless lower-income classes. These successive waves of commodification have come to define the built form of informality, which constitutes a patent representation of land tenure policy and former agrarian practices.

Secondly, this spatial reconfiguration is accompanied by a profound transformation of territorial organization, which could otherwise be described in terms of the “death of the peasantry.”³³⁰ The lost battle between agriculture and urbanization has far-reaching implications

³²⁸ Ministry of Agriculture and Land Reclamation, *Sustainable Agricultural Development Strategy Towards 2030*.

³²⁹ Henri Lefebvre, *The Urban Revolution*, tran. Robert Bononno (Minneapolis: University of Minnesota Press, 2014), 89.

³³⁰ Eric Hobsbawm, *The Age of Extremes: The Short Twentieth Century, 1914-1991* (London: Michael Joseph, 1994), 425.

on a national level as well as for the global food system. In peri-urban Cairo as in many cities worldwide, agriculture has been supplanted by high-density urbanization, a process that has undoubtedly contributed to the food dependency of large portions of the population.

Finally, informal urbanization—mirroring failures of governmental housing and agrarian policy—has resulted in a territorial reorganization of power relations. Authorities are no longer effectively in control of former agricultural land, and the informally rearranged territory has facilitated the creation of spaces of resistance that epitomize the ongoing conflict between autonomous, local forms of organization and those of the state.

What can be deduced from this examination is that arrangements related to food production influence the built environment and its forms as well. At the same time, spatial conditions have a knock-on effect on urbanization dynamics and global systems. How can we account for this and what does it suggest about the relationships between the political economy of food and urbanization?

Food Production and Land Commodification

Food production in Egypt cannot be dissociated from irrigation, a technology that can be viewed as key to the organization of territory. The low-tech but high-maintenance hydraulic system that for centuries has enabled agriculture practices was derived primarily from the formation of ownership patterns and a centralist bureaucracy.³³¹ Born of the necessity to manage water, land productivity, and people, the authoritarian Ottoman property system comprised of landowning rulers and landholding peasants dominated until the early nineteenth century.

New laws under Muhammad Ali sought “to bring order to the land tenure system,” guaranteeing that land would be cultivated and taxes paid.³³² Scholars argue that these laws were preparatory steps towards private landownership. Indeed, it could be said that the ongoing commodification of agrarian land today derives from this early legislation. Control of the land went hand in hand with control of the population. This is because the new form of capitalist production extracted from the land—by cultivating cotton as a commodity—required a cheap labor force that had to be strictly supervised to farm the land and maintain the irrigation systems. It should be noted that the rise of this particular apparatus of control corresponds to the mapping of territory through modern technology. Linked to European penetration and associated with the

³³¹ See Karl August Wittfogel, *Oriental Despotism: A Comparative Study of Total Power* (New Haven and London: Yale University Press, 1967).

³³² Cuno, *The Pasha's Peasants: Land, Society, and Economy in Lower Egypt, 1740-1858*, 202.

disciplining of the farming population, this correlation is discussed at length by Timothy Mitchell in *Rule of Experts*.³³³ An array of regulating systems intended to manage agrarian land, such as cadastral surveys, registered transactions, usufruct rights, tax records, and property deeds all served to establish the state as primary custodian of the land.

The condition of the Egyptian farmer “residing on land he does not own, farming crops he does not choose, harvesting yields he does not keep,” was viewed as unjust by the colonial narratives of British administrators and orientalist scholars who accordingly depicted Muhammad Ali Pasha’s rule as arbitrary and despotic.³³⁴ This said, the privatization of land was nevertheless pursued even further under the British following the bankruptcy of the state in 1867, and, against the backdrop of mounting landlessness and destitution, private landownership was, in fact, proclaimed as a modern concept that would benefit the development of the nation.³³⁵ What emerged was an urban-based, capital-accumulating, landowning class whose members ruled over the peasantry.³³⁶

The cultivation of cotton not only intensified the commodification of land and consolidation of ownership, but also reorganized the productive territory: Hydro-infrastructure on the Nile, irrigation systems, modern communication and transportation means, and all the requisite infrastructure of an import-export economy led to a thorough integration of Egypt into the world economy. After 1919, British power dwindled and land hunger led to increasingly high rents for tenants, while excessive harvesting disrupted the food supply. Consequently, rural violence was pervasive. The series of crises resulting from colonial rule prompted land reassignment and reforms.³³⁷ Still, land tenure regulations remained largely untouched until the 1952 revolution. Meanwhile, the living conditions of the *fellah* steadily deteriorated.

The agrarian reforms implemented under Nasser challenged what had amounted to a patently unequal distribution of agricultural land. The landownership transfer to small farmers ruptured the political power of the class of large landowners. These measures signaled an ambiguous paradigm shift: by putting an end to the ongoing commodification of land, the state served a political desire to promote rural social justice by partitioning agrarian land among the

³³³ See Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*.

³³⁴ Paul Merruau, *L’Égypte Contemporaine, 1840–1857, De Méhémet Ali à Saïd Pacha/Par M. Paul Merruau; Précédée d’une Lettre de M. Ferd. de Lesseps*, vol. 1 (Paris: Didier, 1858), 52.

³³⁵ See Martin W. Daly and Carl F. Petry, *The Cambridge History of Egypt*, vol. 2 (Cambridge: Cambridge University Press, 1998), 283.

³³⁶ See Cuno, *The Pasha’s Peasants: Land, Society, and Economy in Lower Egypt, 1740–1858*.

³³⁷ See Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes*.

lower farming classes, while at the same time retaining the authoritarian tradition of nineteenth-century agrarian policies. This arrangement created an allegiance towards the nation-state that began with Nasser and has had a long-lasting legacy, until today.

The liberalization of the economy that followed and the rollback of Nasser's reforms signified the return of the landed privileged elite. The dismantling of the welfare state would physically translate into a topographical space through the eviction of tenants. While revoking land deals and stripping smallholders from the *feddans* they had been granted under Nasser, both the Sadat and Mubarak-governments retained the idea of using agriculture land as a resource for sustaining the economy. Whereas agricultural exports were generally advocated by international consulting agencies to generate foreign exchange, the implementation of national export policies was required as a conditional term of IMF loans (e.g., the Economic Reform and Structural Adjustment Program).³³⁸ From the vantage point of Egypt's territory, this reversion of land tenure and revenue allotment represented an ideological change. Performance and organization were emphasized in place of sustenance and food production. Agrarian land was once again seen as the high-performing resource and hyper-productive territory it had been under both the Pasha and British domination, amounting to financial infrastructure, of sorts, for extracting capital.

As the aggressive implementation of neoliberal policies proceeded, ever-new ways were devised to conceptualize agrarian territory and its attendant populations. Increasingly so, those farming the existing lands were perceived as rebellious because they were unwilling to perform required tasks. In contrast, those 'New Lands' reclaimed from the desert, in essence, offered a clean slate for deploying technological developments and generating land capital. A reduced labor force of uprooted workers was sent to these remote sites to farm remotely managed land for export crops. The brief episode of liberation that transpired after the 2011 revolution saw farmers challenging existing power and landownership structures, only to face a return to *status quo* governance after 2013. It is in the context of this particular geopolitical topography, shaped by centuries of agrarian practices and decades of neoliberalism, that the informal city developed.

A great deal of evidence has accrued to suggest that the agrarian land tenure determines urban form. Food production and the distribution of land shape the informal city through specific modes of resource allocation, circulation patterns, water distribution, and ownership rights. Most important, the entire reorganization of territory manifests—via urbanization—a profound rebalancing of financial, political, and social forces. This implies a shift from an autocratic state apparatus able to assert control over spaces of food production and taxation, to a weakening form of

³³⁸ See Joel Beinin et al., *Egypt: The Moment of Change* (London: Zed Books, 2013).

authority that relies on a laissez-faire approach to governing. Remarkably, the distributional aspects associated with ongoing land commodification suggest that informal urbanization processes challenge a sanctioned territorial order in a more profoundly active manner.

In Greater Cairo, thousands of workers and low-income citizens now possess most of the previously agrarian land in the form of affordable, informally owned housing units. While the lack of recognized property rights over these assets translates into an unstable tenure arrangement, which in turn might indicate an incomplete commodification process, land ownership, housing property, and the financing of housing are all monetized transactions. Additionally, state services eventually reach informal areas and indicate yet another aspect of shifting relations. The beneficiaries of the process of commodification of agrarian land are, in effect, private stakeholders who rely on transfers from private to other private individuals. Urban landowners and small farm-owners sell plots to workers, rural migrants, and low-to middle-income families, albeit through informal, extra-legal channels, with sixty percent of residents of informal areas being 'informal' owners (40 percent are tenants).³³⁹ In this regard, the access to ownership by lower-income populations is only feasible because urbanization on private agrarian land circumvents urban codes and regulations in order to optimize costs. As a result, the transformation of agrarian land into informal housing, however detrimental it may be with respect to national food security, actually constitutes a redistribution of resources, as it were, that benefits the majority.

This assessment, however, remains ambivalent at best. By identifying changing building typologies, the current research reveals that capital penetration into informal areas has intensified. Departing from a necessity-driven production of space based on affordability, land commodification is now also driven by speculative real estate development. The redistribution of ownership from high-income landowners to lower-income individuals has evolved into a 'classic' commodification of land over the past decade. While the scarcity of affordable housing perhaps offset the loss of agrarian plots to accommodate the poorest populations, the increase in housing prices brought on by speculative practices has served to compromise this fragile social equilibrium. Two populations suffer most from the destruction of the local food systems: former tenants who lose their sustenance means, and indirectly, those inhabitants who rely extensively on bread subsidies for food security. As national reliance on food imports increases, the deterioration of the local food system leaves the 74 million Egyptians who hold a ration card vulnerable to price shocks on the world market.³⁴⁰

³³⁹ Denis, "The Commodification of the Ashwa'iyat: Urban Land, Housing Market Unification, and De Soto's Interventions in Egypt," 236.

³⁴⁰ Food and Agriculture Organization, "Country Brief on Egypt."

Food Production and Receding Rurality

In the past five decades, Egypt's agricultural production system has undergone tremendous changes as the consequence of divergent political orientations. From monarchy and colonial rule to an Arab socialism subsumed by coercive liberalism, the ideologies that frame economic conceptions of property and attitudes toward state engagement have deeply affected the very nature of rurality. In addition to urbanization, a host of local and global agents have accelerated the ongoing restructuring of Egypt's food system. Splintered, small-plot landownership patterns have limited overall productivity. The increased use of fertilizers to offset fertility loss has damaged the soil, lessening harvest yields. Peri-urban plots have become unproductive. Privatization reforms have made farmers evermore susceptible to eviction. Agriculture policies and agendas hostile to rural development have favored technological advances and high-profile land reclamation projects. Today, the results are evident: the local food system does not suffice to fulfill the grain requirements of an increasingly urban population and has led to a constant national dependency on foreign food imports, while urbanization progresses rapidly and rampantly. What are the implications of these new physical conditions for the productive hinterland?

Lefebvre defines the agrarian world or "rurality" according to three interrelated entities: agricultural production, rural life, and peasant society.³⁴¹ In the peri-urban areas of Cairo, such aspects of rurality are disappearing. Informal urbanization implies the "erosion of peasant life."³⁴² Agricultural food production has all but ceased, rural lifestyles continue to be transformed, and peasant society is increasingly being assimilated into the urban realm. On the one hand, the urban sphere is hostile to the rural: as formulated by Lefebvre, "cities harbor bastions and fortresses directed against the peasantry."³⁴³ Urbanization could thus be assessed as the final stage of the transformation of peri-urban agrarian land that has been facilitated by decades of neglect and neoliberal advances against local food production practices. On the other hand, urbanity absorbs forms of rural life, becoming in the process somehow ruralized. Farming activities are incorporated in the urban fabric. Farmers tend to buffaloes in basements, chickens and ducks on rooftops, goats in empty apartments, and buy fodder from threatened farmers.³⁴⁴ But along with the fertile land, food crops such as wheat vanished from these areas long ago. There is a bitter irony in the fact that

³⁴¹ See Lefebvre, *The Urban Revolution*.

³⁴² Neil Smith, "Foreword to *the Urban Revolution* by Henri Lefebvre," in *The Urban Revolution* (Minneapolis: University of Minnesota Press, 2014), xv.

³⁴³ Lefebvre, *The Urban Revolution*, 112.

³⁴⁴ Daburon, "Urban and Peri-Urban Milk Producers of Cairo City: An Efficiency Focus."

urbanization and wheat consumption have followed similarly increasing curves. This is because social protection programs, including bread subsidies, support primarily urban populations. Such programs have also reduced access to alternatives, and bread is a convenient staple to buy and store.³⁴⁵ Many licensed bakeries sell subsidized bread in informal areas. So, while urbanization plays a major role in increasing bread consumption, it also obliterates the local source of its production.

The architecture of informality, one might argue, constitutes a direct material manifestation of the lost battle for land: built versus unbuilt, urban versus rural, real estate commodity versus land for sustenance. The architecture of informality also manifests the “death of peasantry” as a productive labor force and as a class altogether, as stated by Erich Hobsbawm in *The Age of Extremes*.³⁴⁶ The Food and Agriculture Organization and other international agencies claim that “the future of agriculture [is] based on large-scale land ownership,” that “farms are likely to decrease in number,” and that the current balance between the rural and urban populations will shift in favor of the urban population by 2040 globally.^{347 348 349}

Food Production and Urban Dissent

Considered as ‘food riots’, the regime-challenging demonstrations of 1977 and 2011 both originated in informal areas (respectively Eshash al-Turguman and Bulaq al-Dakrou).^{350 351} Whereas decades of socio-spatial inequalities separate these two particular events, the injustice suffered by the neglected populations of the so-called *ashwa’iyyat* has not receded. Both movements took place against the backdrop of economic liberalization and related hikes of international food prices. It has been admitted that the trigger for the 2011 Revolution was escalating living and food costs.³⁵² Holding loaves of bread on Nahia Street, the crowds could be heard chanting: “Bread,

³⁴⁵ Nikolas C. Heynen, Maria Kaika, and Erik Swyngedouw, *In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism*, vol. 3 (Taylor & Francis US, 2006), 33.

³⁴⁶ See Hobsbawm, *The Age of Extremes: The Short Twentieth Century, 1914–1991*.

³⁴⁷ Mark Lindeman, "Russia Trip Report: Grain Outlook Favorable Despite Volga Valley Dryness," June 20, 2002, http://www.fas.usda.gov/pecad2/highlights/2002/07/russia_trip_report/.

³⁴⁸ "World Urbanization Prospects - the 2014 Revision," ed. United Nations Department of Economic and Social Affairs (New York: Population Division, 2014).

³⁴⁹ See Agricultural and Food Marketing Management, (Rome: FAO, 1997), accessed May 4, 2018 <http://www.fao.org/DOCREP/004/W3240E/W3240E00.HTM>.

³⁵⁰ See Ghannam, *Remaking the Modern: Space, Relocation, and the Politics of Identity in a Global Cairo*.

³⁵¹ See Adham, "Maqamat'imraniya: Navigating the Virtual and Real Urban Cartographies of the Egyptian".

³⁵² Sabine Frerichs, "Egypt's Neoliberal Reforms and the Moral Economy of Bread: Sadat, Mubarak, Morsi," *Review of Radical Political Economics* 48 (2015).

freedom, children of Egypt!,” which evolved into the famous slogan: “Bread, freedom, social justice!”³⁵³ The choice of the term *aiṣḥ* (meaning both bread and life in Arabic) was hardly coincidental, meant as it was to convey food insecurity and deteriorating living conditions in general. The relationship between food riots and urban discontent highlights the specific politics of rioting under the theme of ‘food’ in this context.³⁵⁴ But as land continues to be commodified and farming populations disappear, and as more grain is imported, rethinking what urban dissent reveals about conflicting spatial relationships between food production and urbanization is essential.

First, the replacement of the local food production system by informal districts has reinforced the political dimension of the reorganization of territorial control. Replacing the century-long state stronghold over agrarian land, local autonomous forms of governance have emerged, at times strong enough to challenge authority. Diane Singerman is unequivocal about the spatial nature of this conflict as she explains that the aim of the state-led siege of Imbaba was to “regain control of the territory.”³⁵⁵ This ambition was illusory in the long term. Today, entire areas that are home to millions are self-built, self-financed, and self-governed by myriads of social groups operating beyond the purview of state laws. Authorities show little interest in these areas, as public projects targeting the relocation of so-called “slum dwellers” so aptly illustrates.³⁵⁶ Still more must be said of the inherent capacities of the so-called *ashwa’iyyat* in ‘making the city.’ As this research argues, the architecture and urban forms generated by agrarian patterns generate a valid—though illegal—urban fabric. Once infrastructure is installed, informal areas gain telltale urban characteristics and qualities. Officially, however, only the state and private investors have the authorization to produce new ‘cities’ en masse.³⁵⁷ The terminology employed across various media perpetuates this discourse, with every illegal settlement indiscriminately labeled as a ‘slum.’³⁵⁸ ³⁵⁹ The quasi-absence of governance foments local empowerment and self-organization

³⁵³ See Nader Sraje, *Revolution and the Slogan of Egyptian Youth: A Study in Spontaneous Expression* (Doha: ACRPS, 2014).

³⁵⁴ See John Walton and David Seddon, *Free Markets & Food Riots. The Politics of Global Adjustment* (Oxford: Blackwell, 1994).

³⁵⁵ Singerman, *Cairo Contested: Governance, Urban Space, and Global Modernity*, 21.

³⁵⁶ Amr Abdallah Dalsh and Mahmoud Mourad, "Egypt Builds New Homes to Replace Crumbling Slums," photo essay, *Reuters* June 13, 2016, <https://widerimage.reuters.com/story/egypt-builds-new-homes-to-replace-crumbling-slums>.

³⁵⁷ Benedict Florin, "Banished by the Quake: Urban Cairenes Displaced from the Historic Center to the Desert Periphery," in *Cairo Contested: Governance, Urban Space, and Global Modernity*, ed. Diane Singerman (Cairo: American University in Cairo Press, 2009).

³⁵⁸ Maggie Fick, "Demoralized Cairo Slum Longs for Army Chief as President," *Reuters*, January 12, 2014, <https://www.reuters.com/article/us-egypt-referendum-imbaba/demoralized-cairo-slum-longs-for-army-chief-as-president-idUSBREA0B07F20140112>.

³⁵⁹ Amr Abdallah Dalsh and Mahmoud Mourad, "Egypt Builds New Homes to Replace Crumbling Slums," photo essay, *Reuters* June 13, 2016, <https://widerimage.reuters.com/story/egypt-builds-new-homes-to-replace-crumbling-slums>.

through social networks, word-of-mouth affiliations, and rule-of-thumb practices. This is where spatial conditions, local autonomous organizations, and a sense of injustice intersect and form the grounds for contestation. Consequently, the state upholds food subsidies as the only straightforward form of authority that can be exerted to mediate social tensions. To compensate for both the failing local food system and the lack of governance, state-licensed bakeries sell cheap *baladi* bread, a system prone to abuse that is more often than not in conflict with state rule. But as the state attempts to retain some control over a territory it has otherwise ceded to rampant popular urbanization, bread subsidies have proven to be the Achilles' heel of administration after administration. As local populations come to rely on this form of social welfare, any disruption to their fragile economic equilibrium is blamed on the government.

Urban unrest also reveals how the failings of local systems of production are directly related to globalization, economic restructuring, and the current international food order. The complex links between global food price hikes and urban turmoil have been openly played in Egypt and elsewhere.³⁶⁰ As they took to the streets in 1977 and again in 2011, informal dwellers were well aware of how local sustenance prices are determined by the international political economy as well as the nation's questionable dependence on food imports. According to Harriett Friedmann, the destruction of the local food system and the undermining of sustenance agriculture is driven, and even required by neoliberal ideology in order to advance international trade and capital accumulation.³⁶¹ In other words, the dependence on foreign imports is constructed and artificially sustained. In response, foreign experts tend to advocate diversified agriculture output oriented toward the production of export crops (i.e. horticulture) to be sold on the international market. Foreign currency acquired through these exports allows the country to purchase grain on the global market, which therefore supports global financial transactions, transportation flows, and the ongoing subsidization of western agriculture industries. As consultants for USAID-Egypt announced: "While Egypt still aims for self-sufficiency in food crops, the potential of high value horticulture commodities for earning foreign exchange and increasing employment and incomes in the rural areas is rapidly gaining recognition within the government."³⁶² The promotion of export

³⁶⁰ Marco Lagi, Karla Bertrand, and Yaneer Bar-Yam, "The Food Crises and Political Instability in North Africa and the Middle East."

³⁶¹ Harriet Friedmann, "The Origins of Third World Food Dependence," in *The Food Question: Profits Versus People*, ed. H. Bernstein et al. (London: Earthscan, 1990).

³⁶² Donald M. Taylor et al., "Evaluation of Agriculture Technology Utilization and Transfer Activity in Egypt," (Cairo: Checchi/Louis Berger Joint Venture, 2002).

crops cultivation is, in reality, a not-so-subtle demand by creditors as a decisive condition of IMF loans and structural adjustment programs.³⁶³

To conclude, it is not only the export imperative that took down the local food production structure at the peri-urban fringes of Cairo, but also global neoliberal ideologies regimenting local and world food systems, national agrarian policies, land commodification processes, and finally, urbanization. The “unjust urbanism” of informality manifests the convergence of these driving forces, itself an indisputable product of the political economy of food systems that, especially in the context of Egypt, still holds sway over ways of building the environment.³⁶⁴

³⁶³ Harriet Friedmann, "The Political Economy of Food: The Rise and Fall of the Postwar International Food Order," *The American Journal of Sociology* 88 (1982).

³⁶⁴ Adham, "Maqamat'imraniya: Navigating the Virtual and Real Urban Cartographies of the Egyptian," 184.

2.4 CASE 3: FOOD SECURITY AND INFRASTRUCTURE, TOSHKA

Water Infrastructures: National Agendas, Food Security, and Foreign Influence

The Delta Barrage, the Aswan Low Dam, the Asyut Barrage

The Century Storage Scheme, the High Aswan Dam,

Land Reclamation Schemes

The Toshka Project

The New Valley Western Oasis, the Southern Valley Development Project

The Toshka Project, Agents

Impacts on Space and their Consequences

Commentary: A Biopolitical Infrastructure

2.4 CASE 3: FOOD SECURITY AND INFRASTRUCTURE, TOSHKA

The desert lands of Egypt will remain desert, however many millions of pounds are expended in Nile reservoirs. All that man can do is to extend somewhat the narrow strip of green running along the banks of the Nile...

The Nile Dams and Reservoir, Sir Benjamin Baker, Royal Institution, June 6, 1902.¹

In a dark suit, wearing aviator-style glasses, President Hosni Mubarak stands firmly, arm on the railing, overlooking blue waters. The pumping station that carries his name towers in the background. This scene is captured in a press photograph from 2005, during one of many visits that the then-President of Egypt took to the Toshka project (“Toshka”).² The site is composed of the largest pumping station ever built, a 310 kilometer-long water channel, and a target of 1 million hectares of irrigated fields for crops and fruits, all part of a New Nile Valley vision which includes three schemes (Toshka, Uweynat and the oases) aiming to convert parts of the Western Desert into an agricultural and industrial area.³ A collection of such images documents President Mubarak inspecting various development stages of the construction site located around the Toshka Depression in the desert region west of Lake Nasser. His visits, spanning from the late 1990s to the mid-2000s, attest to the political relevance of water infrastructures to Egyptian governing powers, and the desire of the regime to exhibit confidence in a scheme that claimed to solve water supply, food security and overpopulation issues through the gigantic enterprise. His visits also confirm that Toshka is a presidential project, positioning Mubarak in a long line of Egyptian rulers who have embarked on large-scale schemes.

There is, in Egypt, a legacy of monumental infrastructures and modern water projects presented as national technological achievements. Premier examples include the Delta Barrages, the High Aswan Dam, and Toshka. Scholars argue that these projects have served as governmental instruments of political hegemony and social control, fostering national pride and

¹ Sir Benjamin Baker, "The Nile Dams and Reservoir," in *Notices of the Proceedings at the Meetings of the Members of the Royal Institution of Great Britain with Abstracts of the Discourses Delivered at the Evening Meetings* (London: Royal Institution of Great Britain, 1906).

² See the exhibition *Contingency Plans: Living with Unstable Grounds*, curated by Adam Bobbette and Daan Roggeveen, University of Hong Kong/Shanghai Study Centre, 2014.

³ The Western Desert is a part of the Sahara desert, with 681,000 square kilometers including the oases, East Uweynat, Toshka and Darb El-Arbian areas.

diverting attention from other pressing matters.⁴ In the historical nation-building discourse of Egyptian grand plans, Toshka is one of the most recent projects in a long list of irrigation and hydraulic infrastructures partially inspired by colonial technocracy and associated with agricultural prosperity (see section Water Infrastructures: National Agendas, Food Security, and Foreign Influence).

All rulers of modern Egypt from Muhammad Ali to current President Abdel Fattah el-Sisi have exhibited increasing efforts to harness Nile waters through large-scale building projects. Stated goals of these massive undertakings have included food security and self-sufficiency, agricultural innovation, and industrialization, while simultaneously serving vested political ambitions. From Saint-Simonianism's stimulus to French and British colonial rules to Cold War blocks' political maneuvering all the way up to contemporary politics of international financial institutions and global forces, this work attempts to tackle how the discourse on food security has transformed space, while uncovering the genealogy of foreign influence in shaping these grand plans and their spatial counterparts. The study particularly proceeds in examining The Toshka Project and how the scheme functions as a political and territorial act, involving foreign and national actors and capital, and implemented in the name of food security. It exists as a spatially grounded instrument with social, economic, and political factors affecting the built environment, thereby shaping territory and its organisation. Embedded in an imposing legacy of water infrastructures and land reclamation schemes, the project is part of a larger body of controlling plans, policies, and regulatory instruments concerned with the administration of population through the management of water, land, and food. In practice, the scale of the project embodies visions of population relocations and agricultural prosperity while materially involving large constructions and outsized urban planning schemes. The hypothesis hereby developed is that Toshka and its modern water infrastructures are the physical outcomes of political instruments, infrastructures shaping life and form of territories, and impacting populations in various ways (See section Commentary: A Biopolitical Infrastructure). In this regard, it is considered a tool of modern biopolitics as defined by Michel Foucault, apparatuses to manage populations for the benefits of the state.³ Food security is part of these, as regulatory mechanism to materially and politically control life. Under global pressure, the pursuit of national food self-sufficiency is used to justify large-scale territorial transformations towards the ends of unchecked agricultural

⁴ Jeroen Warner, "The Toshka Mirage in the Egyptian Desert – River Diversion as Political Diversion," *Environmental Science & Policy* 30 (2013).

opulence and expansion of control over land. Echoing the legacy of the High Aswan Dam, Toshka exemplifies how colossal, high-technology hydro-infrastructures inserted in rural areas redefine and redesign territory – from the massive diversion of water flows, to the magnitude of topographical modifications, to the construction of large-scale structures, or irrigation networks, to the envisioned relocation of 16 Million people – with tremendous political, climatic, and topographical consequences.

Water Infrastructures: National Agendas, Food Security, and Foreign Influence

There is no need to resort to biblical narratives of plagues and famines to recognize that, for Egypt, the water and fertilizing sediments carried by its river were imperative to ensure local food production. The fine balance between appropriate irrigation and floods was thus a matter of life and death. For hundreds of years, Egypt has sought to control the flow of the Nile to ensure irrigation of fields, agricultural activities, and its subsequent food supply. The process strained diplomatic relations with neighboring countries Sudan and Ethiopia.⁵ Already in 1929, Muhammad Sa'id Pasha, Wāli of Egypt, had issued a statement stipulating that any attempt to manipulate the river must “not infringe Egypt’s natural and historical rights in the waters of the Nile and its requirements of agricultural extension.”⁶ The political history of the Egyptian nation-state is bound with that of the river. National and colonial rulers – advised by external attendants – relied on the construction of modern infrastructures to regulate the water levels and guarantee food security. The resulting territorial transformations are a physical expression of control- and power-struggles over water, land, topography, population, agriculture, and food production, revealed by the following infrastructural chronicle of the river and its appending schemes.

The Delta Barrages, the Low Aswan Dam, the Asyut Barrage

Egypt’s history of hydraulic management, artificial irrigation, and flood control spans over centuries. Regulation efforts of the Nile date back to Pharaonic times, resulting in a predictable and managed annual flooding of fields. Through an intricate mechanism called basin irrigation, floodwaters were channeled into reservoirs or irrigation waterways along *feddans*. Pumped and distributed according to a complex hierarchy, the water was eventually released back into the

⁵ Khalid Abdelaziz, "Egypt, Ethiopia, Sudan Sign Agreement on Nile Dam," *Reuters*, March 23, 2015, <https://www.reuters.com/article/egypt-ethiopia-dam-idUSL6N0WP1ZA20150323>.

⁶ Quoted in Odido Okidi, "History of the Nile and Lake Victoria Basins through Treaties," in *The Nile: Sharing a Scarce Resource; a Historical and Technical Review of Water Management and of Economic and Legal Issues*, ed. Paul P. Howell (Cambridge: Cambridge University Press, 1996), 327.

river. Despite claims that colonial Britain brought progress to 19th century-Egypt in the form of engineering, it was Khedive Muhammad Ali Pasha (1805-1848) who first ordered infrastructural measures to control the Nile waters in the modern era.⁷ He was partially inspired by the studies of French scientists and by “Saint-Simonian secular priests of engineering who had traveled to Egypt (...) and initiated the irrigation projects.”⁸ Other sources mention Linant de Bellefonds Pasha, a Belgian engineer employed by the Viceroy of Egypt as Director of Public Works, as the instigator of the project in 1833.⁹ The modernization of the irrigation system belonged within Ali’s political project. It was meant to establish the nation’s strength and independence. Under his rule, Egyptian agriculture, which had relied on yearly floodwaters to produce only one major crop a year, shifted from basin irrigation to a perennial irrigation system, expanding a network of deep canals (*sayfi* canals) in the Delta. Yet, canals deepening and maintenance, based on forced labor, soon appeared inadequate. A modern perennial irrigation system was implemented, partly to improve the cultivation of cotton. Reservoirs stored floodwaters to be used throughout the year, and barrages dammed the Nile to raise its water level.⁷ The obstruction of cotton exports from America during the Civil War opened the British market for Egyptian cotton, and Muhammad Ali seized this chance by imposing local cotton production and supporting irrigation projects. After the Mahmoudiyah canal, the first modern infrastructural works on the Egyptian Nile that aimed to increase agricultural production grown out of national demand were the Delta Barrages.¹⁰ In 1834, the French Saint-Simonian follower Barthélemy-Prosper Enfantin had come to Egypt in a messianic mission, and was introduced to the Pasha.¹¹ He presented several large projects, including a train line between Cairo and Suez, a canal at Suez, and a dam on the Nile.¹² Following a socialist utopia of uniting humanity by linking Orient and Occident, Enfantin was primarily interested in engineering the Suez transit route. The

⁷ Ottoman Viceroy of Egypt, also known as Sultan Mehmet Ali.

⁸ Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 35.

⁹ See Harold E. Hurst, *The Nile; a General Account of the River and the Utilization of Its Waters* (London: Constable, 1952).

¹⁰ Built in 1820 under the supervision of French engineer Pascal Coste, who was under the Pasha’s architectural patronage, the Mahmoudiyah canal links the Nile with the harbor of Alexandria, avoiding the turbulent waters of Rosette and providing fresh Nile water to the city. The canal was constructed using 300,000 forced laborers. A derelict canal, dating back to antiquity, remained—called the *Asbrafiyya* Canal.

¹¹ Saint-Simonianism was a French political and social movement of the 19th century, inspired by the ideas of the Comte de Saint-Simon, centered on the perception that industrialization and scientific discovery would have profound changes on society. A religiously minded ritualistic group was founded after Saint-Simon’s death, led by Enfantin.

¹² Bruce Rich, *Mortgaging the Earth: The World Bank, Environmental Impoverishment, and the Crisis of Development* (Boston: Beacon Press, 1994), 217.

Khedive, on the other hand, privileged irrigation-related projects.¹³ Works on the Barrages located at the Nile division between the Rosetta and Damietta branches had already started haphazardly in 1833. A city was to be built next to the infrastructure, named Al-Qanatir al-Khayriyya (literally, the Benevolent Bridges). Infantin worked on the project with his associates until 1836, when he abandoned the project because of an outbreak of plague.¹⁴ In 1842, Muhammad Ali hired the French engineer Eugène Mougel (later to author the first draft of the Suez Canal for Ferdinand de Lesseps) to continue the project. Works resumed in 1845. Composed of two barrages, each over the two Nile branches, the project includes the Rosetta section (465 meters long, 4.8 meters wide) and the Damietta section (545 meters long, 4.8 meters wide).¹⁵ The Nile Delta Barrages were completed in 1862, allowing over 300,000 hectares of the Nile delta to switch from basin to perennial irrigation, thus increasing agricultural output.¹⁶ It quickly surfaced, however, that the Delta Barrages had structural flaws and could not resist Nile floods. Under pressure of the Khedive who wanted rapid completion, Mougel had used Nile mud, sand, and insufficient concrete for the foundations. Cracks appeared in the walls, and in 1867, a whole section of the Rosetta Barrage broke off. The Barrages lingered, unused. Two decades later, as financial collapse loomed, Egypt became a British protectorate. Colonial forces came to Egypt with technocratic beliefs “in the powers of technology in the form of irrigation infrastructures,” disdainful towards Muhammad Ali’s efforts to control floods, guarantee food security and promote cotton production.¹⁷ Nevertheless, aware of the Delta Barrages’ economic importance, the occupant undertook costly reparation works, completed in 1890. With the construction of other cement barrages downstream (the Sifta Dam, Isna Dam, Nag’Hammadi Dam), the British accelerated the modernization of the country’s irrigation system initiated by Muhammad Ali. The Delta Barrages marked the start of irrigation works of the 19th century. Yet, it was their failure in restraining the floods that prompted the construction of the Low Aswan Dam. Debt generated by the construction of Suez Canal and other projects afflicted the country. Advised by foreign experts, Ali’s grandson Khedive Ismail (1830-1895) obtained more loans from

¹³ Susumu Ishida, "Delta Barrages and Egyptian Economy in the Nineteenth Century," *The Developing Economies* 10, no. 2 (1972).

¹⁴ See Matt K. Matsuda, *Empire of Love. Histories of France and the Pacific* (New York: Oxford University Press, 2005).

¹⁵ See Robert Hanbury Brown, *History of the Barrage at the Head of the Delta of Egypt* (Cairo: F. Diemer, 1896).

¹⁶ Samir Raafat, "The Delta Barrage," *Cairo Times*, August 21, 1997, <http://www.egy.com/landmarks/97-08-21.php>.

¹⁷ Diana K. Davis, "Imperialism, Orientalism, and the Environment in the Middle East," in *Environmental Imaginaries of the Middle East and North Africa*, eds. Diana K. Davis, Edmund Burke, and Timothy Mitchell (Athens (OH): Ohio University Press, 2011), 6.

European banks, precipitating the country's financial collapse. With the mission of retrieving taxes to repay European creditors, British banks set up a Debt Commission. By 1882, when British colonial power entered Egypt, foreign financial powers were already well established in the unstable and indebted nation. The British soon pushed out Khedive Ismail. The occupants were now solely interested in capitalizing on the country's main economic resource, cotton, which they exported to Britain. Thus, the primary motivation of the British for erecting another dam was to keep water year-round. The colonial administration was shifting away from the culture of sustenance food crops to an export-oriented cotton economy, a water-demanding crop. This move was concealed in a modernization discourse and a Western conception that the Nile waters were previously underutilized. Based on such assumptions, and with the underlying aims to serve foreign interests and fuel European banks with debt repayments, more hydraulic infrastructures were established along the Nile.¹⁸

In 1899, an international commission set the location for a new dam at the first Nile cataract at Aswan, 1000 kilometers south of Cairo.¹⁹ The British consul-general Evelyn Baring defended the project and proposed a five-year construction plan. The Egyptian national budget was to finance the dam over a 30-year period. Private investors (e.g. Ernest Cassel) also helped to fund the project. Under British supervision, build by British contractors with Egyptian labor force and capital, the Low Aswan Dam had been conceived as a gravity dam with a granite wall and cemented rubble infill measuring 1.9 kilometer in length and 54 meters in height. It was rapidly completed in 1902 and inaugurated jointly by Khedive Abbas Hilmi, great-great-grandson of Ali, and the Duke and Duchess of Connaught.²⁰ Newspapers celebrated the promise of greening the desert: "the dam (...) is expected to make the Egyptian desert a garden by controlling the sediment laden waters of the Nile."²¹ Moreover, Egypt will "now be able to feed contiguous countries in times of scarcity, besides supplying the wants of her own teeming population."²² Yet, the dam also impacted the Egyptian territory in adverse ways. As the infrastructure put an end to major floods and its fertile silt, the soil required purchased fertilizers. This brought drastic change to local agricultural methods and economy, and to its farming

¹⁸ Dams built by the British colonial powers in Sudan at Sennar (1925), Jebel Aulia (1937), Roseires (1966) and Khasm el Girba (1966) provided additional water storage against floods.

¹⁹ Composed of British Benjamin Baker, French Augustus Boulé and Italian Giacomo Torricelli.

²⁰ The main contractor was Messrs. John Aird & Co., a British company commissioned by the Egyptian government (in colonial hands). Sylvia Nasar, *Grand Pursuit: The Story of Economic Genius* (New York: Simon & Schuster, 2011), 182.

²¹ "King Edwards' Sister-in-Law Who Dedicated Great Nile Dam," *Chicago Daily Tribune*, December 11, 1901.

²² "The Great Nile Dam. Inaugurated by Royalty," *The Advertiser*, December 12, 1902.

populations. The lack of silt transported by the Nile also began to impact the shorelines of the Mediterranean Sea at Rosetta and Damietta. Deviations on the topography of river channel itself appeared, a phenomenon later intensified by the second dam. Ten Nubian villages were submerged by the dam's reservoir and relocated.²³ Thought at time of completion, the dam generated the largest water reservoir in the world, it too proved insufficient and had to be raised several times. The construction of the Low Dam corresponds to the rise of engineering expertise and technical development as synonyms of progress brought upon colonized countries. Framed in an orientalist, developmentalism discourse that considers colonized Egyptians as backward and underutilizing their resources, this grand environmental engineering project was legitimized in the name of progress.²⁴ This legacy was to infiltrate and intensify in post-colonial times.

Another barrage of importance was built almost in parallel to the Low Aswan Dam. Supervised and designed by the same British engineer, William Willcock, the Asyut Barrage crosses the Nile from bank to bank. The Asyut Barrage was complementary to the Low Dam, providing water to Middle Egypt. Constructed in 1902 and located 560 kilometers downstream from Aswan, the dam, when closed, raised the flood levels and retained water to be diverted in the Ibrahimiya Canal in summer. Instructed by the Khedive Ismail to irrigate 400,000 hectares of reclaimed desert land for his sugar estates, the canal extended more than 400 kilometers from Asyut to Cairo. The Delta Barrages, the Low Aswan Dam, and the Asyut Barrage were manifestations of the strong will to control and contain the Nile, from Muhammad Ali to the colonial powers. A multitude of smaller structures were also erected, such as the Zifta barrage on the Damietta branch (1903), the Esna barrage near Qena (1908), the Nag-Hammadi barrage in Middle-Egypt (1927) and the Edfina barrage on the Rosetta branch (1948).²⁵ Despite these infrastructures, however, continuous droughts (1879, 1889, 1900) and floods (1946) revealed the shortcomings of Nile control devices, paving the way for larger, more ambitious projects of major territorial significance.

The Century Storage Scheme, The High Aswan Dam

Premises of a large dam at Aswan, "The Aswan project" as it was termed, came to the fore almost immediately after the Low Dam's completion. The Egyptian Government discussed it in

²³ See Anne M. Jennings, *The Nubians of West Aswan: Village Women in the Midst of Change* (Boulder: L. Rienner Publishers, 1995).

²⁴ Travis Cook, "Engineering Modernity: The Aswan Low Dam and Modernizing the Nile," Department of History capstone paper, Western Oregon University, 2013.

²⁵ See Mamdouh Shahin, *Hydrology of the Nile Basin* (Amsterdam; New York: Elsevier, 1985).

1919.²⁶ Incentives for construction of a higher dam already appear to have been tightly related to food security and national development. Flood control and the production of hydroelectric power to sustain the country's industrialization and agriculture, along with a fertilizer plant, were the key objectives. Yet, negotiations from 1929 to 1939 revealed that the project might be unfeasible. In 1946, the Ministry of Public Works published the "Century Storage Scheme," a comprehensive water plan for the entire Nile basin.²⁷ The author of the report was a civil servant to the British crown, hydrologist Harold E. Hurst. He was sometimes referred to as *Abu Nil*, "Father of the Nile," for his extensive statistical research on the river. According to Hurst, the management of the Nile's waters should span centuries rather than rely on short-term planning. The Scheme comprised several projects: i.e., a storage facility at the Uganda-Sudan border, a dam at Sennar to irrigate the region south of Khartoum, and a dam on the White Nile to retain summer floodwaters for Egypt. It stretched across several British-controlled territories. This vision, based on years of data collection on the Nile waters, considered the river as a transnational entity. Indeed, Egypt, dubbed the "Gift of the Nile," benefits from a water catchment system that encompasses nine nations, and yet hydropower and agriculture could only prosper when liberated from floods and droughts, with over-year storage.²⁸ Ignoring national boundaries, Hurst's project was drafted in the context of British colonial supremacy and its territorial sphere. Consequently, when countries along the Nile later became independent states, every single portion of the plan triggered major political battles, most notably with the dams on Lake Albert and Lake Victoria. Still, the Scheme was implemented in parts. 1954 saw completion of the Owen-Falls Dam at the exit of the Nile from Lake Victoria, followed by the dams at Lake Albert and Lake Tana.

According to the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS), the construction of the High Aswan Dam would not have been necessary, had the Century Storage Scheme been realized.²⁹ At the end of his book *The Nile*, Hurst himself mentions that he had "received (1951) a pamphlet by Mr. Adrian Daninos proposing a new dam at Aswan of such a height as to form a reservoir capable of performing Century Storage on the Main Nile, and at the same time providing an enormous amount of power, by means of which

²⁶ See Terje Tvedt, *The River Nile in the Age of the British. Political Ecology and the Quest for Economic Power* (Cairo: The American University in Cairo Press, 2006).

²⁷ See Harold E. Hurst, R. P. Black, and Y. M. Simaika, *The Future Conservation of the Nile* (Cairo: S.O.P. Press, 1946).

²⁸ David B. Small, *Methods in the Mediterranean: Historical and Archaeological Views on Texts and Archaeology* (Leiden; New York: E.J. Brill, 1995), 64.

²⁹ See Fouad N. Ibrahim and Barbara Ibrahim, *Egypt. An Economic Geography* (London; New York: I.B. Tauris, 2003).

Egypt might become an industrial country. (...) The proposal is worthy of some examination to see whether the difficulties are as formidable as they first appear.”³⁰

As the Low Dam threatened to overflow for a third time in 1946, the decision was made to build a second dam a few miles upstream – a decision confirmed after the ousting of the monarch by the Free Officers. Rooted in a modernist rationale, the first Aswan Dam paved the way for the largest hydro-power infrastructure based on foreign expertise in Egypt: the High Aswan Dam. A Greek engineer, Adrien Daninos, drafted the first tangible plans for a gigantic dam at Aswan. With twenty-six times the capacity of the Low Dam, Daninos claimed that besides regulating the Nile, his project would expand arable land by one-sixth and boost agricultural exports and industrialization.

Dismissed by King Farouk (1936-1952), his project was to find a sympathetic ear in the Free Officers. Only six weeks after taking power in 1952, the new regime had already enacted a land reform law. The reform was aimed at reducing the leverage of big landowners while correcting the imbalance in ownership to solve poverty. Complete with industrialization and land reclamation measures, the agrarian reform needed the High Dam project to sustain its goals. Thus, motivations for its construction spanned from energy production to Cold War political arrangements, yet the primary objective was to feed the Egyptian population by improving irrigation and enabling large desert reclamation schemes for agriculture and food security. The Aswan project appeared to be a viable alternative to the Century Storage Scheme, because its location on Egyptian ground guaranteed domestic control over Nile waters. By providing year-round irrigation on the Delta, the dam held great promises concerning self-sufficiency and food production. One of the expected benefits of the High Aswan Dam was allowing irrigation of new lands. The fields could be redistributed to farmers, sustaining the agrarian reform. Additionally, the dam carried political benefits. Displaying Egypt’s capacity to modernize, nurturing its national pride, and legitimizing the new regime, it propelled the nation into a stage of development. Abundant literature exists on the political, economic, and diplomatic intricacies surrounding the construction of the High Aswan Dam in the Cold War context.³¹ These need not be extensively reexamined here. Concisely, Britain, the USA and the World Bank had agreed to grant loans to finance the project (USD 1.6 billion). German experts (the firm *Hochtief*) had

³⁰ Hurst, *The Nile; a General Account of the River and the Utilization of Its Waters*, 320.

³¹ See Elizabeth Edith Lytle, *The Aswan High Dam* (Monticello, III.: Council of Planning Librarians, 1977).

already drafted detailed plans.³² In July 1956, in retaliation to the renegeing of this financial agreement, Nasser announced the nationalization of the Suez Canal and of its operator, the Suez Canal Company, to finance the dam. Israeli troops, followed by British and French military forces invaded the area in October 1956. Compelled by the condemnation of tripartite action by the USA, the USSR, and the United Nations, the invaders retreated, leaving Egypt with sole ownership of the Canal. In 1958, the Soviet Union stepped up to provide financial and technical assistance. This alliance was given due political weight by a highly symbolic ceremony marking the first stage of building the High Dam.

In 1964, Gamal Abdel Nasser and Soviet leader Nikita Khrushchev met at Aswan, pressing a button to divert the Nile. Sudan and Egypt had signed the bi-lateral Nile Waters Agreement to allocate water flows through the border, earlier in 1959. Plans had been finalized at the Hydroprojekt Institute in Moscow and construction started in 1960. Knowledge transfer and Soviet machinery largely contributed to what could be considered an early form of “development aid.” The dam was completed in 1971 for a total cost of EGP 500 million (about USD 1 billion), which were repaid with revenue from power sales within three years. The infrastructure is 3600 meters long and pyramidal in shape (980 meters wide at the base and 40 meters at the top), rising 111 meters above the Nile floor. Six tunnels of 14 meters in diameter release and regulate water flow, while 12 generating units produce electrical power. Lake Nasser (also called *Es-Sadd el-Ali* Lake) is a 182-meter-deep reservoir above the dam, with a storage capacity of 164 billion cubic meters, which spans 500 kilometers across the Egyptian–Sudanese border. With a water surface of about 5,500 square kilometers, it obliterated a large part of the province of Nubia. This storage holds excess water from floods for several years, and releases it in dry times, putting an end to 3.5-meter-high floods in the High Delta area. Without the fertile silt carried by the floods, and as the country engaged in the “Green” agricultural revolution, consumption of fertilizers increased dramatically and constituted a considerable drain for the nation budget. Built approximately at the same time than the dam and inaugurated in early 1963, the Kima nitrate factory was to sustain the country’s food production. New housing districts to host foreign experts and workers were also erected. In the mid 1980s, an airport and several hotels were constructed for the blooming tourist industry, with visitors coming to see the displaced temples of Abu Simbel, Philae, as well as the Dam itself.³³ The large hydropower infrastructure and backbone of

³² See William J. Burns, *Economic Aid and American Policy toward Egypt, 1955-1981* (Albany: State University of New York Press, 1985).

³³ Anne M. Jennings, *The Nubians of West Aswan: Village Women in the Midst of Change* (Boulder: L. Rienner Publishers, 1995), 135.

Egypt's development triggered much controversy.³⁴ The material effects of the dam on environmental, social, and cultural concerns highlighted how infrastructure – tightly correlated to food systems and matters of food security – could impact social and territorial space at various scales. In term of food production and agriculture, the claimed benefits of the dam are well known. Summer crops that previously had to be irrigated while the Nile level was low are now cultivated year-round thanks to permanent irrigation. The waters of the Nile are regulated, preventing drought or floods, both devastating afflictions for agriculture. Navigation and transportation of goods, people, and food on the river also became more efficient. Production of hydro-energy has been providing approximately 20 percent of the electricity of Egypt. The cultivable area available for crops and food production is said to have increased by 20 percent. Social anthropologist Taylor Scudder sums up the overall assessment as follow: “Built exclusively for Egypt’s benefit, short and medium term results, including resettlement, have been largely positive at the national, regional and local levels”.³⁵ However, these ameliorations have come under criticism. Paradoxically, the abundance of Nile water has caused damages to the land. Between 1970 and 1998, 286,000 hectares of formally fertile land were lost to waterlogging, salinization, and urbanization.^{36 37} The rise of underground water tables has damaged structures of local houses and antiquities alike. In areas of Cairo, ground water level is only 80 centimeters away from the surface. A consequence of waterlogging and lack of appropriate drainage, salinity in soil decreases the productivity of agricultural land. This fertility decline is compounded by the deprivation of fertilizing sediments from the Blue Nile previously deposited by floods on agrarian land and now trapped by the dam. This led to a consequential surge in the use of chemical fertilizers, which were subsidized by the government until the introduction of IMF Structural Adjustment Programs in 1994. Further silt depravation intensified riverbed degradation and coastal erosion –actual land loss on the Delta shores. Additionally, the brick industry, which relied heavily on silt extracted from canals for production, once deprived of its traditional material, turned to buying topsoil from farmers' fields – the existing alluvium of arable land.³⁸ Estimates claimed that 120 square kilometers of fertile grounds were lost annually, prompting the

³⁴ See Hussein M. Fahim, *Dams, People, and Development: The Aswan High Dam Case* (New York: Pergamon Press, 1981).

³⁵ Thayer Scudder, "The Aswan High Dam Case," (PhD diss. California Institute of Technology, 2003).

³⁶ United Nations Development Programme, Regional Bureau for Arab States, and Arab Fund for Economic Social Development, "The Arab Human Development Report 2002: Creating Opportunities for Future Generations," ed. Nadir Farjani (New York: United Nations Development Programme, Regional Bureau for Arab States, 2002), 150.

³⁷ Ibrahim and Ibrahim, *Egypt. An Economic Geography*, 78.

³⁸ *Ibid.*, 105.

Mubarak government to ban the practice.³⁹ Soil scraping still remains a prevalent method for brick used in construction in rural Egypt, perpetuating the ongoing obliteration of old agrarian land.⁴⁰ While 743,000 hectares were reclaimed on desert land during the four decades after the dam's completion, reclaimed agrarian land is by no means as fertile as soils of the alluvial plains in the Nile valley.⁴¹ Thus, the overall loss of cultivable land, soil productivity, and additional costs generated for farmers contributed to rural poverty, which in turn accelerated migration to cities – a population transfer at the territorial scale. Another impact is urban sprawl. Fields previously on floodable grounds became permanently dry and potentially habitable. Construction on these lands sprouted up near existing urban areas. In *Rule of Experts*, Timothy Mitchell foregrounds additional effects of infrastructure building on food security and the constitution of the built environment. He argues that the extension of sugarcane fields facilitated by year-round irrigation supplanted wheat production. This, in addition to possibly reducing food self-sufficiency, resulted in less available straw for vernacular construction and less free time for farmers to produce mud bricks, causing a shift in local modes of construction away from traditional vernacular architecture towards modern reinforced concrete structures with red brick infill.⁴²

Other controversial consequences of the dam construction involve the displacement of antiquities. The spectacular relocations of seventeen historical temples of Lower Nubia (Philae, Abu Simbel, etc.) were financed by the same international community that had denied help for the High Dam. While the infrastructure was built with Soviet money and expertise along with Egyptian resources and work forces, the Western consortium that had withdrawn from financing the project engaged in what Lucia Allais calls, in her extensive examination of the rescue of Abu Simbel, a “world-historical event.” She frames the power struggle as follows: “By 1964 the dam had become a veritable iron curtain neatly dividing the Nile Valley between Eastern and Western blocks, each side running a large-scale engineering project. Downstream, more than 800 Russian engineers built the dam and its associated power stations. Upstream, Nubia was crowded with Western archaeologists and engineers brought by Unesco to survey and salvage hundreds of monuments and sites.”⁴³ In an attempt to counterbalance the missed opportunity of exerting

³⁹ Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*, 195.

⁴⁰ Debora MacKenzie, "Egypt's Great Bricks Crisis," *New Scientist*, May 30, 1985.

⁴¹ CAPMAS, *Statistical Year Book 1993–2000* (Cairo, 2001).

⁴² Detlef Müller-Mahn, "Spaces of Poverty: The Geography of Social Change in Rural Egypt," in *Directions of Change in Rural Egypt*, eds. Nicholas S. Hopkins and Kirsten Westergaard (Cairo: American University in Cairo Press, 1998).

⁴³ Lucia Allais, "Integrities: The Salvage of Abu Simbel," *Grey Room*, no. 50 (2013): 12.

influence via the construction of the dam, Western nations positioned themselves as culturally superior. By undertaking a monumental endeavor of such sort, the role of foreign influences in shaping Egyptian territory became more detectible, with effects that were to increase after Nasser, albeit in other forms. Conjointly, the exodus of 120,000 Nubians took place as their habitat was submerged.⁴⁴ Migration was already underway as a consequence of the first dam, which had crippled the agricultural system of the region, forcing Nubians to move to urban centers. Populations were relocated to other areas, notably New Nubia, 800 kilometers from Cairo. Marking the dawn of desert urbanization, new towns were established for the displaced populations.⁴⁵ As part of existing land reclamation plans, sites like Kom Ombo, 50 kilometers north of Aswan, were chosen because considered favorable for the cultivation of cash crops (sugar cane mostly). Traumatic, but framed in the ongoing discourse of progress, these resettlements were presented and accepted as a positive contribution to national development, embedded in the international race towards modernization.

The physical effects associated with the High Aswan Dam are multiple and profound. The massive hydro-infrastructure and its appending schemes (land reclamation, irrigation works, nitrate factories, industry, etc.) are built upon national narratives of food security and development. Mass volumes of earth, water and people were quantified, moved, and remodeled. Mitchell highlights why water management infrastructures are of utter relevance to rulers: “Dams were unique in the scope and manner in which they altered the distribution of resources across space and time, among entire communities and ecosystems. They offered more than just a promise of agricultural development or technical progress. For many postcolonial governments, this ability to rearrange the natural and social environment became a means to demonstrate the strength of the modern state as a techno-economic power.”⁴⁶ Thus, the High Dam marked a culminating point of the national development project initiated by Mohamed Ali more than a century ago.

Land Reclamation Schemes

Released in 1964, a set of two stamps of the United Arab Republic (Egypt until 1971) celebrated, “Electricity” and “Land Reclamation,” with the former showing an image of the High

⁴⁴ Roman Poeschke, *Nubians in Egypt and Sudan: Constraints and Coping Strategies* (Saarbrücken: Verlag für Entwicklungspolitik Saarbrücken, 1996), 37.

⁴⁵ For instance, Nasser City, the administrative center of Kom Obo.

⁴⁶ Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*, 21.

Dam and the latter, depicting a farmer driving a tractor on sand and trailed by a house, a windmill and a wheat spikelet.⁴⁷ In 2002, the Egypt Post issued another stamp. This one represented a colorful image of the Mubarak Pumping Station, reading “Toshka Land Reclamation Project.” Spanning over almost four decades, these memorabilia illustrate how hydro-infrastructures are linked to the conquest of the desert, the continuous commitment of Egyptian politicians to land reclamation schemes from Nasser’s socialist agenda to Mubarak’s neoliberal aspirations, and the popularity of these endeavors. As phrased by Robert Maro in *The Economy of Egypt*, “Much glamour is attached to desert reclamation.”⁴⁸ But beyond the glamour, agrarian fields within the *zimam* (the border zone between cultivated and desert land) constitute a productive, quantifiable, taxable, and controllable territory.⁴⁹ In fact, Ottoman rulers had already attempted to increase the surface available for agriculture, and by extension, tax revenues. In the 19th century, the irrigation works of Muhammad Ali propelled the modern process of land reclamation by facilitating land cultivation at the immediate limits of the so-called “Old Lands” in the Nile Delta and Nile Valley. Restricted by the irregular debit of the Nile, the efforts undertaken by the Khedive and his successors focused on restoring abandoned, swampy, and saline agriculture lands. Colonial powers pursued the practice with mitigated success. Because of these developments and the succession of infrastructures on the river, private investors, companies, and colonial authorities reclaimed 400,000 *feddans* (circa 200,000 hectares) between 1892 and 1952.⁵⁰ Following the Land Reform Act of 1952, agricultural expansion became a central preoccupation of the new regime seeking food security for the nation, a goal that appeared reachable by intensifying desert developments.

Desert land projects materialized as an ideal solution to Egypt’s problems, offering clean slates for new rural societies through social and physical engineering on large scales without requiring demolition. The conquest of the desert, supported by hydro-infrastructures, became a topic of prime political importance under Nasser and remains an enduring feature of national modernization and food security narratives, its implementation spanning over decades.⁵¹ In the post-colonial period, the evolution of land reclamation programs stretches across four phases: A

⁴⁷ In Egypt, the terms “land reclamation” and “horizontal expansion” designate desert land brought under cultivation or developed.

⁴⁸ Robert Mabro, *The Egyptian Economy, 1952–1972* (Oxford: Clarendon Press, 1974), 99.

⁴⁹ The *zimam* is an abstract border between cultivation and desert, with lands cultivated inside the *zimam* taxed by central powers and land outside considered state property or public land.

⁵⁰ Mabro, *The Egyptian Economy, 1952–1972*, 98.

⁵¹ *Ibid.*, 99.

pioneering phase (1952-1959), an investment phase (1960-1968), a reassessment phase (1969-1978), and a privatization phase (1979-1996).

The first phase (1952-1959) saw the implementation of major pilot projects aiming for the expansion of agricultural land and the creation of a new rural social order. In April 1953, a state-controlled project started in the Tahrir Province. Located on parts of the Western Desert, the government provided financing, organizational direction, and technical cadres.⁵² The area was close to Cairo, with access to an aquifer and Nile water. The goals were to reclaim 1.2 million *feddans* and to build 11 new villages. Mudiriyyat al-Tahrir followed socialist guidelines loosely based on Soviet models, included training, education, and desert-adaptation programs, communal living, and limited land ownership.⁵³ The land was collectively cultivated and equipped with mechanized technologies. Financing derived from the sale of royal properties, production profits, and Soviet funding. Considered extremely successful, Mudiriyyat al-Tahrir was later developed in a large-scale fruit production for export. Scholars claim it became the model for Mubarak projects like Toshka.⁵⁴ Launched in May 1953 in a marshy area close to Alexandria, Abis, a project of smaller scope began as part of the collaborative program “Egyptian-American Rural Improvement Services Project” (EARIS). On Lake Mariut swamps, dykes were built, surface water pumped and drained, and canals dug and leveled.⁵⁵ The 37,000 *feddans* reclaimed (in Abis, Kom Oshim and Quta) went to landless farmers. EARIS was joint-funded by Egypt and the United States (USD 15 and 10 million respectively) who supplied direct technical assistance and a significant amount of surplus equipment.⁵⁶ The scheme entailed socioeconomic and urban components, with “each farmer (...) given 5 acres of land, a house and a cow.”⁵⁷ In 1958, Nasser also announced a “New Valley” project in the Western Desert (see section [The Toshka Project](#)). Termed by sociologist Omnia El Shakry “pioneering ethic,” desert developments respond to the

⁵² Sarah Voll, "Egyptian Land Reclamation since the Revolution," *The Middle East Journal* 34, no. 2 (1980).

⁵³ See Reem Abou-El-Fadl, *Revolutionary Egypt: Connecting Domestic and International Struggles* (London; New York, NY: Routledge/Taylor & Francis Group, 2015).

⁵⁴ Abou-El-Fadl, *Revolutionary Egypt: Connecting Domestic and International Struggles*, 107.

⁵⁵ Tom Zalla, "Availability and Quality of Agricultural Data for the New Lands in Egypt," ed. Abt Associates Inc. (Cairo: Government of Egypt, Ministry of Agriculture and Land Reclamation, United States Agency for International Development, 2000), 9.

⁵⁶ Jessica Barnes, "Expanding the Nile's Watershed: The Science and Politics of Land Reclamation in Egypt," in *Water on Sand: Environmental Histories of the Middle East and North Africa*, ed. Alan Mikhail (New York: Oxford University Press, 2012).

⁵⁷ Sardar. S. Johl, "Irrigation and Agricultural Development," (paper presented at the International Expert Consultation on Irrigation Agricultural Development, Muassasat al-Bahth, al-Ilmi, Baghdad, Iraq, 1979).

need for a substantial increase of available cultivated area triggered by Nasser's policies of land redistribution to rural populations.⁵⁸ Such projects belonged to a social-welfare framework envisioning social engineering, agricultural productivity, and territorial growth towards national modernization. Integrating urbanization and the disciplining of rural populations in its schemes, these holistic approaches were paradigmatic of land reclamation projects under Nasser. The farming of "New Lands," such as the Abis and Tahrir projects, included the creation of new urban centers, accommodating local authorities, services, and housing for workers. A new narrative emerged. Agricultural activities on desert land appeared as the solution to Egypt's rapidly expanding population, providing employment and physical space, becoming altogether "an economic investment, (...) a social endeavor and a political imperative."⁵⁹

The second phase was one of rapid investment, which mainly corresponded to the first and second Five-Year Plans of 1960-1965 and 1965-1970. Formulated by the General Authority for Desert Development (GADD) and the Land Reclamation Authority, the first Five-Year-Plan targeted reclamation of 521,000 *feddans* in the Delta (in Northern Tahrir) irrigated with Nile water and another 300,000 *feddans* using underground and High Dam reservoir water. With the dam, the government had in fact begun to promote and fund large-scale, state-run projects, such as state-owned farms. However, by the end of the period, less than half of the total land reclaimed was under cultivation. The second Five-Year Plan aimed for 1 million *feddans*, involving foreign firms. The Plan was under the Egyptian Authority for the Utilization and Development of Reclaimed Land (EAUDRL), a sub-unit of the Ministry of Land Reclamation. Only about 169,000 *feddans* were reclaimed before the Six-Days War broke in 1967, causing economic turmoil and restricting further expansion. The only major project undertaken after the war was Noubariya (extension of South Tahrir and North Tahrir), west of the Delta, a mechanized farm supported by the Soviet Union and Russian expertise. While land reclamation in the previous era had served a distributional agenda providing farms for the landless, the program then took a noticeable turn towards higher agricultural production, national income, government revenue, and foreign exchange targets.

The third phase (1969-1978) corresponded to a reassessment of land reclamation programs, a decrease in their pace, and an overall shift in national politics towards a

⁵⁸ See Omnia El Shakry, "Cairo as Capital of Socialist Revolution?," in *Cairo Cosmopolitan: Politics, Culture, and Urban Space in the New Globalized Middle East*, eds. Diane Singerman and Paul Amar (Cairo: American University in Cairo Press, 2006).

⁵⁹ Jeannie Sowers, "Remapping the Nation, Critiquing the State. Environmental Narratives and Desert Land Reclamation in Egypt," in *Environmental Imaginaries of the Middle East and North Africa*, eds. Diana K. Davis, Edmund Burke, and Timothy Mitchell (Athens, OH: Ohio University Press, 2011), 159.

disengagement of the state. In 1969, Nasser had recognized the relative failure of reclamation programs. The ensuing policy adjustments promoted land privatization, mechanization for intensive production, and the dismantling of state farms. After Nasser's death in 1970, land was leased for a period of 40 years to agricultural workers on state farms (5 *feddans*), to young graduates (10 to 20 *feddans*), and to large foreign or Egyptian private companies. With land reclamation emerging as expensive, barely productive, and with meager economic returns, preference was given to projects set on improving productivity of existing reclaimed lands. To sum up, the model developed after Nasser was "simply expanding cultivation to larger tracts of land via capital intensive projects."⁶⁰ Even though the completion of the Aswan dam in 1971 allowed for a major increase in the water available for reclamation, in March 1972, the government suspended all projects. Shifting to serve a more urban agenda, in 1974, Sadat called for the creation of a "new population map of Egypt" based on an extensive new-town program and "Desert Invasion" (*Ghazw al-Shara*), introducing his "New Map for Egypt."⁶¹ The first desert city was built in 1977, followed by "a variety of new urban structures including satellite cities, new towns, and new settlements."⁶² In that decade, only 40,000 *feddans* were reclaimed.⁶³ In 1978, searching for alternative sites for development to redistribute the Egyptian population, Sadat said in an interview: "Why should we not emerge from this narrow valley to new horizons in the land where there is space and water?"⁶⁴ The creation of the administrative entity of the "New Valley Governorate" in 1980 to oversee a vast, still sparsely populated region, anticipated the upcoming desert development. This new impulse given to desert appropriation corresponded to adjustments in national ideology and political circumstances, and marked the fourth phase of land reclamation, one based on privatization (1980-1996). The USA, the World Bank, and the IMF were supportive of Sadat's liberalization agenda. Paradigmatic of this period, which sought a reactivation of large-scale American and international assistance, the World-Bank-funded New Land Development Project was launched in 1980. The project's objective was to increase "agricultural production in order to reduce the dependence of Egypt on food imports, and to save

⁶⁰ El Shakry, "Cairo as Capital of Socialist Revolution?," 81.

⁶¹ See Anwar Sadat, *The October Working Paper, Presented by President Mohamed Anwar El Sadat* (Cairo: Arab Republic of Egypt, Ministry of Information, State Information Service, 1974).

⁶² Dona J. Stewart, "Cities in the Desert: The Egyptian New-Town Program," *Annals of the Association of American Geographers* 86, no. 3 (1996).

⁶³ Sayed Hussein et al., "Study of New Land Allocation Policy in Egypt," Report, 65, Reform Design and Implementation Unit of Agriculture Policy Reform Program, Ministry of Agriculture and Land Reclamation with US Agency for Intl. Development, (Cairo, 1999).

⁶⁴ Sowers, "Remapping the Nation, Critiquing the State. Environmental Narratives and Desert Land Reclamation in Egypt," 167.

foreign exchange.”⁶⁵ Against the backdrop of state land being sold to private investors for reclamation, in 1981, Public Law N° 143/1981 was passed. The law stipulated that any unfarmed land outside of the *zimam* was to be classified as state-owned desert land, yet purchasable by individuals or firms. The law essentially removed the public sector’s legal monopoly on reclamation, opening the process to private, foreign companies. The government auctioned big tracks of land – sometimes as large as 50 *feddans* – and created holding companies to take over management of existing sites, while incentivizing commercial ventures on reclaimed land. Whereas the Nasser regime had favored and protected farmers, establishing new rural communities around a network of cooperatives, the Sadat government took a divergent stand. Farming rents were revised upward, tenants’ tenure rights revoked, and rural disputes committees dismantled, as “nearly anything can be justified in terms of ‘food security,’ and increased production.”⁶⁶ This reversal was epitomized with the showcase farm of Salhia (*Salhiya, Salihya*), 150,000 to-be-reclaimed *feddans* for export crops in the Eastern desert near Ismailia. In 1980, President Sadat proclaimed – while driving a US tractor on green fields in Salhia: “We have found the solution for food and housing.”⁶⁷ Running on central-pivot irrigation, the Salhia Agricultural Project was built and developed by the firm Arab Contractors. Despite being a private joint venture 40-percent-owned by foreign investors farm shares (Pepsico, the International Swedish Marketing Group, Arizona Farmers, etc.), the company received substantial government subsidies. A World Bank report from 1983 praised the project as a great “combination of urban housing development and agricultural development.” The institution advised, “that New Lands development must also consider urban development” to stem the increasing pressure of population on land.⁶⁸ The report also stated that improvement of agricultural production on “Old Lands” needed to be considered, while being less enthusiastic about the future of reclaimed “New Lands.” Because of low water availability, it capped development rate at about 100,000 families on 500,000 *feddans* (assuming 5 *feddans*/family) as a nation-wide, long-term target. It also claimed that agricultural settlements there ought to be combined with non-agricultural settlements to yield any success. Furthermore, the Bank warned

⁶⁵ Agricultural Operations Division, "Project Completion Report, New Land Development Project," (The World Bank, 1992).

⁶⁶ John Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes* (Princeton, N.J.: Princeton University Press, 1983), 300.

⁶⁷ Raymond William Baker, *Sadat and After: Struggles for Egypt's Political Soul* (Cambridge, Mass.: Harvard University Press, 1990), 32.

⁶⁸ Europe, Middle East and North Africa Regional Office, *Arab Republic of Egypt. Selected Issues in Agriculture, Irrigation and Land Reclamation* ed. Regional Projects Department (The World Bank, 1983), 31.

against the “great danger of squandering” by channeling existing water supplies to unproductive, water-intensive, and politically motivated undertakings.⁶⁹ Bank experts concluded that expansion of existing urban centers would be less costly than developing new towns in the desert, but still argued for new urban communities on unused “New Lands” next to Egyptian cities. Both advices, namely, the promotion of agricultural and urban projects as well as the urbanization of “New Lands,” were consistent with Sadat’s land policies. For instance, the large urban center built next to the existing and dilapidated city of Salhia, New Salhia, which was created by presidential decree in 1982, belonged to the first generation of Sadat’s New Cities program. Based on modernist planning guidelines, with a population target of 80,000 inhabitants, New Salhia is now home to 40,000 inhabitants, distributed in 5,500 housing units. The city, like New Damietta (1980) and New Noubariya City (1987), was classified as a “Special Nature” community, because of its agricultural functions. Although hailed as a model farm, Salhia was plagued by enormous financial losses and technical failures.⁷⁰ Indebted, the farm was privatized and restructured into a joint-venture agricultural company in 1992 (the New Salhiya Investment and Development Company), now owned by a consortium of banks and the Arab Contractors Company. As of 2016, 36 of 112 central water pivots were functioning.⁷¹ From 1982 onwards, reclamation efforts focused on sandy desert soils (west of the Delta, in the Sinai, and in Upper Egypt, parallel to the Nile Valley.) In 1983, a third Five-Year Plan stipulated the reclamation of 500,000 *feddans* by 1987. Encouraging private and cooperative sectors’ participation in the reclamation programs, about 132,000 *feddans* were actually gained by the public sector and 58,000 by private companies. After Sadat, President Mubarak followed similar liberal reclamation policies. Agricultural strategies still envisioned an increased agricultural productivity, aiming to diminish the country’s reliance on imported food, particularly wheat, and to reduce population density in the Nile Valley and Delta. In 1986, a Land Master Plan study was undertaken to identify areas most appropriate for expanding irrigation.⁷² The resultant Land Master Plan was an essential document that went on to determine years of land reclamation projects. The Plan involved the Egyptian Ministry of Agriculture and Land Reclamation (MALR), the Dutch Ministry of Foreign Affairs, and the Dutch-Egyptian company Euroconsult-Pacer Consultants. Based on the FAO High Dam soil

⁶⁹ Ibid., 37.

⁷⁰ Nicholas S. Hopkins and Kirsten Westergaard, “Directions of Change in Rural Egypt,” *Digest of Middle East Studies* 8, no. 2 (1999).

⁷¹ Google Earth, 2016.

⁷² See David E. Sims, *Egypt’s Desert Dreams: Development or Disaster?* (Cairo: The American University in Cairo Press, 2014).

survey, satellite data and other soil studies, the General Authority for Rehabilitation Projects and Agricultural Development (GARPAD) supervised the survey, which was done at scales of 1:250,000 and 1:50,000.⁷³ According to the Plan, 2.88 million *feddans* appeared suitable for development with Nile water and canal water pumps.⁷⁴

In 1987, the Graduates Project or Mubarak Project was initiated (aka. the Mubarak Project for Developing and Serving the Land Allocated to Young Graduates, *Qura al-Kharigeen*). Unemployed high school and college graduates, and other social beneficiaries received plots of “New Lands” of 5 *feddans*. GARPAD offered to graduates a first leaching of the soil, a house, and a monthly salary of LE 50 for a period of four years. At the same time, the fourth Five-Year Plan (1988-1992) pursued an ambitious reclamation target of 750,000 *feddans*, i.e. 150,000 per year. However, as neither government nor international donors delivered the necessary funds, the private sector was encouraged to engage in reclamation, with the state providing the necessary infrastructure. This was a critical moment in the early 1990s, when the Mubarak regime, upon realizing that land reclamation projects were a budgetary strain, handed over desert development to private companies. Following this trend, a fifth Five-Year Plan (1993-1997) aimed at 572,000 *feddans* – a target almost reached considering that 469,900 *feddans* were reclaimed. Private sector involvement grew as companies financed infrastructures in half of these areas. Additionally, the transfer of reclamation projects to the private sector signaled a shift from food crops production to agricultural exports (such as horticultural commodities and cotton).

Under Mubarak, privatization of the Egyptian economy, policies and market reforms of the agricultural sector, have been detrimental to both national food security and agricultural labor forces. Law N°96/1992, which reversed the tenancy guarantees of Nasser’s Agrarian Reform Act of 1952 epitomized this struggle as, for example, outlined by Ray Bush in “Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt.”⁷⁵ Four decades of land reclamation projects offer proof of how ideologies concerning socio-spatial organization evolved – from programs promoting rural villages built upon semi-socialist utopias to practices of neoliberal urban development benefiting governmental elites.

The current phase in land reclamation is the *Egypt 2017 Urban Development Plan*, a 20-year strategy (1997-2017) for urbanization and land reclamation launched in 1996, claiming to

⁷³ Wfirst name?. J. Dorman, "Exclusion and Informality: The Praetorian Politics of Land Management in Cairo, Egypt," *International Journal of Urban and Regional Research* 37, no. 5 (2013).

⁷⁴ Zalla, "Availability and Quality of Agricultural Data for the New Lands in Egypt."

⁷⁵ Ray Bush, "Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt," *Third World Quarterly* 28, no. 8 (2007).

cope with rising population and food security. Merging rural and urban schemes, the plan builds upon existing agriculture and urban development strategies, albeit at an unprecedented scale. 24.4 million people are to settle into the desert. Among these, 13.3 million inhabitants would move to 44 New Cities and the rest to land reclamation projects on 4.3 million *feddans* including the revived New Valley project and Toshka.⁷⁶

The Toshka Project

The geneses of Toshka are many, for a single propelling force could not instigate and construct a project of such size. In the previous section, the infrastructural chronicle of monumental water projects illuminated an impressive legacy of national technological achievements in Egypt. The historical account of land reclamation policies revealed how such schemes, originally deployed as tools of agricultural prosperity and food security, later became instruments of constructed national narratives. An examination of the material components and the different actors involved at all stages of Toshka exposes how a project of such scale and controversy could emerge. Moreover, an inquiry into the detectable impacts of such a project on the physical environment illuminates how space in being appropriated in the name of ‘food security’ as political and economic agenda.

The New Valley Western Oasis

In 1953, inspired by historical accounts of prosperous settlements in the oases of the Western Desert, the Ministry of Agriculture commissioned a survey of available groundwater to the U.S. Foreign Operations Administration in Cairo. On its behalf, the US Geological Survey (USGS) conducted groundwater investigations of selected desert areas. Although the Underground Water Survey was abandoned in 1956, 22 artesian wells were drilled in the oases of Khargah and Dakhelah, drawing from that incomplete report.⁷⁷ On this occasion, the General Authority for Desert Development (GADD) was established to support what was to become the New Valley Western Oasis Development Project (NVWOD, *El-Wadi El-Gadeed* or “The New Valley”).⁷⁸ The New Valley was also the first approved project of the freshly created Permanent Organization for Land Reclamation (POLR). In 1958, Nasser announced in an official speech

⁷⁶ Yahia Shawkat and MennatuAllah Hendawy, "Myths and Facts of Urban Planning in Egypt," *Built Environment Observatory*, November 20, 2016, http://marsadomran.info/en/policy_analysis/2016/11/501/.

⁷⁷ George C. Taylor, "Historical Review of the International Water-Resources Program of the U.S. Geological Survey, 1940-70," ed. United States Agency for International Development and Geological Survey (Washington: U.S. Govt. Print. Off., 1976).

⁷⁸ Voll, "Egyptian Land Reclamation since the Revolution."

the launch of the New Valley reclamation project: "Today, brethren, we turn to the Western Desert to establish there a New Valley, parallel to the valley of the Nile. We are endeavoring to utilize the water of the wells in order to create new lands.... [T]here are cultivable lands there estimated at 3 million *feddans* which are being left uncultivated."⁷⁹ Formed by a prehistoric arm of the Nile located in the lowlands of the Western Desert, (now known as the New Valley Governorate), the New Valley is a chain of lush oases (Dakhelah, Khargah, Bahriyah, Farafrah), located over large quantities of fossil ground water. As part of the first Five-Year Plan (1960-1965), the goal was to expand the existing cultivation areas into the oases. Irrigation water came from 3000 wells drilling 30 to 80 meters deep in the aquifer and 300 boreholes going 400 to 1500 meters deep. The extracted deep water was salty and unusable, however, leading to disappointing production results. Also, because of the extraction of large quantities of the aquifers' water, the artesian wells stopped functioning. Pumps were installed at great costs. These misfortunes explain why desert land reclamation in the New Valley was not successful, with less than 30 percent of goals achieved. By 1967, efforts concentrated on Dakhelah and Khargah. The oases of Bahriyah and Farafrah were excluded from GADD's program, considered too remote and challenging to cultivate. The USGS technical support of the New Valley Project phased out in May 1967 and the collaboration ended on this partial fiasco. Only 18,350 *feddans* were under cultivation out of the 45,000 *feddans* reclaimed in the New Valley oases. In parallel to these efforts, the Ministry of Irrigation and Water had also launched investigations around the Toshka Depression. The resulting survey from 1971 estimated that "one-half million acres from the 1.5 million of the Toshka Depression were arable for cultivation if watered."⁸⁰ The 1973 War halted all desert projects, but in January 1974, the Egyptian government signed an agreement with the United Nations Development Program (UNDP) for aid in the New Valley. In 1980, critics began to question the agricultural potential of the oases. Opponents noted the difficult soil, water, and climate conditions, saying that local soil variety is problematic to manage, that costs generated by pumping water make irrigation for cultivation prohibitive, and that high temperatures and hot winds cause damage to sensitive crops. Economist Sarah P. Voll stated, in her 1980 essay entitled "Egyptian Land Reclamation Since the Revolution," that "The vision of a New Valley, sister to the Nile Valley, seems destined to remain a mirage."⁸¹ The government's moratorium of March

⁷⁹ United Arab Republic, "The New Valley," ed. Information Department (Cairo, 1964).

⁸⁰ Robert O. Collins, "Negotiations and Exploitation of the Nile Waters at the End of the Millennium," *Water International* 31, no. 1 (2006).

⁸¹ Voll, "Egyptian Land Reclamation since the Revolution," 140.

1982 halted reclamation projects for a while. A study conducted by UNDP in 1988 announced that “at least 50% of the deep wells drilled in the New Valley project area (Khargah and Dakhelah) have stopped flowing and pumping is now necessary.”⁸² But despite recurring failures in reaching goals both of population density and cultivated area, the New Valley Project was never abandoned. It was repackaged as the “Southern Valley Development Project”, which included Toshka.

The Southern Valley Development Project

In October 1996, President Mubarak announced the revival of Nasser’s land reclamation plans to construct a parallel Nile valley: The Southern Valley Development Project (SVDP). A USD 90 billion plan to turn the desert into an agricultural and industrial area, the SVDP included mining, oil and gas extraction and tourism activities.⁸³ The SVDP was part of the National Project for the Development of Upper Egypt (NPDUE), a regional development project for the Western and Southern Deserts that envisioned the construction of 18 new cities, 25 industrial zones, tourism centers, phosphates and iron ores plants, and 3.4 million *feddans* of reclaimed agriculture land. 30 pumping stations and a 310-kilometer-long water canal would connect Lake Nasser to the oasis of Dakhelah.⁸⁴ One particular aspect of the scheme aimed at doubling the amount of cultivated land in Upper Egypt by developing Toshka, East Uweynat, and the New Valley oases (for a total cost of USD 2 billion) as part of the 20-year strategy referred to as the “Egypt 2017 Urban Development Plan.” This strategy envisioned the relocation of certain population into new settlements in desert lands to divert pressure from the urban areas of the Nile Valley, the Nile Delta, and Cairo.⁸⁵ Over seven million persons would move to the revived New Valley by 2017, its initial completion deadline. Expansion into reclaimed lands available for farming and the upgrading of existing areas was expected to create jobs and income for rural populations, especially via exports crops. Land given to young, unemployed graduates (a continuation of the Mubarak project for the 1998-2002 period) would guarantee decent living conditions and social peace.

⁸² United Nations Development Program, "Transnational Project on the Major Regional Aquifer in North-East Africa: Proceedings of the Project Workshop Held in Khartoum, Sudan, 12th-14th December, 1987" (Khartoum, Sudan, 1988), 17.

⁸³ Warner, "The Toshka Mirage in the Egyptian Desert – River Diversion as Political Diversion."

⁸⁴ Steve Lonergan and Aaron Wolf, "Moving Water to Move People: The Toshka Project in Egypt," *Water International* 26, no. 4 (2011).

⁸⁵ Hussein et al., "Study of New Land Allocation Policy in Egypt."

As with many other political projects in Egypt, the plan appeared to be a substitute for public policies. It includes social, economic, and political solutions achieved using spatial means. As an illustration of how this rhetoric is deployed, President Mubarak declared in an interview to *Der Spiegel* that land reclamation in general and Toshka in particular were a means to fight terrorism.⁸⁶ According to his argument, creating new desert communities would reduce poverty and unemployment, the underlying reasons for radicalism and violence. In that sense, the primary goals of SVDP aligned with previous desert development projects in Egypt. To move Nile Valley and Nile Delta populations into the desert would increase agricultural and economic development, and by extension solve a range of other issues faced by the country, such as overpopulation and unemployment.

The Toshka Project

Toshka finds its pedigree in the High Aswan Dam.⁸⁷ It is in the waters of Lake Nasser, the 163,000 cubic kilometers water reservoir created by the dam, that the project originated.⁸⁸ In 1975, the lake kept rising, threatening the dam. To prevent any downstream or backflow flooding, a 22-kilometer-long and 750-meter-wide overflow-by-gravity canal was hastily excavated. It was first named “Sadat Canal” and later “Toshka Channel Spillway.” Located on the western shore of Lake Nasser, the canal connects the Toshka Bay (*Khur Toshka*) with the Kiseiba-Dungul Depression, a natural reservoir with a storage capacity of 150,000 cubic kilometers (150 billion cubic meters).⁸⁹ The Toshka Bay is a 56-kilometer-long ancient estuary of the Nile located 250 kilometers upstream from the Dam. Upgrading works conducted from 1978 to 1982 allowed the spillway to potentially receive more of the excess Lake Nasser floodwater. The spillway was turned into a concrete canal equipped with a sloped Ogee weir – a barrage-like finish.⁹⁰ While it remained unused, Egyptian engineers saw in the spillway the potential to turn

⁸⁶ Volkhard Windfuhr, "Einfach Nur Verbrecher," *Der Spiegel*, December 8, 1997, <http://www.spiegel.de/spiegel/print/d-8840252.html>.

⁸⁷ The origins of the name are disputed. Allegedly, it is the name of an ancient Nubian village drowned in Lake Nasser, albeit located in another area. Other sources mention a Nubian term meaning “flower of the garden.”

⁸⁸ “When the Egyptians planned the 565 km long Lake Nasser reservoir on the Sudanese border, they had not considered that its 163,000 km³ capacity could ever be too small.” in Jeroen Warner, “The Toshka Mirage in the Egyptian Desert – River Diversion as Political Diversion,” *Environmental Science & Policy* 30 (2013), 103.

⁸⁹ Wafeek Wahby, “The Toshka Project of Egypt. A Multidisciplinary Engineering Education Case Study: Proceedings of the 2002 American Society for Engineering Education Annual Conference & Exposition Held in Montreal, Quebec, Canada, June 2002” (Montreal, Quebec, 2002), 7.

⁹⁰ Mahmoud Kamel Mahmood, “Improvement the Efficiency of Toshka Spillway Canal (Sic),” *Water Science*, no. 37 (2005).

the Toshka Depression into lakes and “make the deserts bloom.”⁹¹ The idea resurfaced when, on the 6th of October 1996, the Nile waters massively overflowed for the first time into the canal, reaching the record high of 178.10 meters above sea level.⁹² This desert-greening vision was supported by an earlier discovery. In 1980, SIR-A, an observation imagery instrument using radar pulses aboard the NASA Space Shuttle Columbia, detected the remnants of buried prehistoric riverbeds in the Sahara Desert.⁹³ The images corroborated the Egyptian idea of an ancient lush area and a possible “restoration of the ancient Nile flow.”⁹⁴ To date, the Toshka Spillway fulfilled its purpose in 1996, 1998, 1999, 2000, and 2001. The infrastructure prevented excess silt-free water from threatening bank stability, canal intakes, barrages and shorelines, and from being released into the Nile Valley and the Mediterranean Sea.⁹⁵ The 40 billion cubic meters of water poured into the depressions also alleviated pressure on the geological faults vulnerable to fracture under the lake.⁹⁶ Stunning NASA satellite images show how water went down *Khur* Toshka into the spillway to fill five basins of the natural depression.⁹⁷ The consecutive floods created the Toshka Lakes, an impressive 1500 square kilometers water surface in the midst of the Sahara. The Toshka Lakes geographically connect the spillway at their southern edge to parts of the New Valley at the Northern edge, with the oasis of Kharga. But the lakes’ evaporation rate is very high – about 87 percent – and in 2017, all but one had already disappeared.^{98,99} Paradoxically, the many sites with the names of Toshka, including Toshka Bay, Toshka Spillway, Toshka Depression, and Toshka Lakes are not all part of the Toshka project. Although a preliminary idea suggested

⁹¹ Andrew Martin, "Mideast Facing Choice between Crops and Water," *The New York Times*, July 21, 2008, <http://www.nytimes.com/2008/07/21/business/worldbusiness/21arabfood.html>.

⁹² Mahmud M. Sayed and Medhat M. Kamal, "Flood Evaluation and Management after the High Dam Reservoir," in *International symposium on dams in the societies of the 21st century; ICOLD* (Barcelona: Francis, 2006).

⁹³ NASA, "Mission to Earth. Shuttle Imaging Radar-A," California Institute of Technology, accessed October 7, 2017, <http://www.jpl.nasa.gov/missions/shuttle-imaging-radar-a-sir-a/>.

⁹⁴ Shizuichi Sakamoto, "Mubarak Pumping Station Bringing Life to the Desert," in *Public & Municipal Systems Division Hitachi Intermedix Co. Brochure*, ed. Industrial Systems Group, 97 (Tokyo: Hitachi Intermedix Co, 2005), 12.

⁹⁵ After the massive flood of 1999, the High Aswan Dam Authority (HADA) decided to upgrade the spillway to increase its capacity. Both the *Khur* and the canal were deepened by 2 meters and widened by 500 meters, increasing water discharge from 130 to 370 million cubic meters per day. A regulator now controls the water intake from Lake Nasser.

⁹⁶ Gamal M. El-Shabrawy and Henri J. Dumont, "The Toshka Lakes," in *The Nile: Origin, Environments, Limnology, and Human Use*, ed. Henri J. Dumont (Dordrecht, Netherlands: Springer, 2009).

⁹⁷ Amiko Kauderer, "International Space Station Imagery," NASA, accessed 5 May, 2018 <http://spaceflight.nasa.gov/gallery/images/station/crew-12/html/iss012e11654.html>.

⁹⁸ Jeroen Warner, "Midnight at Noon? The Tussle over Toshka, Egypt," in *Flood Planning: The Politics of Water Security* (London: I.B. Tauris, 2011).

⁹⁹ Google Earth, 2017.

extending the spillway with a channel to the New Valley oases, the final plans abandoned this component, instead drawing water directly from Lake Nasser. While inspired by the spillway and the overflow of water into the new lakes, Toshka was a new project altogether.

Shortly before his death in 1996, Minister of Public Works and Water Resources Mohamed Rady convinced President Mubarak to revive Nasser's scheme and create a "New Delta:" the Toshka project was born.¹⁰⁰ Then-Prime Minister Kamal el-Ganzouri was also a strong advocate to the project. Following the presidential decision, assisted by foreign experts, the Mechanical and Electrical Department (MED) of the Ministry of Water Resources formulated the specifications for the project. MED invited a first delegation of engineers, planners, and politicians to the project site in November 1996, a month after Lake Nasser had overflowed into the Depression. Along with the Sadat Peace Canal in the Sinai, President Mubarak officially announced the project on 9th of January 1997. A symbolic explosion was deployed at the construction site of Toshka, 8 kilometers north of the spillway.¹⁰¹ In March, a call for tender was issued for a turnkey pumping station project that would include civil engineering and architectural works. In September the bid went to an international consortium, the Egyptian-European Japanese Consortium (EEJC). The contract between EEJC and MED was signed at the Hotel Sheraton-Heliopolis in Cairo on March 15, 1998.¹⁰² Excavation works started in August, scheduled for completion in 2002. President Mubarak first visited the site on February 15, 1999. The first phase of the project included the Mubarak Pumping Station, Sheik Zayed Canal, four minor branch canals, wells, windbreakers, and a few other buildings, as well as the reclamation and cultivation of 550,000 *feddans* (circa 227,000 hectares). EEJC was to build a partially underwater, 5-kilometer-long intake canal, a discharge basin, the pumping station, discharge ducts, maintenance workshops, residences for the employers and workers, an administration building, and auxiliary facilities. Additionally, local staff had to be trained to maintain and operate the station. At a given moment of the project, the Minister of Water Resources, Mahmoud Abu Zeid, claimed that 7,000 engineers, technicians, and workers were employed on the project.¹⁰³ Works started simultaneously on the station and the canal. To produce the necessary concrete, aggregates (basalt and gravel) were locally sourced, and sand

¹⁰⁰ See Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*.

¹⁰¹ Gale Young, "Egypt Looks to Desert to Ease Overcrowding," *CNN*, June 26, 1997, <http://edition.cnn.com/WORLD/9706/26/egypt.population/>.

¹⁰² Sakamoto, "Mubarak Pumping Station Bringing Life to the Desert," 27.

¹⁰³ "Toshka Moves," *Al-Abram Weekly*, December 2-8, 1999.

came from Kom Ombo, 100 kilometers away. The concrete mix incorporated different types of cements for better age durability. Suez Cement and the Asyut Cemex factory (a former Soviet plant) provided part of the cement.¹⁰⁴ Batching plants were installed every 5 kilometers along the canal, and 8 mixing units equipped with cooling systems (for optimal results, concrete should not reach more than 35° C), producing 1,000 cubic meters a day.¹⁰⁵ 140,000 cubic meters of concrete was used to build the pumping station alone.¹⁰⁶ Between 1998 and 2004, the construction site's progress was extensively broadcasted on national television.¹⁰⁷ An intake channel was dug underwater, transporting water from Lake Nasser to a suction basin surrounding the pumping station—regardless of the lake level. The intake basin is a 54-meter-deep pit measuring 167 meters long by 75 meters wide, excavated in Nubian sandstone. Said to be the largest of its kind, the Mubarak Pumping Station is an island-like concrete construction measuring 140 meters in length, 40 meters width, and 70 meters height, of which 50 meters are permanently submerged. 148,000 cubic meters of concrete were used for the main construction, which was installed on steel mini-piles and made earthquake resistant. The whole complex is powered by Aswan High Dam electricity. The major metal parts of the pumps (casings and discharge conducts) were manufactured in plants in Cairo with steel imported from Japan and welded on site. Six underwater pipelines and twenty-one pumping turbines arranged in two rows can raise 25 million cubic meters of water per day, delivered into Sheik Zayed Canal by twenty-four discharge concrete ducts of 3 by 2 meters. Operating around the clock, the pumping station can be activated over telephone interface from Cairo. On January 12, 2003, President Mubarak came to inaugurate the project in a daylong ceremony broadcasted on national television during which he pressed a button activating the pumps, releasing a waterfall in the Sheik Zayed Canal and bringing water 50 meters up on the Nubian plateau.

Sheik Zayed Canal was designed to bring 5.5 cubic kilometers of Lake Nasser's water yearly to irrigate 550,000 *feddans* of the Western Desert to be turned into agricultural land.¹⁰⁸ The canal network was to have a total length of 310 kilometers in order to reach the city of Baris in the Khargah oasis, thus joining the Nile waters with the New Valley oases. Four branches were planned: The first branch of 37 kilometers (north-east) serving 120,000 *feddans*, the second

¹⁰⁴ Suez Cement, "Press Release," news release, September 28, 2009, <https://www.suezcement.com.eg/en/pr-28-09-2009>.

¹⁰⁵ Wafeek Wahby, "Technologies Applied in the Toshka Project of Egypt," *The Journal of Technology Studies* 30, no. 4 (2004).

¹⁰⁶ Sakamoto, "Mubarak Pumping Station Bringing Life to the Desert," 38.

¹⁰⁷ See Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*.

¹⁰⁸ Lonergan and Wolf, "Moving Water to Move People: The Toshka Project in Egypt."

branch of 35 kilometers (north-west) serving 120,000 *feddans*, the third branch of 22 kilometers (south-east) serving 100,000 *feddans*, and the fourth and longest branch (south-west) with a length of 60 kilometers serving an area of 200,000 *feddans*. The first 50 kilometers of the canal were constructed from 1997 till 2002. The main canal is 54 meters wide with a depth of 6 to 9 meters. After a compacted mix of sand and cement was applied, polyethylene sheets and 20-centimeter-thick concrete panels of 2.5 meters width were poured on site, jointed with elastic Sardinian cork.¹⁰⁹ The canal has sloped sides lined with a denser concrete to avoid water leakage. In order to produce the concrete necessary to line the canal, two aggregating and concrete batching plants were built in the vicinity. The current main canal length of 70 kilometers was to be complemented by four additional minor branch canals of 125 kilometers to provide irrigation for the surrounding lands. Currently, the canal network stops in the desert, 100 kilometers north of the pumping station, and the south branches are only partially realized.¹¹⁰ The name of the canal bears that of Sheikh Zayed Bin Sultan Al-Nahyan, president of the United Arab Emirates at the time, who invested USD 100 million for its construction. Under supervision of the Abu Dhabi Fund for Development (ADFD), the grant was mainly used for the construction of branch 3, the 24-kilometer-long section south of Sheikh Zayed canal, three major lift irrigation stations, the development of experimental farmlands, and the provision of advisory services.¹¹¹ It was presented as “a gift from the United Arab Emirates to the Egyptian people,” although the involvement of the Egyptian-Saudi Real Estate Development may suggest vested interests.¹¹² The *raison d'être* for both the pumping station and the canal were to achieve the greening of the desert and the creation of new communities as part of the “Egypt 2017 Urban Development Plan.” Originally, the Toshka project aimed to irrigate 550,000 reclaimed *feddans* (circa 227,000 hectares) by lifting water from Lake Nasser.¹¹³ But with land reclamation targets having been adjusted over the years, there are important discrepancies in official figures. According to the “National Water Resources Plan for Egypt 2017” produced by the Ministry of Water Resources

¹⁰⁹ Arturo Gallia, "Making the Desert Bloom: The Toshka Project," in *Africa, Big Change, Big Chance*, ed. Benno Albrecht (Milan: Editrice Compositori, 2014).

¹¹⁰ Google Earth, 2016.

¹¹¹ WAM, "Zayed the Generous: Icon of Global Charity and Humanitarianism. UAE Remembers the Late Sheikh Zayed Bin Sultan Al Nahyan," *Emirates* 24/7, July 27, 2013, <https://gulfnews.com/news/uae/general/zayed-the-generous-an-icon-of-global-charity-1.1213989>.

¹¹² WAM/AB, "Sheikh Zayed Canal in Egypt to Create a New Delta," *WAM*, August 17, 2010, <https://www.emirates247.com/zayed-canal-in-egypt-to-create-a-new-delta-2010-08-16-1.279843>.

¹¹³ Fawzi Karajeh et al., "Water and Agriculture in Egypt," in *Egypt-Australia-ICARDA Workshop on On-farm Water-use Efficiency*, ed. International Center for Agricultural Research in Dry Areas (Cairo: Australian Government Overseas Aid Program, 2011).

and Irrigation in 2005, the current reclamation goals for Toshka are 35,000 *feddans* for agricultural land, 2,500 *feddans* for residential areas, including a target population of 100,000 inhabitants and 40,000 jobs.¹¹⁴ These objectives were altered from the original plan, which was set to be realized in two phases. In the first phase, upon completion of the Sheikh Zayed Canal, 550,000 *feddans* would have been reclaimed until 2017 (100,000 in Farafrah's Qarween Valley, 200,000 in East Uweynat, 200,000 in South Khargah, 50,000 in Toshka itself.) At the end of the second phase in 2017, a total of 2 million *feddans* would have been recovered from the Western Desert. However, the government announced in 2005 the cancellation of the second phase, extending the project's completion deadline to 2022.¹¹⁵ Marketing efforts attempted to capture investors and uphold national attention. In 2006, the Ministry of Investment visited the project with various foreign delegations such as the Egyptian-European Council (EEC), ambassadors of European Union member states, and the ambassador of the European Commission.¹¹⁶ Yet, in 2009, the government recognized difficulties in planning as stated in the *Sustainable Agricultural Development Strategy Towards 2030* report: "The concept of land reclamation has been restricted to the provision of infrastructure, irrigation facilities, roads and energy needs, without giving much attention to the provision of agricultural and social services necessary to establish settled agricultural communities. This has (...) impeded the utilization of investments spent on establishing the infrastructure in these areas. One example is the Toshka project."¹¹⁷ Estimates from 2010 suggested that 16,500 *feddans* were irrigated at Toshka.¹¹⁸ The urbanization ambitions of the project that aimed to sustain seven million people in 2017 to alleviate pressure on the country's crowded cities fizzled throughout the years. The planned New Toshka City had come to a partial standstill before 2011.¹¹⁹ After the events of 2011, critical voices became louder, doubting the productivity of the scheme and the viability of massive population relocations. The new regime of Mohamed Morsi had little interest in the project, and expressed it without reserve:

¹¹⁴ Ministry of Water Resources and Irrigation Planning Sector, "National Water Resources Plan for Egypt - 2017," (Cairo: Arab Republic of Egypt, 2005).

¹¹⁵ Andre Fecteau, "On Toshka New Valley's Mega-Failure," *Egypt Independent*, April 26, 2012,, <http://www.egyptindependent.com/news/toshka-new-valleys-mega-failure>.

¹¹⁶ Niveen Wahish, "Marketing Toshka," *Al-Abram Weekly*, February 16-22, 2006, <http://weekly.ahram.org.eg/Archive/2006/782/eg8.htm>.

¹¹⁷ Ministry of Agriculture and Land Reclamation, *Sustainable Agricultural Development Strategy Towards 2030* (Cairo: Arab Republic of Egypt, 2009), 60.

¹¹⁸ Shawkat and Hendawy, "Myths and Facts of Urban Planning in Egypt".

¹¹⁹ Emmarie Kathleen Deputy, "Designed to Deceive: President Hosni Mubarak's Toshka Project" Master diss., The University of Texas, 2011).

"We are completely against Toshka as it was envisioned," said Mohamed Abdul Fattah, at the time the Muslim Brotherhood's Freedom and Justice Party's secretary general in Aswan.¹²⁰ However, in August 2014, the current president Abdel Fattah el-Sisi revived the project, reinstating the by-now classic Egyptian rhetoric of desert reclamation as an all-round solution to the country's problems.¹²¹ Based on 2016 satellite imagery, it can be estimated that roughly 21,000 *feddans* are cultivated by central-pivot irrigation.¹²² The promised job opportunities have yet to materialize, and a mere 10,000 people are employed at Toshka.

The financial aspects of the project remain shrouded in secrecy, and reliable data is difficult to obtain. Originally, the government planned to pay only 20 percent of the total investment cost. The remaining 80 percent had to be financed by domestic and international investors who would have had to provide the necessary infrastructure to cultivate their own land (subsidiary irrigation canals and irrigation system, roads, power stations, etc.). Companies would then benefit from a 20-year tax exemption, and be exempted from paying tariffs or other regulatory duties on imported equipment and machinery. Obviously, the land price of Toshka was set below market prices at LE 120/hectare, in a stark contrast to the average LE 50,000/hectare in the Nile Delta.¹²³ This was made possible by privatization reforms, with Law N°96/1992 allowing desert and arable land to be freely allocated, thus permitting speculation on land prices, marking an attractive prospect to certain investors.¹²⁴ These financial arrangements did not function as projected, however, as Timothy Mitchell explains: "Unable to persuade the World Bank or commercial investors that the Toshka scheme, as it was known, was feasible, the government proceeded with building the pumping station and an initial seventy kilometers of the canal."¹²⁵ The Mubarak regime actually financed the bulk of the project via the state-owned National Investment Bank.¹²⁶ At earlier stages of construction, the project benefited "cement makers, manufacturers of steel reinforcing bars, and contracting companies (...) with the

¹²⁰ Bradley Hope, "Egypt's New Nile Valley: Grand Plan Gone Bad," *The National*, April 22, 2012, <https://www.thenational.ae/world/mena/egypt-s-new-nile-valley-grand-plan-gone-bad-1.402214>.

¹²¹ Dina Ezzat, "Mega Projects Make a Comeback," *Al-Ahram Weekly*, Issue 1208, August 7-13, 2014, <http://weekly.ahram.org.eg/News/6942.aspx>.

¹²² Google Earth, 2016.

¹²³ Usman El Fiky, "Toward Applicable Green Architecture: An Approach to Colonize the Desert in Egypt" (PhD diss., Technische Universiteit Eindhoven, 2006).

¹²⁴ Bush, "Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt."

¹²⁵ Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*, 273.

¹²⁶ Sowers, "Remapping the Nation, Critiquing the State. Environmental Narratives and Desert Land Reclamation in Egypt."

contractors' profit on government projects said to average 30 to 40 percent of income."¹²⁷ According to the US State Department, costs so far have reached USD 87 billion.¹²⁸ Regarding agro-projects, the land was assigned to four investor groups (see next section *Agents*) whose primary objective was to resell underpriced lands rather than invest in agricultural projects. Nonetheless, Toshka was included in the 2014 "Participatory National, Regional and Governorate Strategic Planning for Balanced Spatial Development" to provide more agricultural land for crop production and develop urban settlements as part of el-Sisi's "One million *feddans* land reclamation national project."¹²⁹ ¹³⁰ Rooted in the long lineage of land reclamation plans, the "One million *feddans*" project simply expands and revives the 2009 "Three million *feddans*" reclamation plan of the Mubarak government. It is in this framework that Toshka was reactivated and new wells drilled. The USDA report "Egyptian Land Reclamation Efforts" published in 2016 highlights the difficulties of the plan, mentioning budget strain, post-reclamation management issues, and the precarious water situation of the area, with researchers remaining "skeptical of the government's ability to overcome these challenges in full."¹³¹

The scale of the Toshka project remains enormous: From the grandeur of preceding infrastructures and land reclaiming schemes to the immense territorial scale of its desert location, the massive population movement it shall host, the extraordinary amount of water absorbed, the colossal sums invested, the copious press it attracted, and the monumentality of the project itself, representing thousands of cubic meters of earth moved and concrete poured on sand. Unfortunately, the size of the undertaking is proportional to its failure. The Toshka project therefore provides a particularly salient example of the effects of the concept of food security on territory based on the multi-scalar magnitude of its infrastructure and its power of political attraction. An analysis of the agents involved will help discern how an endeavor of such scale could have been conceived, advocated, designed, financed, politically supported, and partially realized.

¹²⁷ Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*, 281.

¹²⁸ Bret Tate, "Egyptian Land Reclamation Efforts," in *GAIN report*, ed. USDA Foreign Agricultural Service & Government of Egypt (Washington: USDA, 2016).

¹²⁹ "Participatory National Regional and Governorate Strategic Planning for Balanced Spatial Development," in *Annual Progress Report*, ed. GOPP (Government Of The Arab Republic Of Egypt & The United Nations Development Programme, 2014).

¹³⁰ Ahmad Abu El Hassan Zarad, "The Mega National Projects...a Locomotive of Development," news release, March 3, 2016, <http://www.sis.gov.eg/section/352/4683?lang=en-us>.

¹³¹ Bret Tate, "Egyptian Land Reclamation Efforts," in *GAIN report*, ed. USDA Foreign Agricultural Service & Government of Egypt (Washington: USDA, 2016), 3.

Agents

While one would need to reconstruct the long list of institutions and documents (consultants' and commission reports, official missions, parliamentary exchanges, expert panels, children's books and popular pamphlets, press conferences, newspaper articles and television broadcasts, etc.) surrounding the Toshka project, the research scope can be limited to the most visible channels and routes (international institutions' surveys and policy notes, governmental strategy papers, contractors' publications, local and foreign press, etc.) of the information flows involved in order to outline the intricacies of and power structures underlying the operation. The protagonists, engaged in the political, technical, and discursive framework for land reclamation and large hydro-infrastructure, during the preliminary phases of the project, the actual construction works, and the current activities of agribusinesses at Toshka, are divided into three categories: 1) *Public*, 2) *Public-private*, and 3) *Private agents*.

1) Public agents

Desert land allocation is a complex affair in the hands of an array of institutions. Proof of this is found in the ever-expanding lists of acronyms at the beginnings of reports on land reclamation in Egypt.¹³² In fact, from 1952 until the present day, state-led development of desert land, with land reclamation efforts and agricultural projects, has generated a bureaucratic leviathan. A myriad of state bureaus have been created, renamed, divided, reassembled, and dissolved in the course of the past five decades.¹³³ Under Nasser, various entities, institutional formations, political coalitions, and army executives have engaged in horizontal expansion, fostering a technocratic elite among governmental agencies. Under Sadat, who encouraged private companies to embark in national desert greening endeavors, new public agencies in charge of managing the urbanization of desert lands increased the already large number of state entities involved in reclamation plans. Law N°143/1981 established a hierarchy of control over all land development projects: firstly defense and armed forces, followed by agriculture and land reclamation authorities, and finally new urban communities. Mubarak thus allowed the military to gain a foothold in land speculation and the privatization of public resources, and facilitated the commitment of private foreign and local firms to desert development, tourism, and agribusiness projects. He also attempted to simplify procedures and curb the bureaucracy hydra, with moderate success. While the administrative structure of land reclamation underwent considerable

¹³² E.g. The World Bank, "World Development Report 2008: Agriculture for Development," (The World Bank, 2007).

¹³³ Dorman, "Exclusion and Informality: The Praetorian Politics of Land Management in Cairo, Egypt."

evolution, institutional control over desert land is still fragmented among central and local government entities, each operating with different procedures.

Historically, in Egypt, all land was public unless cultivated or built upon. The *zimam*, the boundary between cultivated and uncultivated lands, defined the taxable area. From 1879 onward, land within this limit was charted and mapped by the Egyptian Survey Authority, under British oversight, and included in the Real Estate Tax Department's Land and Property Tax Registry.¹³⁴ Subject to the agricultural land property tax, and production taxes, land within the *zimam* has been an important income source for the state. Law N°143/1981 and Law N°7/1991 declared the remaining land outside of the *zimam* to belong to the state. David Sims classified Egyptian land into four categories: Public land, state private-domain land, private land, and religious trust land (*waqf*).¹³⁵ These partially correspond to the categories defined by the 1858 Land Law, which distinguished particular forms of land tenure: Public use land, state land (*Amlak Amerya*), privately-owned land, endowment land (*Aṣwakaf*), and dead land (*Maoat*).¹³⁶ Desert land mostly falls within the state land (or state private-domain) category, meaning it can be transferred, assigned or privately held according to governmental laws.

Established in 1954, the Permanent Organization for Land Reclamation (POLR also known as Land Reclamation Authority) was the first governmental agency responsible for reclamation and resettlement on desert land. In 1957, the General Authority of Desert Development (GADD) was created to manage land reclamation projects in the New Lands, including the drilling of government wells. In 1961, the GADD became the Ministry of Agrarian Reform and Land Reclamation (MARLR), which was comprised of two sub-entities: The Ministry of Agriculture and Land Reform (MALR) and the Ministry of Land Reclamation. Incorporating the POLR, under the authority of the Ministry of Land Reclamation, the Egyptian Authority for the Utilization and Development of Reclaimed Land (EAUDRL) was responsible for reclamation and cultivation from 1966 to 1975, when it was dissolved and replaced by the General Authority for Rehabilitation Projects and Agricultural Development (GARPAD, created in 1971 and enacted by Presidential Decree N°269/1975).¹³⁷ In 1978, GARPAD became the entity in charge

¹³⁴ Hesham Nasr and Mostafa Radwan, "Capacity Building in the Egyptian Survey Authority: A Cooperation Program with the Dutch Government" in *International Society for Photogrammetry and Remote Sensing Congress, Geo-Imagery Bridging Continents* (Istanbul, 2004).

¹³⁵ Sims, *Egypt's Desert Dreams: Development or Disaster?*, 262.

¹³⁶ See Richard A. Debs, Frank E. Vogel, and Abd al-Wahhab Sayyid Radwan, *Islamic Law and Civil Code: The Law of Property in Egypt* (New York: Columbia University Press, 2010).

¹³⁷ After 1976, MALR was united with the Ministry of Irrigation, renamed in late 1977 Ministry of Irrigation and Land Reclamation (MILR). MILR was then in charge of major land reclamation projects.

of all land reclamation activities, via the Ministry of Housing, New Communities, and Land Reclamation. This position was consolidated by Law N°143/1981. In 1986, GARPAD reintegrated the Ministry of Agriculture, while the Ministry of Irrigation merged with the Ministry of Public Works to become the Ministry of Public Works and Water Resources.¹³⁸ Today, because different public land controlling entities have “overlapping mandates, unclear jurisdiction and little horizontal coordination,” the institutional landscape governing public land is complex, with several agencies and central government ministries involved directly, indirectly, or peripherally in land reclamation.¹³⁹ ¹⁴⁰ Control over public land for agriculture and agrobusiness development outside of the *zimam* is now managed and implemented by GARPAD.¹⁴¹ The coordinating agency for all reclamation projects supersedes all former agencies involved in land reclamation. Its mission is to materialize the agricultural strategies formulated in the 1980s and 1990s that aimed to increase agricultural productivity with a view to reducing the country's reliance on imported food and decreasing population density in the Nile Valley and Nile Delta. In charge of investments, construction, and implementation of the irrigation-drainage distribution, along with other physical infrastructures, GARPAD manages all plans for areas, locations, and timing of land reclamation activities. It oversees the costs of developing irrigation infrastructure (including land leveling, irrigation canals, pumping stations, farm size, and all other infrastructure costs), the different areas reclaimed, and the distribution of new lands according to the major types of holders (beneficiaries, small investors, graduates, and big investors). GARPAD implements projects through six public sector companies, and has assumed much of the responsibility of supplying extension services to farmers in new lands. As the main planning entity, the agency coordinates with other appropriate authorities, particularly the Ministry of Public Works and Water Resources (MPWWR). Construction of major canals and drains is a joint effort between MPWWR and GARPAD. The MPWWR is responsible for irrigation water management and distribution, and for the planning, design, and construction of principal

¹³⁸ See Hiroshi Kato and Erina Iwasaki, *Rashda: The Birth and Growth of an Egyptian Oasis Village* (Leiden: Brill, 2016).

¹³⁹ The World Bank, "Egypt Public Land Management Strategy: Policy Note," (Cairo: The World Bank, 2006), 16.

¹⁴⁰ Apart from GARPAD, the Ministry of Agriculture also manages land via the General Authority for Wealth (GAFW) and the Agrarian Reform Authority (ARA). The Ministry of Culture (via the Supreme Council for Antiquities, SCA), the Ministry of Environment, the Ministry of Housing (via NUCA and the Urban Communities Holding Company), the Ministry of Tourism (via the Tourism Development Authority, TDA), the Ministry of Industry (via the General Authority for Industrial Development, GAID), the Ministry of Investment (via several holding companies), the Ministry of Petroleum (via the Specialized Company for Petroleum and Natural Gas), the Ministry of Defense and Military Production, the Ministry of Interior (via several affiliated holding companies), and other specialized authorities (Suez Canal Authority, Railroad Authority, etc.) are the main entities that can dispose of public land.

¹⁴¹ Otherwise, it is governed by the State Asset Protection Agency, under authority of governorates.

water channels (e.g., Nubariya, El Salaam, and Ismailia Canals). This ministry is in charge of designing the primary levels of the irrigation system, and once the land is reclaimed, it is responsible for delivering the water. In fact, the Mechanical and Electrical Department (MED) of the Ministry of Water Resources was the project leading authority for implementing Toshka, backed by National Investment Bank funds.

Land allocation mechanisms do not rely on standard market channels. Land prices are determined by the state (the Higher Committee for State Land Valuation) and appear unrelated to both the actual and potential value of the land. Instead, the price is set below-market to encourage investors through cheap provision of public land. GARPAD allocates land primarily through public auctions. However, until 2003, GARPAD was also allowed to allocate directly to eligible entities (governorate residents, former armed forces staff and civil servants, small farmers, young graduates, and projects of national significance) or to private investors upon spontaneous requests.¹⁴² The maximum land holding size restrictions vary from 200 *feddans* for individuals to 50,000 *feddans* for private companies. Lease ownership prevails, with rates set by the Higher Committee for State Land Valuation over a period of three years, upon which the investor's seriousness is evaluated (e.g., substantial project or infrastructure completion) and the lease converted to ownership or the land returning to the state. At Toshka, GARPAD handed over the new land to the West Delta and South Valley Development Holding Company (WDSVDHC, see following section 2) *Public-private agents*), with maintenance being assigned to MPWWR, which must guarantee sufficient water pressure through its sub-entities (i.e., the Irrigation Sector Department or the Mechanical and Electrical Department).

The urban development part of Toshka is managed by state agency NUCA, the New Urban Communities Authority. Located southeast of the Aswan-Abu Simbel road, New Toshka City should be home to 80,000 inhabitants. Construction of the projected settlement started in 2002 and halted in 2005. The project was revived by President el-Sisi in 2014, at least on paper.¹⁴³ In 2016, the government allocated more land surface to NUCA to develop New Toshka City.¹⁴⁴ Following this re-launch, another entity funded by NUCA, namely, the state-led Egyptian Rural Development Company (also known as Egyptian Company for Agricultural and Rural Development or Holding Company for Agricultural Development) was established with a capital

¹⁴² Since 2003, this is no longer allowed, in application of Law N°89/1998 on Public Tenders.

¹⁴³ "Egypt's Sisi to Launch 1.5 Million Feddan Project in Late December," *Al-Ahram Weekly*, December 14, 2015, <http://english.ahram.org.eg/News/173472.aspx>.

¹⁴⁴ "Egypt Allocates Additional Land to Toshka Project," *Mada Masr*, August 12, 2016, <https://www.madamasr.com/en/2016/08/12/news/u/egypt-allocates-additional-land-to-toshka-project/>.

of EGP 8 billion, together with the General Authority for Reconstruction Projects and Agricultural Development. The Ministry of Finance took charge of sales and distribution of desert lands earmarked for reclamation.¹⁴⁵ There are also a few military-run farms.¹⁴⁶ Among the many sub-entities engaged in land reclamation projects (e.g., Central Administration for Agricultural Economics, Central Administration for Horticulture, Economic Affairs Sector of MALR, Principal Bank for Development and Agricultural Credit), the above-mentioned authorities are the chief local public agents involved in the making of Toshka. However, these state entities were not unaccompanied in their enterprise, requiring expertise or financial support from abroad, for example.

In the enduring history of foreign involvement in Egypt, it should come as no surprise that consultants, experts, and international institutions were also drawn into the Toshka Project, though mostly indirectly. The U.S. Foreign Operations Administration (FOA) and the US Geological Survey (USGS) undertook soil surveys in the 1950s. In the 1960s, the British Aid program sponsored feasibility studies while the US engaged in multipartite agricultural schemes such as the Egyptian-American Rural Improvement Services Project (EARIS). The Dutch Ministry of Foreign Affairs conducted water surveys in the 1980s. In short, the involvement of public foreign agents in land reclamation and irrigation infrastructure projects has been significant. In the Sadat era, international institutions such as the Food and Agriculture Organization (FAO), the International Development Agency of the World Bank, and the United Nations Development Programme (UNDP) supported agricultural projects.¹⁴⁷ Foreign aid from the USA, Japan, Canada, Arab countries, and major Western European states also contributed to many projects, though funding dwindled during the 1980s. UNDP, for instance, was involved in the New Valley from 2002 to 2007 – in cooperation with the General Organization for Physical Planning (GOPP) – to help implement the “Strategic Development Plan of Southern Egypt.”¹⁴⁸ International donors were more present in the business of assessing, as outlined in multiple reports on Egypt’s agriculture and economic development. The African Development Bank, the World Bank, CEDARE (the Center for Environment and Development in the Arab World

¹⁴⁵ Mohamed Ayyad, "PM Turns to International Community to Implement 1.5m-Acre Land Reclamation Project," *Daily News Egypt*, March 6, 2016, <http://www.dailynewsegyp.com/2016/03/06/407530/>.

¹⁴⁶ "Desert Blooms: Initiatives to Green the Desert Will Boost Agricultural Production," in *The Report: Egypt 2012* (Oxford Business Group, 2012).

¹⁴⁷ The World Bank, "New Land Development Project," The World Bank Group, accessed 6 June, 2017, <http://projects.worldbank.org/P005028/new-land-development-project?lang=en&tab=overview>.

¹⁴⁸ "Implementation Mechanism of the Strategic Development Plan of Southern Egypt," in *Project Budget*, (Cairo: United Nations Development Programme & Government of Egypt, 2005).

funded by the Egyptian state, UNDP and the Arab Fund for Economic and Social Development), the FAO, UNDP, the Japan International Cooperation Agency, the French Ministère de l'Agriculture, de l'Agroalimentaire, et de la Forêt, the European Union (Nostrum-DSS), and USAID all produced – often via private consultants – numerous documents evaluating Egypt's agricultural resources. These surveys consistently mention Toshka, although no serious Environmental Impact Assessments and feasibility studies were conducted before the project started.^{149 150 151} For this very reason, USAID advised American companies not to invest.¹⁵² While some reports remain descriptive and vague, others are frankly skeptical of the project's actual situation.^{153 154} In 2014, UNDP funded the "Participatory National, Regional and Governorate Strategic Planning for Balanced Spatial Development," with Toshka among the plan's ten priority areas (e.g., the Farafrah Oasis, the Qattara Depression, Toshka, and areas around Minya).¹⁵⁵ The few public foreign agents directly engaged in the financing and realization of the Toshka project were the Arab Fund for Economic and Social Development, the Kuwait Fund for Arab Economic Development, and the Abu Dhabi Fund for Development (ADFD).¹⁵⁶ The ADFD, the foreign aid agency established by the government of Abu Dhabi in 1971, was one of the main investors in Toshka, contributing a USD 100-million grant that was set aside for the execution of the third branch of the Sheikh Zayed Canal, the construction of three smaller irrigation stations, and the development of experimental farmlands. The Netherlands-based international company Archirodon received the contract for design and construction, while Dutch Euroconsult (later Euroconsult Mott MacDonald) reviewed preliminary designs.^{157 158 159}

¹⁴⁹ "Egypt Public Land Management Strategy: Background Notes on Access to Public Land by Investment Sector: Industry, Tourism, Agriculture, and Real Estate Development," (Arab Republic of Egypt: The World Bank, 2006).

¹⁵⁰ Jacques Teyssier d'Orfeuille, Hervé Lejeune, and Henri-Luc Thibault, "Cartographie Des Acteurs De La Coopération Agricole Avec Les Pays Du Sud Et De L'Est De La Méditerranée," ed. Conseil général de l'alimentation de l'agriculture et des espaces ruraux (Paris: Ministère de l'Agriculture, de l'Agroalimentaire, et de la Forêt, 2013).

¹⁵¹ Simon A. Mason, "From Conflict to Cooperation in the Nile Basin" (PhD diss, Swiss Federal Institute of Technology, Zurich, 2003).

¹⁵² Forum 2000, Concise Report on the South Valley Development Project, Exploring Water Patterns in the Middle East (Prague: Forum 2000 Foundation, 2007)

¹⁵³ Heba Handoussa et al., "Egypt Human Development Report. Choosing Our Future: Towards a New Social Contract," ed. Gillian Potter (Cairo: United Nations Development Programme and The Institute of National Planning Egypt, 2015).

¹⁵⁴ Tate, "Egyptian Land Reclamation Efforts."

¹⁵⁵ "Participatory National Regional and Governorate Strategic Planning for Balanced Spatial Development."

¹⁵⁶ Mark Huband, "The Move from the Nile Valley," *The Financial Times*, May 11, 1999, <http://www.markhuband.com/the-move-from-the-nile-valley>.

¹⁵⁷ WAM, "Sheikh Zayed Canal in Egypt to Create a New Delta," *Emirates News Agency*, August 17, 2010, <http://wam.ae/en/details/1395228728240>.

2) *Private-public agents*

Prior to the project start, GARPAD had transferred the land at Toshka to the Ministry of Irrigation and Water Resources (MIWR), which controlled a total of 550,000 *feddans* through the West Delta and South Valley Development Holding Company (WDSVDHC) – a holding specifically created in 2002 by Presidential Decree N°25/2002 in accordance with Law N°159/1981 that allowed the establishment of joint stock companies and partnerships.¹⁶⁰ The decree also handed to the Company ownership of additional unallocated public land at Toshka.¹⁶¹ WDSVDHC disposed of this land for investment projects and established local shareholding companies for developing purposes, with revenues from land sales flowing back to the holding.¹⁶² With a shared capital of EGP 35 million, the holding owns shares of Egyptian companies focusing on agricultural development: Tyba, El-Watad, El-Mostathmeron, El-Hoda, El-Ekhlaas, and Kayan Hills, as well as individuals Salah Ahmen Abd El-Sabour and Abd El-Sabour Ahmed Mohamed. Among the eleven private investors, three are foreign companies for agricultural investment: Zera'a (Saudi Arabia), El-Baraka (Libya), and Hedyan Fahes Hedyan (Kuwait).¹⁶³ The main farm of the Holding Company for Construction and Development was managed by Egyptian Ganoub el-Wadi Company – itself being since 1991 a sub-company of the Ministry of Investment and a public-private entity specialized in land reclamation works.¹⁶⁴ As of 2009, the el-Wadi Company had only reclaimed 25,000 *feddans* of the 40,000 originally allocated.¹⁶⁵

Moreover, the Egyptian army has since the project's inception been an important player, primarily by being involved in a range of public-private partnerships, albeit often in a vested

¹⁵⁸ Archirodon, "South Valley Development Project, Sheikh Zayed Canal, Design and Build Branch 3 Pumping Stations," Archirodon Group N.V., accessed April 29, 2015, <http://www.archirodon.net/project/336>.

¹⁵⁹ Euroconsult Mott MacDonald, "South Valley Development Project (Toshka Region) Egypt," Euroconsult Mott MacDonald Report (Amsterdam, 2011).

¹⁶⁰ The World Bank, "Egypt Public Land Management Strategy: Policy Note."

¹⁶¹ The World Bank, "Egypt Public Land Management Strategy: Background Notes on Access to Public Land by Investment Sector: Industry, Tourism, Agriculture, and Real Estate Development."

¹⁶² The Ministry for Agriculture and Land Reclamation and the Ministry of Interior also control land there via the Holding Company for Trade.

¹⁶³ The Holding Company for Construction and Development, "Investors," The South Valley Development Company, accessed 5 August, 2015, <http://www.southvalley-co.com/projects/>.

¹⁶⁴ "Mission & Vission," Holding Company for Construction and Development, accessed 6 August, 2016, http://www.hccd-construction.com/MasrRay/MasrRay_Default.aspx.

¹⁶⁵ Sahar El-Miligy, "Toshka Pumping Station Manager: Cracks Delayed Third Phase," *Almasry Alyoum*, no. 1773 (2009), <http://today.almasryalyoum.com/article2.aspx?ArticleID=208045>.

manner. Since Law N°143 was passed in 1981, the defense forces were entrusted to oversee all land development projects, giving them de facto control over bidding processes for major government procurements. The hidden politics of land speculation in which the armed forces and other state agencies competed to control desert projects can be exemplified by the fact that many holding companies have members of the military on their Board of Directors.¹⁶⁶ The army owns 87 percent of the country's area and is allowed to seize any public land for defense purposes, a prerogative it used in Toshka in 2016.¹⁶⁷ Furthermore, the armed forces have been able to offer better deals for tendering to public works, due in part to the availability of cheap labor provided by recruits (with a monthly salary of USD 17-28 during the military service).¹⁶⁸ Thus, the military has been able to compete easily with private-sector companies and state-owned enterprises. It is assumed that the defense forces have multiple contracting companies involved in Toshka, "in addition to military-trained engineers working for private subcontractors and suppliers."¹⁶⁹ Egyptian-foreign joint ventures have close connections with the military such as semi state-owned Arab Contractors, headed by former Prime Minister Ibrahim Mahlab (2014-2015) appointed in June 2014 after el-Sisi came to power.¹⁷⁰ However, reliable data is inexistent because the military is exempt from civilian oversight and any information is secret.¹⁷¹ A revealing fact is how the military-backed interim government who ousted Morsi immediately communicated its renewed commitment to Toshka, soon followed by el-Sisi's government. This might also be related to the short-lived return to power (2011-2012) of a strong advocate of Toshka, Prime Minister Kamal el-Ganzouri, previously in charge of the project from 1997 to 1999.¹⁷² After a loss of influence to the private sector during the last ruling decade of Mubarak, the military's position of power was consolidated under el-Sisi – a former commander- as he allowed army-owned

¹⁶⁶ Abigail Hauslohner, "Egypt's Military Expands Its Control of the Country's Economy," *The Washington Post*, March 16, 2014, https://www.washingtonpost.com/world/middle_east/egyptian-military-expands-its-economic-control/2014/03/16/39508b52-a554-11e3-b865-38b254d92063_story.html?utm_term=.5809bdf2bc23.

¹⁶⁷ Walaa Ramadan, "The Egyptian Military Empire," *Middle East Monitor*, July 9, 2014, <https://www.middleeastmonitor.com/20140709-the-egyptian-military-empire/>.

¹⁶⁸ Nimrod Raphaeli, "Egyptian Army's Pervasive Role in National Economy," ed. MEMRI (Washington, DC: The Middle East Media Research Institute, 2013).

¹⁶⁹ Shana Marshall, "The Egyptian Armed Forces and the Remaking of an Economic Empire," Paper, *Diwan*, April 15, 2015, <http://carnegie-mec.org/2015/04/15/egyptian-armed-forces-and-remaking-of-economic-empire-pub-59726>.

¹⁷⁰ "Executive Profile Ibrahim Mahlab " Bloomberg L.P., accessed 4 May, 2018, <http://www.bloomberg.com/research/stocks/private/person.asp?personId=107990166&privcapId=26465291>.

¹⁷¹ Marina Ottaway, "Al-Sisi's Egypt: The Military Moves on the Economy," in *Middle East Program Occasional Paper Series* (Washington D.C.: Woodrow Wilson International Center for Scholars, 2015).

¹⁷² Soraya Sarhaddi Nelson, "Mubarak's Dream Remains Just That in Egypt's Desert," *NPR*, July 10, 2012, <http://www.npr.org/2012/07/10/155027725/mubaraks-dream-remains-just-that-in-egypts-desert>.

companies to take direct control of large projects and to subcontract execution to private companies. This mechanism has subdued the private sector to abide by the armed forces in order to secure contracts.¹⁷³

3) *Private agents*

With Sadat's shift to a market-oriented economy, local and foreign private companies became involved in national infrastructure projects and entered the agro-business sector (see section *Land Reclamation Schemes*), a trend that continued under Mubarak. The 1990s corresponded to an era of privatization and liberalization, with the government selling shares in state-owned enterprises on the Cairo stock market. This has been illustrated by the involvement of Egyptian contractors in the construction of Toshka. Privatization also corresponded with the increased engagement of foreign firms in Egyptian large infrastructure projects, as indicated by the substantial number of partnerships between local and foreign private firms. Foreign consultants in particular were present throughout the process, from the preliminary project phases, including water and soil surveys that accompanied the national program of land reclamation, to the management and assessment of the implementation schemes. In 1983, GARPAD contracted German consultant Deutsche AeroConsult (DACO) to lead a comprehensive soil study of the New Valley region.¹⁷⁴ A wholly owned subsidiary of Flughafen Frankfurt/Main AG (the Frankfurt Airport company), DACO later formed a consortium with Lahmeyer International GmbH, the partner of the Egyptian planning office Hamza on Toshka.¹⁷⁵ Lahmeyer also collaborated with the Dutch consultant firm Euroconsult, a partner of the Egyptian agency Pacer Consultants on developing the 1983 Land Master Plan for the New Valley, financed by FAO and USAID.¹⁷⁶ ¹⁷⁷ Euroconsult in turn partnered with Cairo-based Darwish Consulting Engineers to assess the extension of the main canal at Toshka. Three consortiums were involved in the construction of the first phase of Toshka. Edipco

¹⁷³ Hazem Kandil, "Sisi's Egypt," *New Left Review* 102, no. 1 (2016).

¹⁷⁴ Collins, "Negotiations and Exploitation of the Nile Waters at the End of the Millennium," 122.

¹⁷⁵ Flughafen Frankfurt/Main AG, "Frankfurt Airport's Deutsche Aeroconsult Subsidiary Wins Contract for Launching New Incheon International Airport at Seoul, South Korea in 2001," *PR Newswire*, 2001, <http://www.prnewswire.com/news-releases/frankfurt-airports-deutsche-aeroconsult-subsidiary-wins-contract-for-launching-new-incheon-international-airport-at-seoul-south-korea-in-2001-77335047.html>.

¹⁷⁶ Martine Drozd, "Une Géographie Urbaine à la Marge? Formes et Processus de L'Urbanisation Saharienne Égyptienne (Hors Marges du Delta et de la Vallée) 1917-2006," *Insaniyat* 51-52 (2011).

¹⁷⁷ Euroconsult Mott MacDonald is still involved in Egypt, notably as a partner for Gesellschaft für Internationale Zusammenarbeit (GIZ), the state-owned German agency.

Sogreah formed the first consortium, with Egyptian firm Edipco (Engineering Design & Irrigation Project Consulting Office) and French Sogreah (Société Grenobloise d'Etudes et d'Applications Hydrauliques) representing the Mechanical and Electrical Department (MED) of the Ministry of Water Resources as *de facto* client. Edipco-Sogreah prepared the tender documents and supervised the construction of the pumping station as well as the design of the first 30 kilometers of the main canal.¹⁷⁸

The second consortium was the EEJC, the Egyptian, European, and Japanese Corporation, which included Hitachi, Skanska Cementation International Ltd. (known at this time as the Anglo-Norwegian Kvaerner Construction International) and Egyptian Arabian International Construction, plus other sub-contractors committed to the material execution of the project. Tokyo-based Hitachi was responsible for the execution and basic design of the pumping station. This included the design, manufacturing, and installation of the main pumps, the synchronous motors and the control system, as well as the engineering of the mechanical and electrical systems.¹⁷⁹ Hitachi sub-contracted the Swiss firm Asea Brown Boveri (ABB) for the electrical engineering of the pumps. Skanska Cementation International Limited (SCIL), part of the Skanska AB Group, based in the United Kingdom and Sweden, purchased Kvaerner during construction. Skanska was in charge of excavating the intake canal from Lake Nasser to the Pumping Station, installing the necessary cranes and gates, and equipping maintenance workshops. Arabian International Construction (AIC), as further partner of EEJC, held around 40 percent of the shares.¹⁸⁰ AIC was privatized in 1987 and bought by Mohamed Metwalli. The company has often worked as local partner to foreign firms and engaged in the construction of large infrastructures such as power stations. AIC was not only involved in Toshka, but also in its sister scheme, the "North Sinai Development Project."¹⁸¹ Following these involvements, the company became Egypt's largest private construction firm, and the profits generated were channeled into the investment firm, Arabian International Group, now known as Arabiyya Iel Istithmaraa.¹⁸² AIC has tight relations with state-entities, being the main contractor of the Ministry of Electricity, and engaged in the construction of several public infrastructures such as

¹⁷⁸ Chris Lang et al., "Dams Incorporated. The Record of Twelve European Dam Building Companies," report (Dorset, UK: The Corner House, 2000).

¹⁷⁹ Sakamoto, "Mubarak Pumping Station Bringing Life to the Desert."

¹⁸⁰ "Arabian International Construction: Company Profile," AIC, accessed May 5, 2018, <http://aicnet.tripod.com/aic.htm>.

¹⁸¹ Timothy Mitchell, "Dreamland," in *Evil Paradises: Dreamworlds of Neoliberalism*, eds. Mike Davis and Daniel Bertrand Monk (New York: New Press : Distributed by W.W. Norton & Co., 2007).

¹⁸² Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*, 283.

the new Esna Dam, a siphon on the Suez Canal, and the Sidi Kreir and Eyoun Moussa thermal power plants.¹⁸³

The third consortium, sub-contracted by EEJC, was composed of the design team of Germany-based Lahmeyer International and Hamza Associates in an equal shared joint venture. Lahmeyer and Cairo-based Hamza Associates's tasks were: to design the project for the concrete structure of the Mubarak Pumping station; to define with Hitachi the required hydro-mechanical equipment; to prepare the concrete mix for the first 3 kilometers of the main canal; and to assist and control the contractors.¹⁸⁴ Hamza Associates claimed ownership of the idea of an island-like design for the pumping station construction pit, and was later awarded for it by the American Society of Civil Engineers.¹⁸⁵ The consortium prepared all architectural, civil, and structural designs of the water intake structure, the pump house structure and the discharge basin, as well as for the service buildings (electrical works building, an emergency diesel generator building, workshops, and permanent staff residential facilities). The design for the surrounding road network, water and wastewater network, drainage system, and landscaping were also part of the team's tasks. Hamza subcontracted the Suez Cement Group for the blended cement used in the project.

While the Mubarak Pumping Station was under construction, the government passed a series of pro-private sector decrees, targeting potential backers for reclaiming and cultivating the New Valley region. Investors received a 20-year tax holiday if they located in Toshka (Investment Law N° 8/1997), although this advantage was partially cancelled by Tax Law N°91/2005. Projects that had not yet started also benefited from tax exemptions until three years after their due date of completion. At the time, the government made it clear that it was looking for big investors rather than individual farmers. Interviewed in 1998, Fayek Abdel-Sayed, general supervisor of the Toshka project at the Ministry of Public Works, insisted that "Investors (...) will have to dig their own subsidiary canals to allow the water to reach their land. They will also

¹⁸³ There were a few additional sub-contractors, such as the Italian company O.Cuoghi, who manufactured the concrete mixing plants, the British company Morris Material Handling who supplied five cranes mounted on-site to lift the machinery of the pumps, and Berlin-based Quantum Hydrometrie who installed the ultrasonic water discharge measurement systems. Additionally, the Behera Company was the all-round Egyptian implementing sub-contractor, responsible for installing the spillway siphons, pouring the concrete for the pumping station and the lining of the Sheikh Zayed Canal, constructing the bridges and the extended road network around Toshka, and implementing parts of the irrigation systems (sprinklers and drippers) on reclaimed agricultural land. Maisa Essam Sohail "Behera Company," *Mosahmet Elbehera*, IT Department, accessed May 16, 2018, http://www.mbehera1881.com/Est_Torabia.aspx?ProSType_Id=.

¹⁸⁴ Lahmeyer Group, "Mubarak Pumping Station, Egypt," Lahmeyer International GmbH, accessed April, 5 2015, <http://www.lahmeyer.de/en/projects/hydropower-water-resources/hydraulic-structures/single/article/mubarak-pumping-station-egypt.html>.

¹⁸⁵ "Toshka Pumping Station (Egypt)," Network & IT Administration Hamza Associates, accessed April, 5, 2015 http://www.hamza.org/Projects.aspx?proid=107&cas_qdr=y15.

have to build their own irrigation system, roads, houses, power stations and anything else they require.”¹⁸⁶ Prior to 1997, individuals needed to be Egyptian (Arab nationals needed a Presidential Decree) and companies had to be 51 percent owned by Egyptians to own land. Law N°8/1997 revoked these demands, and there are currently no restrictions on land ownership of agriculture and land reclamation projects by foreign individuals or firms.¹⁸⁷ The government thus encouraged local-foreign and public-private partnerships in the financing, development, and management of irrigation infrastructure and agribusiness.¹⁸⁸

At first, land at Toshka was distributed among four large investors: The aforementioned Abu Dhabi Development Fund and the state-led Holding Company for Agricultural Development, another consortium of investors (private businessmen and public sector companies from Egypt, Libya, South Africa and Australia, and banks), and Saudi billionaire Prince Al Waleed bin Talal's Kingdom Agricultural Development Company (KADCO).¹⁸⁹ Before committing to the Toshka reclamation plans, Al Waleed hired the consultant company Arthur Andersen LLP, which claimed that the “large-scale, integrated and irrigated agricultural development at the chosen site could be commercially attractive under certain conditions.”^{190 191} KADCO, a subsidiary of the Kingdom Holding Company listed on the Saudi stock exchange, has been involved since the very commencement of Toshka, purchasing 100,000 *feddans* as early as 1997. The deal was controversial for several reasons. Al Waleed paid only EGP 50 (less than USD 10) per *feddan* and received discounted rates for utilities and tax exemptions, setting his own purchase price and contract terms, all later endorsed by former President Hosni Mubarak.¹⁹² KADCO then hired a Californian agribusiness, Cadiz Inc.'s Sun World, “to design a massive drip-irrigation system for one of the world's largest farms and to plant its own patented crops.”¹⁹³

¹⁸⁶ Niveen Wahish, "Toshka Turns Millennial Green," *Al-Ahram Weekly* Issue No. 392, August 27–September 2, 1998, <http://weekly.ahram.org.eg/Archive/1998/392/ec1.htm>.

¹⁸⁷ The World Bank, "Egypt Public Land Management Strategy: Policy Note."

¹⁸⁸ Vijay Jagannathan, Ahmed Shawky Mohamed, and Alexander Kremer, "Water in the Arab World. Management Perspectives and Innovations," in *Middle East and North Africa Region* (Washington, DC: The World Bank, 2009).

¹⁸⁹ Okbazghi Yohannes, *Water Resources and Inter-Riparian Relations in the Nile Basin. The Search for an Integrative Discourse* (Albany: State University of New York Press, 2008), 39.

¹⁹⁰ Wahish, "Toshka Turns Millennial Green."

¹⁹¹ Arthur Andersen was later involved in one of the world's biggest corporate scandals, for the criminal handling of the energy company Enron's accounting.

¹⁹² "Dispute over Toshka Project Land over, Saudi Prince Says," *Egypt Independent*, April 26, 2011, <http://www.egyptindependent.com/news/dispute-over-toshka-project-land-over-saudi-prince-says>.

¹⁹³ Melinda Fulmer, "Desert Farmer Taps into Global Markets," *Los Angeles Times*, October 8, 2000 <http://articles.latimes.com/2000/oct/08/business/fi-33244>.

Cadiz Inc. had no funds of its own and the Egyptian government provided 20 percent of the farm's capital, leading Timothy Mitchell to argue that the state was in fact subsidizing speculative investment, through "networks linking speculators, bankers, and state officials."¹⁹⁴ In 2010, a group of lawyers, human rights organizations, and Nubian activists filed a lawsuit at the Administrative Court questioning the legality of Al Waleed's ownership contract, arguing that he "enjoys unprecedented advantages while the Egyptian state and its people get nothing in return."¹⁹⁵ In 2015, the court rejected the invalidity of Toshka's sales contract to Al Waleed. After the fall of Mubarak, in 2011, the Morsi government also declared the purchase illegal.¹⁹⁶ It argued that KADCO had not respected the contract of purchase and therefore could not have been granted outright ownership of the land once the company had completed payments, because rules had been violated, thus stipulating that the land should be completely reclaimed and planted within five years. 75,000 *feddans* were withdrawn from KADCO in April 2011 after it had only reclaimed 17,000 *feddans* and cultivated 3,000.¹⁹⁷ After a new deal was signed, the company retained ownership of 10,000 *feddans* while cultivating another 15,000 *feddans* that it would take ownership of at a later date.¹⁹⁸ KADCO produces export crops: melons, table grapes, alfalfa, potatoes, and onions, among others, via various methods such as drip irrigation, plastic mulch and shade cloth.¹⁹⁹ The farm employs 1,200 laborers in the high season and is considered to be fairly successful. KADCO started by commissioning a soil survey, then installed appropriate irrigation equipment, performed minimum tillage, planted wedge grass to break and prepare the soil, grew alfalfa, and alternates crops every three years. Only thanks to massive investments and by following painstaking processes could the company succeed in cultivating export crops. After KADCO and the three original investors, other companies engaged in land reclamation at Toshka. In 2008, Abu Dhabi-based Al Dhara was allocated 100,000 *feddans* (43,000 hectares).²⁰⁰

¹⁹⁴ Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity*, 275.

¹⁹⁵ Tamim Eylan, "Lawsuit Aims to Annul Saudi Prince's Toshka Land Deal," *Daily News Egypt*, October 20, 2010, <http://www.farmlandgrab.org/post/view/16592>.

¹⁹⁶ Mohamed Ayyad, "Saudi Prince Al-Waleed Eyes Investment Opportunities in Egypt," *Daily News Egypt*, August 19, 2015, <http://www.dailynewsegyp.com/2015/08/19/saudi-prince-al-waleed-eyes-investment-opportunities-in-egypt/>.

¹⁹⁷ "Dispute over Toshka Project Land over, Saudi Prince Says".

¹⁹⁸ "Egypt, Prince Alwaleed Enter New Farm Land Deal," *Trade Arabia*, June 7, 2011, http://www.tradearabia.com/news/MISC_200045.html.

¹⁹⁹ Forum 2000, Concise Report on the South Valley Development Project.

²⁰⁰ Ahmed Fayeze, "UAE-Al Dahra to Egypt's Mahlab 'We Pumped EGP 750mn in Toshka Project'," *Amwal Alghad*, October 1, 2014, <http://en.amwalalghad.com/investment-news/industry-trade/30090-uae-al-dahra-to-egypts-mahlab-we-pumped-egp750mn-in-toshka-project.html>.

Al Dhara is an agribusiness that produces food and animal feed through worldwide land acquisitions and joint ventures. It is a private sector partner of the Emirati government, engaged in purchases and leases internationally. Accused by NGOs of land grabbing, the company ran into similar troubles as KADCO when in February 2011, after the end of Mubarak's rule, an administrative court ruled that the Ministry of Agriculture and Land Reclamation had improperly granted Al Dahra the right to cultivate the 100,000 *feddans* farm.²⁰¹ The allocation of such a large property size required the publication of an open tender, rather than a "direct order."²⁰² The decision was reverted two months after by a cabinet-level committee, asking the firm to hand over a development plan and allowing cultivation to be resumed.²⁰³ Three years later, in an elated announcement, Al Dahra declared that it would begin to produce wheat at Toshka, with an expected 300,000 tons of production to cater for the domestic market.²⁰⁴ In a similar fashion, another Toshka investor, the Al-Rajhi Company, announced in 2009 its intention to produce wheat.²⁰⁵ Saudi-based Al Rajhi International for Agricultural Investment Company (RAII), a subsidiary of Al Rajhi Investment from the Kingdom of Saudi Arabia, was established in 2006. The company claims it "has been highly successful in achieving food security through land rehabilitation in the Toshka region of South Egypt."²⁰⁶ RAII was allocated 25,000 *feddans* and purportedly invested USD 80 millions. In 2009, however, only 5000 *feddans* were cultivated, and in 2016, only 8 of 72 central pivots were functioning.²⁰⁷ ²⁰⁸ In 2016, RAII announced its goal of investing a further USD 135 million to reclaim 75,000 *feddans* until 2020.²⁰⁹ Such announcements were common and ought to be considered prudently as many of the ambitious

²⁰¹ GRAIN, "Squeezing Africa Dry: Behind Every Land Grab Is a Water Grab," (Barcelona: GRAIN, 2012).

²⁰² Chris Stanton, "Cairo Court Says Al Dahra Land Deal Was Illegal," *The National*, February 23, 2011, <http://www.thenational.ae/news/world/middle-east/cairo-court-says-al-dahra-land-deal-was-illegal>.

²⁰³ "Egypt Revives Abu Dhabi Company's \$500m Project Cancelled after Revolution," *The National*, April 10, 2011, <https://www.pressreader.com/uae/the-national-news-business/20110410/281882999882908>.

²⁰⁴ "UAE Firm Set to Produce 300,000 Tonnes of Wheat in Egypt's Toshka," *Reuters Africa*, October 27, 2014, <http://af.reuters.com/article/investingNews/idAFKBN0IG0SC20141027?pageNumber=2&virtualBrandChannel=0>.

²⁰⁵ "Al Rajhi to Spend SR 1.5 Billion for Wheat, Maize Farms Abroad," *Saudi Economic Survey*, April 26, 2009, http://www.soyatech.com/print_news.php?id=13506.

²⁰⁶ "Al Rajhi International Agricultural Investment (Raie)," Al Rajhi International Group, accessed May 17, 2015, <http://www.raii.info/journey.html>.

²⁰⁷ Google Earth, 2016.

²⁰⁸ El-Miligy, "Toshka Pumping Station Manager: Cracks Delayed Third Phase".

²⁰⁹ Amwal Alghad, "Saudi Al Rajhi Co. To Pump \$135mn in Egypt's Toshka until 2020," *Zawya*, April 9, 2016, https://projects.zawya.com/Saudi_Al_Rajhi__to_pump_135 mln_in_Egypt's_Toshka_until_2020/story/ZAWYA20160410051314/.

projects by private and public entities in Egypt failed to materialize. Big plan proclamations were and are still part of the official rhetoric, alighting a constant flow of promised investments and large-scale projects presented as solutions to the country's problems. One of the declared goals of Toshka, as originally promised by Mubarak, was to solve the country's dependence on wheat imports. Thus, to announce the start of long-awaited wheat cultivation served the el-Sisi administration, supported by the Gulf States, well.

Additionally, there are countless highly specialized companies involved at various levels of maintenance, technical assistance, and cultivation, undertaking at Toshka what Mitchell called the "scientific management of resources."²¹⁰ For example, South-African firm Floppy Sprinkler developed state-of-the-art irrigation systems over 50,000 *feddans* at the fourth branch.²¹¹ Australian firm Sagric International was contracted by KADCO for pivot and drip agriculture; and Cropio, a US and Europe-based precision farming firm using satellite field management systems to monitor large areas of agricultural land, was working with Al Dahra.^{212 213} All of this is a reminder that the geography of the Egyptian deserts is the product of "power, technology, expertise, and privilege."²¹⁴ This portrait of public and private agents, and of the position these entities occupy within the structures of relations of power, finance, competition, and collusion that tie the whole set of participants together in the making of Toshka, points not only to prevalent modes of operations involved in large-scale infrastructure projects, but also illuminates the physical effects such projects have yielded on the construction of new territories in Egypt.

Impacts on Space and their Consequences.

In his inaugural speech for the opening of the main canal, Hosni Mubarak proclaimed that "the New Valley Project will create new lives, cities, villages, and societies for Egyptians."²¹⁵ While such promised social and practical benefits have failed to materialize so far, the complex

²¹⁰ Timothy Mitchell, "The Object of Development/Fixing the Economy," in *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 210.

²¹¹ "Floppy and Egyptian Megaproject," Floppy Sprinkler, accessed May 17, 2015, <http://www.floppysprinkler.com/media-menu/articles/47-international/31-floppy-and-egyptian-megaproject>.

²¹² Al Dahra Agriculture, "Multimedia Grains," Al Dahra Holding, accessed 18 May, 2015, <http://www.aldahra.com/en-us/media-center/multimedia>.

²¹³ Huband, "The Move from the Nile Valley."

²¹⁴ Mitchell, "The Object of Development/ Fixing the Economy," 211.

²¹⁵ Sowers, "Remapping the Nation, Critiquing the State. Environmental Narratives and Desert Land Reclamation in Egypt," 168.

contingencies between narratives of national food security, governance, capital, and space in the context of Egypt have resulted in the partial construction of the Toshka project. Within the framework of the political economy of food and the current food regime, driven by global matters of human nutrition, globalized capital flows, and domestic structural adjustments such as the privatization of public land and other resources, the project and its related agents have generated transformations of various kinds, at different scales and with broad consequences.²¹⁶ Based on the premise that the political economy of food systems affects space at various levels, the examination of the Toshka project proceeds accordingly from the *Architectural and Infrastructural Scale*, via the *Urban and Rural Scale* as well as the *Territorial Scale*, to the *Transnational Scale*.²¹⁷

1) *Architectural & Infrastructural Scale*

At the “heart” of Toshka, the Mubarak pumping station is both an architectural object and an infrastructure. The building is the most obvious spatial consequence of the global political economy of food, and a central element to the political discourse on national food security which surrounds the entire project. Its size is striking, and it is considered to be the biggest pumping station in the world. Often, large public works are minimalist in their expression, but hydraulic infrastructures in Egypt tend to be not only gigantic in scale, but expressly foregrounded as “monuments” in presence and appearance. Infrastructures, one could argue, are purposely “monumentalized” to represent the power of those in command. The architecture of the pumping station fits this account, a semi-submerged concrete building – 140 meters long, 40 meters wide, and 70 meters high – that matches in size royal palaces, temples, and tombs of Pharaonic Egypt (Karnak’s Hypostyle Hall is 102 meters long by 53 meters wide). Design-wise, there are a few implied and intended references. The intake basin, a 54-meter-deep pit of 167 meters length and 75 meters width, with the island-type construction at its center, is reminiscent of the island of Philae, located in the reservoir of the Aswan Low Dam and home to the Temple of Isis. The towers of the pumping station even imitate in shape its two 18-meter-high battered walls. The designers admit to the references to ancient Egyptian regalia, stating that “The main design motif of the pump station is a Pharaoh’s (ancient king) temple. The resulting structure has the potential to become a promising sightseeing spot for the 21st century comparable to the Pyramids.”²¹⁸ It was

²¹⁶ Dorman, “Exclusion and Informality: The Praetorian Politics of Land Management in Cairo, Egypt.”

²¹⁷ See Andrew Herod and Melissa W. Wright, *Geographies of Power: Placing Scale* (Malden: Blackwell Pub., 2002).

²¹⁸ Sakamoto, “Mubarak Pumping Station Bringing Life to the Desert,” 23.

in fact called a “Pharaonic” project and “Mubarak’s pyramids.”²¹⁹ In another reference to antiquity, a similar formulation described the High Aswan Dam as “Nasser’s pyramid,” in part because of the pyramidal section of the dam.²²⁰ Such comparisons situate the project in the lineage of great hydro-infrastructures serving the country’s interests, and its instigator as the dignified heir of Egypt’s great leaders. Monumentality then and now has been indicative of a ruler’s control over the entire country’s labor force and material resources, allowing the construction of massive works – which more often than not have been associated with absolute power.²²¹ Such parallels and allegations were repeatedly brought to the fore by the Egyptian press, provocatively asking, “How, in Egypt, can the decision to do a 20-30 billion dollar project have been taken by only a few people?”²²²

Another feature associated with the monumentality of the construction is its over-dimension. At full capacity, the station can pump 10 per cent of Lake Nasser’s water from the underground intake canal to the suction basin, through Sheikh Zayed Canal and on to the fields of Toshka. Stage one aimed at reclaiming 550,000 *feddans*. Reports had alerted that the “pumping capacity may be excessive if only stage one is completed.”²²³ The government cancelled the second stage in 2005.²²⁴ At the time of writing, in 2017, 214 center-pivot irrigation systems are visible on satellite imagery, corresponding to circa 21,000 *feddans* (10,700 hectares).²²⁵ As only a third of the first stage is realized, the building is operating at less than 10 per cent of its capacity with two of the 24 pumps in use.²²⁶ This fact implies that the pumping station is over-dimensioned, confidently designed for an unattainable 550,000 *feddans* irrigation goal. The corresponding enormous amount of 148,000 cubic meters of concrete poured in the making of the pumping station and Sheik Zayed Canal had an unanticipated impact during Toshka’s early phase of construction (1998-1999): a shortage of Egyptian cement.²²⁷ The budget deficit induced by the

²¹⁹ See Jack Shenker, *The Egyptians: A Radical Story* (London: Penguin Books, 2017), 103.

²²⁰ Allais, "Integrities: The Salvage of Abu Simbel."

²²¹ See Karl August Wittfogel, *Oriental Despotism: A Comparative Study of Total Power* (New York: Random House, 1981).

²²² Sowers, "Remapping the Nation, Critiquing the State. Environmental Narratives and Desert Land Reclamation in Egypt."

²²³ Lonergan and Wolf, "Moving Water to Move People: The Toshka Project in Egypt."

²²⁴ Fecteau, "On Toshka New Valley's Mega-Failure".

²²⁵ Google Earth, 2017.

²²⁶ Wahby, "Technologies Applied in the Toshka Project of Egypt."

²²⁷ Arthur Little, "Towards a Sustainable Cement Industry," ed. Battelle (World Business Council for Sustainable Development, 2002), 24.

project led to the urgent need for foreign direct investment, which was achieved by selling shares of national cement companies, boosted by the cement demand of the New Valley and other national projects.²²⁸ With Egyptian cement production costs low and profit margins high, foreign investors eagerly put capital into Egyptian cement companies, accelerating the privatization process of national resources.²²⁹

The effects of the infrastructure on topography are tremendous. An estimated 2.5 million cubic meters of earth (50 ton trucks loaded 180 times a day over 10 months) were excavated to dig the intake basin in which the pumping station now stands. 5.5 million cubic meters were excavated for the underwater part of the intake canal, requiring sophisticated and costly technologies. 5.1 million cubic meters were excavated for the dry portion.²³⁰ This is a little more than the amount moved during the construction of the High Aswan Dam (12 million cubic meters).²³¹

The earth was leveled to fill parts of the bay and to shape the dry portion of the intake channel, entirely remodeling the landscape at the site.²³² Built over this new ground, the small complex of buildings around the pumping station form a sort of outpost of technocratic authority, and a demonstration of a rational, technologically-driven type of engineering planning. Organized in a wing form, service buildings are located south of the pumping station: a diesel generator building, a water treatment plant, electrical, mechanical, and automotive workshops, and a sewage treatment compact unit. The administrative compound as well as the contractor and employees' facilities are situated north of the station, overlooking Toshka Bay. In fact, there is a paradoxical contrast between the impeccable ordering of the area with neatly lined-up administrative and service buildings, and the unrealistic and failing aspect of the enterprise, materialized in what could be coined as a "technocratic landscape."

2) *Urban and Rural Scale*

The intake canal, located 5 kilometers into Lake Nasser to prevent water level variations' issues, is the starting point of the entire water network at Toshka, spanning from the western

²²⁸ See Steven Heydemann, *Networks of Privilege in the Middle East: The Politics of Economic Reform Revisited* (New York: Palgrave Macmillan, 2016).

²²⁹ In 1999, the British cement company Blue Circle Industries purchased Alexandria Portland Cement. Beni Suef Cement was sold to the French company Lafarge, and Assiut Cement was bought by Cemex of Mexico.

²³⁰ Sakamoto, "Mubarak Pumping Station Bringing Life to the Desert," 35.

²³¹ Wahby, "Technologies Applied in the Toshka Project of Egypt."

²³² Image Landsat/Copernicus 2001, Google Earth, 2017.

shore of the lake to 100 kilometers deep in the western desert. Sheik Zayed Canal splits into four branches (north and south) 50 kilometers away from the pumping station. The two branches to the north (serving KADCO, Al Rajih and al Dharha) end in the desert, short of reaching the oasis of Baris by 100 kilometers. The third branch of 22 kilometers length (south-east) irrigates a few center-pivot fields. Unfinished, the fourth and longest branch (south-west) is a 35-kilometer-long trace fizzing away in the sand, half its projected length. Constructed with haste, the first two branches are showing signs of seepage and leaks. This network of open, concrete-lined channels dotted with pumping stations and service buildings is an infrastructure constructed and designed to suck in water resources to support agriculture, and eventually, industry and urban life. The irrigated land ceases to be a desolated desert and becomes agrarian land: quantifiable, marketable, controllable, and potentially taxable. The water network thus emerges as an instrument of vanquishing space and an attempt to transform land into an organized, controlled territory. The high-tech farms along the canals contribute this transformation by occupying large tracks of land, which are essentially outposts of technologically advanced agricultural practices, supported by official pro-agribusiness narratives. Generally in favor of private high-tech investors, the government tended to contrast their achievements with those of seemingly less profitable farmers of the Delta, arguing that “New Lands” were pristine and cleaner than “Old Land,” and that water management in the former was more efficient.²³³ The encouragement of large agriculture companies on desert lands is consistent with the ongoing state-led “invasion of the desert” on the one hand and with governmental neoliberal policies and the dismantling of smallholder’s rights on the other.²³⁴ Additionally, agriculture techniques required for land reclamation rely on expensive, imported technical equipment. These are unaffordable for smaller farmers and investors, and local forces are excluded from engaging in cultivating at Toshka, except as a cheaply hired labor force. The transformation of formerly rural, state-owned, semi-deserted spaces into mechanized, private, managed zones of production is the physical translation of such policies at the rural scale.

Paradoxically, while sophisticated, powerful, and advanced infrastructures were being built, in part with state funding, rural development stalled. Only a few of the installations that were promised to benefit local inhabitants, migrants, and modest employees of the area actually materialized. Factories, schools, and hospitals failed to be realized. In light of such developments,

²³³ "South Valley Development Project in Toshka," Ministry of Water Resources and Irrigation Planning Sector, accessed May 16, 2015, http://www.mwri.gov.eg/En/project_toshka.html.

²³⁴ Bush, "Politics, Power and Poverty: Twenty Years of Agricultural Reform and Market Liberalisation in Egypt."

the underlying goal of Toshka and the New Valley to become home to 7 million Egyptians appears unlikely. The differential treatment regarding which infrastructures have been prioritized and constructed points to governmental inconsistencies, the broken promise of rural development, and questions of social and territorial justice.

Construction resumed in New Toshka City in 2015, one of the many announced urban centers that commenced in 2005. The new city is planned for 80,000 workers and their families. Basic facilities (mosques, a school, and stores) and 500 housing units were completed in 2017.²³⁵ The master plan of the city is typical of desert development in Egypt, following a zoning urban model with segregated uses. Most of the cities built on this model have stood vacant for lack of the socio-economic planning needed to populate them, poor transportation networks, and few work opportunities. The built form of New Toshka City and its sole standing buildings suggest that the desert context and its extreme climatic conditions are of little importance to planners. Additionally, the sheer size of Toshka with farming activities spanning over 120,000 hectares entails that, to reach the urban center, employees would need access to transportation networks, which are currently inexistent. The truth is that most of the workers employed at Toshka still commute to the nearby “real city” of Abu Simbel, a two-hour drive away, or live in residential units provided by the management of farms, with New Toshka City remaining vacant.²³⁶ The urban morphology of the new town signals the replication of an economic formula applied in Egypt since 1978, disclosing the hegemony of a prevalent mode of top-down planning reluctant to take other factors into consideration other than profit – an attitude also concerning matters of land ownership.

In 2010, non-governmental associations protested against the expulsion of 13,000 Nubian families from their land around Toshka.²³⁷ Long-suppressed issues of land property resurfaced with el-Sisi’s re-launching of the project. In 2014, the Egyptian president issued Decree 444 defining lands at Toshka as military zones that were to remain unpopulated, a decision that affected 16 Nubian villages. Nubians, the local inhabitants, claimed part of Toshka’s land as their homeland, and in 2016, demonstrated against a government-run auction for the “One million

²³⁵ Marwa Himdan, "Arab Contractors to Install 477 Units in New Toshka City," *Amwalalghad*, March 7, 2016, http://en.amwalalghad.com/?tmpl=component&coption=com_content&id=43981?

²³⁶ See Sims, *Egypt's Desert Dreams: Development or Disaster?*

²³⁷ Eylan, "Lawsuit Aims to Annul Saudi Prince's Toshka Land Deal," *Daily News Egypt*, October 20, 2010, <http://www.dailynewsegyp.com/2010/10/20/lawsuit-aims-to-annul-saudi-princes-toshka-land-deal/>.

feddans project” of 922 *feddans* including the annexed village lands.^{238 239} Local activists claimed that ancient Nubian land—confiscated under security pretenses—were not to be sold to agribusinesses.

Furthermore, such actions trample the Article 236 of Egypt’s constitution passed in 2014, pledging “to bring back the residents of Nubia to their original areas and develop them within ten years,” against the backdrop of the flooding of Nubia by the High Aswan Dam and the relocation of 135,000 people in the 1960s, never compensated. What is defined as “original areas ” does not include ancestral land now under the Nasser Lake, but adjacent terrains. This injustice has exacerbated the dispute, insofar as populations of Nubian descent would be relocated again to resettlement villages rather than accessing property to promised land-reclaimed fields.²⁴⁰

3) *Territorial Scale*

The very existence of the Toshka scheme is grounded in a major transformation on a territorial scale, one that originated by the infrastructure of the High Aswan Dam and the flooding of Nubia. Risk of overflowing the dam’s giant reservoir prompted the creation of another infrastructure, the Toshka Spillway, which in turn allowed for the incidental creation of the Toshka Lakes. While spectacular, the manufactured five lakes have been short-lived. Although they enabled fishing activities for a few years, they are now dry except for one, a blatant testimony to the fluctuation of the Nile waters and the harshness of the region’s climate. It is unlikely they will refill, since if the New Valley Project is completed, water demands will keep the spillway from being used again, preventing the discharge that created the lakes in the first place.

The actual impact of this territorial transformation is not to be found in the physicality of the lakes themselves, but rather in the ideal their formation resuscitated: greening the desert and allowing it to become a livable, productive environment. Combined with narratives of progress, necessity, and food security formed by state agencies at the time of the High Dam, and nurtured by decades of land reclamation projects, the lakes legitimized the rebirth of the New Valley. The government thus continues to highlight the alleged virtues of constructing large hydro-

²³⁸ Ruth Michaelson, "Egypt's Nubians Fight for Ancestral Land Earmarked for Mega-Project," *The Guardian*, February 13, 2017, <https://www.theguardian.com/global-development/2017/feb/13/egypt-nubians-fight-for-ancestral-land-earmarked-for-mega-project>.

²³⁹ Zeinab El-Guindy, "Nubian Protesters to Continue Sit-in against Sale of Toshka Land in Egypt's Aswan," *Al-Ahram Weekly*, November 20, 2016, <http://english.ahram.org.eg/NewsContent/1/64/250385/Egypt/Politics-/Nubian-protesters-to-continue-sitin-against-sale-o.aspx>.

²⁴⁰ Peter Schwartzstein, "Changing Egypt Offers Hope to Long-Marginalized Nubians," *National Geographic*, February 1, 2014, <http://news.nationalgeographic.com/news/2014/01/140131-egypt-nubia-dams-nile-constitution-culture/>.

infrastructures while undermining political and social oppositions to force infrastructural and territorial change upon civil society, commodified for private gain.

The territorial transformation of a desert into a fertile area is a strenuous, costly, and long-term process; if successful, land reclamation can alter the entire character of a region. By irrigating, preparing, fertilizing, and cultivating the soil, desert land can become productive and generate both food and profit. This prospect attracts agriculture companies. At Toshka, the engagement in land reclamation projects of the large, private, and foreign agro-businesses KADCO, Al Darah, and Al Rajih, points to probable “land grabbing,” large-scale acquisition of farmland to develop commercial investment in agriculture. Saudi investors, low on arable land and water at home but with large capital, turned to investments dedicated to food security in Africa.²⁴¹ In the New Valley, the phenomenon could appear less acute because the reclaimed farmland is new, and seems as if the firms had “created” it *ex nihilo*. This disregards the fact that crucial national resources of water and public capital are diverted to transform the desert into arable land, and that citizens are denied the new lands’ production and its attendant implication to guarantee food security. It has been established that land grabbing generates adverse impacts on affected populations, draining water and land resources and causing loss of land for local food production, with water being both a target and a driver. Toshka, heralded as the solution for solving national issues of food provisioning, has fallen victim to the economic influence to serve foreign socio-political aspirations of food security. What results is the territorial transformation of Nubian ancestral desert lands into Gulf-owned center-pivot irrigation fields.

In 2012, the official webpage of the Ministry of Water Resources and Irrigation describing the “South Valley Development Project in Toshka” announced, under the section on agriculture investment: “Cultivation using water flowing from Al-Sheikh Zayed Canal and its branches: Corn, barley, wheat, artichoke, strawberry, grapes, asparagus.”²⁴² The page has been taken down since, but the promise of cultivating wheat at Toshka remains. It does not appear coincidental that the firm Al-Darah trumpeted vast programs of wheat cultivation at Toshka, in 2014.²⁴³ Such announcements sustain the government’s rhetoric of successful land reclamation projects feeding the nation, attempting to prevent food-oriented political dissent. However, the impacts of Toshka’s new wheat fields were not noticeable during the 2016-wheat harvest. At

²⁴¹ Joachim von Braun and Ruth Suseela Meinzen-Dick, ““Land Grabbing” by Foreign Investors in Developing Countries,” *International Food Policy Research Institute (IFPRI)* 13 (2009).

²⁴² Ministry of Water Resources and Irrigation Planning Sector, “South Valley Development Project in Toshka”.

²⁴³ Maha El Dahan, “UAE Firm Set to Produce 300,000 Tonnes of Wheat in Egypt’s Toshka,” *Reuters*, October 27, 2014, <http://af.reuters.com/article/investingNews/idAFKBN0IG0SC20141027>.

9 million tons, local wheat production stayed at the same level as the five-year average. Thus, in relation to wheat, at national and global levels, this rather points to Toshka's lack of effect. Egypt remains the world's largest wheat importer, with, for example, 12 million tons of imports in 2016 alone.²⁴⁴

4) *Transnational Scale*

In 2010, during the signing of the Cooperative Framework Agreement in Sharm El-Sheikh, Egypt and Sudan left the negotiating table. Both countries declined to sign the treaty instigated by the Nile Basin Initiative group for an equitable and reasonable utilization of the waters of the Nile, over Article 14(b) that requires members "not to significantly affect the water security of any other Nile Basin States."²⁴⁵ The Nile Basin Initiative, a nine-member intergovernmental partnership launched in February 1999 aims at "consultation and coordination among the Basin States for the sustainable management and development of the shared Nile water and related resources for win-win benefits."²⁴⁶ Egypt has been a passive member ever since, arguing that the nation's "historic Nile water rights" are non-negotiable.²⁴⁷ Hydro-politics are complex and lay largely outside the current work's area of expertise, however, what surfaced was that this rebuffing was linked to Toshka. Experts suggested that the New Valley project was "a strategy to safeguard claims for the long term by enabling a claim to prior use of Nile floodwaters."²⁴⁸ Overall the scheme should utilize 5.5 cubic kilometers of Nile water for irrigation. Egypt is allocated 55.5 cubic kilometers yearly based on the 1959 Nile Waters Agreement signed with Sudan. The Egyptian government argued that the water for Toshka would not impact upstream states, and promised that savings would offset the 5.5 cubic kilometers taken from the 55.5 cubic kilometers annual allocation. It is, however, unclear how Egypt will succeed in saving this amount. Besides, foreseeable upstream deficits (e.g., dams in Ethiopia, and reservoirs in Sudan) will have an effect on Egypt.

²⁴⁴ Food and Agriculture Organization, "Country Brief on Egypt," in *Global Information and Early Warning System on Food and Agriculture*, ed. FAO GIEWS (Rome: Food and Agriculture Organization of the United Nations, 2016).

²⁴⁵ Bassem Abo Alabass, "Egypt's Thawing Relations with the Nile Basin Initiative: What You Need to Know," *Al-Ahram Weekly*, January 24, 2017, <http://english.ahram.org.eg/News/256450.aspx>.

²⁴⁶ Ibid.

²⁴⁷ Maha El Dahan, "Egypt Says Historic Nile River Rights Not Negotiable," *Reuters*, July 27, 2009, <http://www.reuters.com/article/us-egypt-nile-framework-idUSTRE56Q3LZ20090727>.

²⁴⁸ John Waterbury and Dale Whittington, "Playing Chicken on the Nile? The Implications of Micro-Dam Development in the Ethiopian Highlands and Egypt's New Valley Project," *Natural Resources Forum*, 22, no. 3 (1998).

Toshka and parts of the New Valley project also rely on ground water from the Nubian aquifer to irrigate land, through artesian wells and pumps. Studies of groundwater levels in the area have shown a drop, indicating that intensive pumping has led to a higher extraction than replacement rate.²⁴⁹ This groundwater is non-renewable, and levels will keep falling.²⁵⁰ This impact is transnational, and regional, if not global, because the Nubian aquifer is not confined to the Western Desert of Egypt but also exists in Libya, Chad and Sudan – countries facing water shortages. Experts have also warned that extraction will result in the deterioration of the water quality, which will become more saline. Moreover, the irrigation water infiltrating the aquifer might change the direction of underground water flows, resulting in the contamination of Lake Nasser by agricultural drainage, with repercussions downstream. It is also expected that the reclamation of the whole proposed area will have an impact on the climatic condition in the area, although this has been scarcely studied. Outcomes still appear mitigated because the project is only partially realized.

In short, Toshka, when and if fully implemented, will jeopardize the supply of Nile River water available to farmers in the Nile Delta and Nile Valley, a heavily populated and highly productive agricultural region. This water deficit, combined with coastal erosion (due to the lack of silt retained by the High Dam), the increasing salinity of the water, and the expected rise of the Mediterranean Sea as a result of global warming, are endangering the food productivity of the Delta. While water deficit can be dealt with indirectly by importing increased amounts of food and grain on the world markets, or by forcing upstream countries to reduce use via political, diplomatic, or military powers, other effects cannot be deflected.

Compromising regional political stability, reducing national food security, endangering food production and the ecosystem of the Nile Delta, the physical effects of Toshka on a larger scale have severe human and ecological impacts felt beyond the regional scope and the present time, showing that infrastructures “do not have simple, definitive and universal (...) impacts in isolation, but (...) have contingent effects in different places and different times.”²⁵¹

²⁴⁹ Ahmed Aziz Abdel Moneim, Sameh Zaki, and Maghawri Diab, "Groundwater Conditions and the Geoenvironmental Impacts of the Recent Development in the South Eastern Part of the Western Desert of Egypt," *Journal of Water Resource and Protection* 6 (2014).

²⁵⁰ Waterbury and Whittington, "Playing Chicken on the Nile? The Implications of Micro-Dam Development in the Ethiopian Highlands and Egypt's New Valley Project."

²⁵¹ Stephen Graham and Simon Marvin, *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition* (London: Routledge, 2009), 11.

Commentary: A Biopolitical Infrastructure

In July 1977, President Sadat created the National Democratic Party (NDP), adopting the slogan: “ Food for every mouth, a house for every individual and prosperity for all.”²⁵² In August, the Ministry of Planning published a report called “The General Strategy for Agriculture, Irrigation and Food Security.”²⁵³ In the wake of these developments, Sadat appointed Ahmad Osman, former director of Kima Fertilizers, the company operating the nitrate factory at the Aswan Dam, as his “special advisor on food security.”²⁵⁴ These measures, supplemented by more repressive actions, were a reaction to the “bread riots,” which saw people take to the streets, protesting against high food prices and IMF structural adjustments, in January of 1977. Three decades later, against the backdrop of the 2008 hike in global food prices and further food riots, President Mubarak – at the time Chairman of the Organisation of African Unity (OAU) – urged his counterparts to hold a special summit to address food security, while mass arrests and repression hit Egypt.²⁵⁵

What do such episodes reveal concerning the very concept of food security, whether understood as social policy, discursive device, or as an instrument of population management? And, what are their implications on the constitution and production of the built environment? Clearly, there are more than a few critical imperatives that dictate what food security might entail. Not only is there the political imperative to guarantee the provision of food for a nation’s people and implicitly secure social peace. The claim for food security is also accompanied by a globally dominant technocratic imperative to modernize, which demands technological investments targeting irrigation and agriculture. These are further accentuated by the constructed topographical imperative of a country with explosive demographics and little agrarian land. The combination of such imperatives forms the driving force behind a large-scale hydro-agribusiness infrastructure presented as a “fix” for Egypt's food insecurity, unemployment, and urban density. To reiterate, projects such as Toshka – including their irrigation networks, reclaimed fields, and pumping stations – eventually appear to be piggybacked by historical, genuine claims for national betterment, yet they are all born of political decisions that deploy food security as a rhetorical argument for

²⁵² Fouad N. Ibrahim and Barbara Ibrahim, *Egypt. An Economic Geography* (London; New York: I.B. Tauris, 2003), 115.

²⁵³ Ministry of Planning, “The Five Years Plan 1978-82,” in *The General Strategy for Agriculture, Irrigation and Food Security* (Cairo: Arab Republic of Egypt, 1977).

²⁵⁴ John Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes* (Princeton, N.J.: Princeton University Press, 1983), 300.

²⁵⁵ See Olusegun Obasanjo, *The Challenges of Agricultural Production and Food Security in Africa* (London; New York: Taylor and Francis, 2013).

politically and economically motivated interests that, however, sideline the majority of the nation's population.

Food Security as Social Policy

For decades, Egyptian political leaders have consistently turned to food security as a conceptual tool that acts upon the susceptibility of the population vis-à-vis food matters, exemplified for instance by bread subsidies. Global discourses on food security emerged in the 1930s in the US, but it was only at the 1974 World Food Summit that the term was first coined in the context of rising awareness of global food systems and the propagation of the Green Revolution doctrine.²⁵⁶ The concept is not devoid of ideology. It came with a “technocratic faith in the ability of states to redistribute resources if the resources could only be made available.”²⁵⁷ The issue of food security entered political life in Egypt via the Food and Agriculture Organization, who established a “Food Security Assistance” program in 1975 to help developing countries improve their food production.^{258 259} But if the expression “food security” first appeared in official documents in Egypt in 1977, the social contract it stands for pre-dates the term. According to the unwritten pact enacted by Nasser, food security implied that the government was responsible for delivering adequate food to populations, guaranteeing political stability. This pact points at how the dual function of food security as simultaneously securing resources for the population and securing the state against uprisings emerges as a political imperative. This is why food security has a larger socio-political and economic dimension in Egypt than elsewhere. It is a prevalence evident not only in the massive state-run food subsidy programs, but also in the national political narrative and its contingent infrastructures. Nasser had argued that the Aswan Dam would bring about huge benefits for food production, and he called for the reclamation and cultivation of desert land, regarding these as essential processes to achieve food self-sufficiency. Both “Old” and “New Lands” would benefit from technological enhancement and the mechanization of agriculture, he claimed. Meanwhile, the Green Revolution promised to ensure technical progress, thereby increasing agricultural productivity and helping to meet food needs on

²⁵⁶ Erica Drummond, "Global Governance and Food Security Discourses: The FAO and the Via Campesina" (PhD diss., Carlton University, 2012).

²⁵⁷ Raj Patel, "What Does Food Sovereignty Look Like?" *The Journal of Peasant Studies* 36, no. 3 (2009).

²⁵⁸ Food and Agriculture Organization, "Food Security Assistance to Developing Countries. Progress Report on FAO Programme," in *Ad Hoc Consultation on World Food Security* (Rome: Food and Agriculture Organization, 1975).

²⁵⁹ The 1995 World Food Summit definition states that food security “exists when all people, at all times, have physical, social and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.” in *Trade Reforms and Food Security: Conceptualizing the Linkages*, ed. Commodity Policy and Projections Service (Rome: Food and Agriculture Organization of the United Nations, 2003), 29.

a global scale. Sadat and Mubarak both embraced these views and adopted a technocratic and development discourse that conformed to liberalization policies. While it is now well established that the technological contributions of industrialized agriculture have had mixed results and generate environmental and social costs, the narrative endures.

Egypt was almost a self-sufficient country in the 1960s, except for wheat, 30 percent of which had to be imported. Following the processes of liberalization and privatization, and the agricultural reforms initiated in the 1980s, agricultural productivity decreased while demand grew, and by 1990 Egypt was importing 80 percent of its wheat consumption.²⁶⁰ This fact, however, did not prompt the government to support rural development and local agriculture. Rather, the solution to solve the looming food security crisis was envisioned through technology: Hydro-infrastructures and land reclamation projects. Food security became a prevalent argument to legitimize these infrastructures and projects, supported by technocratic beliefs.

Food Security as a Discursive Device

Initiated by Nasser's cheap bread giveaways, national food security narratives came into full force after the 1977 riots. Bread became "the staff of life and the staff of regime survival."²⁶¹ Subsequent administrations followed that line, defusing popular protest through food subsidies on the one hand, and claiming to seek food self-sufficiency through imported high technology, heavily advertised land reclamation, and hydraulic infrastructures on the other. Indeed, international institutions and foreign experts, as well as the national and international press, have invoked the theme of food security throughout the Toshka project, ultimately reinforcing the technocratic modernization imperative. From 1997, when the project was initiated, to the current period, numerous documents have supported the technological-technocratic hypothesis, including reports published by international agencies, national policy strategy papers, and local and foreign press articles. If international donors have been reluctant to support Toshka directly, technological improvements in agriculture have nevertheless been encouraged. For instance, a FAO report from 2003 was unequivocally supportive when it stated that the "adoption of advanced irrigation technology is vital to an increase in water supplies and improved efficiency of use. Ensuring that such investments continue to be exempt from reduction commitments is

²⁶⁰ Julian McGill et al., "Egypt Wheat Sector Review," in *Country Highlights*, ed. FAO Investment Centre (Rome: The Food and Agriculture Organization of the United Nations, The European Bank for Reconstruction and Development, 2015).

²⁶¹ Waterbury, *The Egypt of Nasser and Sadat: The Political Economy of Two Regimes*, 230.

critical for the food security of (...) Egypt.”²⁶² In 2006, the World Bank published the “Egypt Public Land Management Strategy,” a background notes report which stated that the national “policy of reclaiming desert land for agriculture (...) aimed to compensate for the loss of agricultural land resulting from informal urban encroachment in the Nile Valley and Delta, and to increase food production to meet the demands of a rapidly-growing population amidst concerns over food security.”²⁶³ Toshka was listed as one of the projects of national economic interest. Governmental documents have been more candid in linking food security to new investment in agriculture or to irrigation projects. In 2005, the “Integrated Water Resources Management Plan” prepared by the Ministry of Water Resources and Irrigation “assisted by World Bank staff and consultants” identified the need for “securing water for food production.”²⁶⁴ The authorities were confident, claiming that “the agricultural area will increase by 35 percent as a result of horizontal expansion and the (...) mega project in Toshka,” and stressing that “there is an immediate need to adopt and implement a strategy and action plan for achieving food security.”²⁶⁵ The same document published a decade later aimed at “self sufficiency in food.”²⁶⁶ Finally, more recent tender documents issued by the Ministry of Water Resources and Irrigation for a 70,000 *feddans* agricultural project in the New Valley state that the beneficiary sectors are “Agriculture & Food.”²⁶⁷ It is also telling that the military, a dominant force in local agriculture (dairy, poultry, and vegetable farms, bakeries, fisheries, land reclamation projects, and food processing industries), runs the largest agro-industrial enterprise in the country under the name “Food Security Division.”²⁶⁸ With agendas focused on liberalization, foreign imports, and private profit, international agencies and national entities alike support technological enhancements in the name of food security, albeit in different forms. This approach further feeds the national, technology-dependent food-security narrative and emphasizes how production- and efficiency-

²⁶² Food and Agriculture Organization, “Egypt,” in *WTO Agreement on Agriculture: The Implementation Experience - Developing Country Case Studies*, ed. Gamal M. Siam (Rome: Food and Agriculture Organization of the United Nations, 2003), 8.

²⁶³ The World Bank, “Egypt Public Land Management Strategy: Background Notes on Access to Public Land by Investment Sector: Industry, Tourism, Agriculture, and Real Estate Development,” (Cairo: The World Bank, 2006), 72.

²⁶⁴ Hesham Kandil, “Integrated Water Resources Management Plan,” (Cairo: Ministry of Water Resources and Irrigation, 2005), 20.

²⁶⁵ *Ibid.*, 19.

²⁶⁶ Ministry of Water Resources and Irrigation Planning Sector, “National Water Resources Plan for Egypt - 2017,” (Cairo: Arab Republic of Egypt, 2005), 188.

²⁶⁷ American Chamber of Commerce in Egypt, “Ministry of Water Resources & Irrigation Drawing Plans for a 70,000 Feddans Agricultural Project in El Farafr, in El Wadi El Gedid, to Mainly Depend on Underground Water Resources,” news release, April 1, 2014, https://www.amcham.org.eg/online_services/tas/View_Projects_Email_twitter.asp?project_id=31584.

²⁶⁸ Jonathan Crush, *Power of Development* (London: Routledge, 2005), 155.

related infrastructure is an automatic ‘go-to’ in liberal regimes, an argument made convincingly by Timothy Mitchell in *Rule of Experts*.²⁶⁹ The press, though at first supporting the Toshka project, has only recently been less than enthusiastic regarding its performance. From 1998 onwards, the government-controlled newspaper *Al-Ahram Weekly* reported on the progress of the project in exalted terms, defining Toshka as the “Land of the Future,” a “Millennial Green,” and preparing “Egypt for the coming millennium.”^{270 271} In one of the articles published at the time of Toshka’s inauguration, the relocation of populations to areas outside of the Nile Valley and the extension of agrarian land were highlighted, and President Mubarak was quoted defending the project: “Everything necessary is available at Toshka, but enemies of progress do not want it to succeed.”²⁷² In 2006, when the project had already come under criticism, the newspaper insisted on the pristine nature of the land, “ideal for premium, organic crops, a fast growing sector of the European market,” signaling a shift from national food self-sufficiency storylines towards market-oriented logics.²⁷³ Between 2009 and 2013, few articles mentioned the project, except in connection to the land dispute with Al-Waleed bin Talal. It was not until 2014 that the weekly finally acknowledged the fiasco, though it was mitigated by an announcement of wheat cultivation: “UAE companies Al Dahra and Jenaan plan to grow wheat in Egypt’s Southern desert – home to failed Toshka megaproject – despite expert concerns.”²⁷⁴ Yet *Al-Ahram* quoted Suleiman al-Nuaimi, head of Al Dahra, as saying: “We consider ourselves to be strategic partners for the Egyptian government in terms of food security,” hence the enduring alibi seemed unaltered.²⁷⁵ Other national newspapers and news platforms such as *The Cairo Post*, *Daily News Egypt*, *Egypt Independent*, and *Mada Masr* have critically reported on Toshka, using terms such as “deserted” and “mega failure,” and voicing concerns about the credibility of the project’s revival by the el-Sisi administration.^{276 277} The foreign press has been ambivalent towards the project. While

²⁶⁹ See Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002).

²⁷⁰ Niveen Wahish, "Toshka Turns Millennial Green," *Al-Ahram Weekly*, Issue No. 392, August 27-September 2, 1998, <http://weekly.ahram.org.eg/Archive/1998/392/ec1.htm>.

²⁷¹ Wahish, "Marketing Toshka."

²⁷² Chérif Ahmed, "Un Projet D'avenir," *Al-Ahram Weekly*, January 15, 2003.

²⁷³ Wahish, "Marketing Toshka."

²⁷⁴ "UAE-Egypt Alliance Expands to Desert Wheat Venture," *Al-Ahram Weekly*, December 5, 2014, <http://english.ahram.org.eg/News/117304.aspx>.

²⁷⁵ Ibid.

²⁷⁶ Andre Fecteau, "On Toshka New Valley's Mega-Failure," *Egypt Independent*, April 26, 2012, <http://www.egyptindependent.com/news/toshka-new-valleys-mega-failure>.

some news agencies close to consulting groups have followed the official narrative (e.g., Gulf construction, Winne, and Larouche), most newspapers (e.g., *The New York Times* and *The National*) decried Toshka very early on. Neutral press agencies have relayed governmental statements, like Reuters in 2015, with a declaration by Prime Minister Sherif Ismail: “Closing the food gap and increasing habitable space in accordance with scientific studies is the main aim.”²⁷⁸

Tracing the use of the term “food security” through a series of documents discloses that the concept is in fact a rationalizing device of liberal governance. Because it encapsulates the notion of risk, notably potential starvation among the population and possible revolt against political powers, any action or policy that aims at food security is legitimized. This also shows that the conception of how security should be achieved has changed since Nasser, and that Toshka today is the result of this paradigm shift – from food as a means to subsist to food as yet another commodity to be bought and sold on global markets.

Food Security, Infrastructures, Biopolitics

Food security has evolved throughout the years from a genuine social policy to a discursive device deployed to justify large-scale projects that serve various interests. The benefits for the Egyptian government range from preserving a facade of accomplishment to generating capital via land sales. Toshka also generates work for local large contractors and armed forces-related businesses. For international institutions that advocate economic liberalism and globalization investment while seeking political leverage, the level of technological equipment and expertise required at Toshka implies imports and collaboration that profit foreign firms, consultants, and aid agencies, allowing for greater political and economic influence, strengthening a globalized technocratic discourse and expert knowledge.²⁷⁹ ²⁸⁰ Gulf-investors also see an opportunity there to secure land for agricultural investment, and a vitrine to showcase support for the current regime, an ally in the region. The Egyptian people, however, receive few of these perks, as the financial burden of Toshka on the national budget is diverting investment from other sectors in need such as rural development, “Old Lands” agriculture, or urban betterment. However, the construction

²⁷⁷ Nourhan Magdi, “Deserted: Can Sisi Develop a Region 17 Years in the Making?” *The Cairo Post*, August 31, 2014, <http://thecairopost.youm7.com/news/123842/editors-choice/deserted-can-sisi-develop-a-region-17-years-in-the-making>.

²⁷⁸ Ahmed Aboulenein, “Egypt’s Sisi to Inaugurate Land Reclamation Project by End-2015,” *Reuters Africa*, December 14, 2015, <http://af.reuters.com/article/topNews/idAFKBN0TY0KI20151215>.

²⁷⁹ Rupert Alcock, “Speaking Food: A Discourse Analytic Study of Food Security,” School of Sociology, Politics, and International Studies, University of Bristol Working Paper no. 07-09, 2009.

²⁸⁰ See Timothy Mitchell, “The Object of Development/Fixing the Economy,” in *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002).

of Toshka emerges as a completely logical undertaking once placed in the historical context of hydro-infrastructures controlling the Nile waters, monumental technological achievements presented as nation-building storylines, and years of desert land reclamation policies proposed as solutions to overpopulation and food security issues emphasized continuously since decades. Under the cover of attempts to achieve food security as part of an enduring social contract, such large-scale modern projects have proved an essential element of Egyptian politics. Against the backdrop of the political and social unrest associated with the Arab Spring, the continuation of the food subsidy program and the re-launching of the project appear to be logical moves, relying once again on a constructed food security narrative supported by a technocratic trust in infrastructures.

Toshka is thus the physical outcome of a political instrument, a large high-technology infrastructure shaping the life and form of the territory it occupies and impacting the bodies that inhabit it. It is in this regard that projects such as Toshka could be seen to share characteristics of what Michel Foucault called instruments of “biopolitics.” According to Foucault, biopolitics encompasses political tools to control, regulate, and manage populations at the service of the state, materialized by an increasing concern among politicians with the administration of life itself. These are “techniques for achieving the subjugation of bodies and the control of populations marking the era of bio-power.”²⁸¹ Food security has become merely the most recent regulatory instrument with which to politically control and manage life, deviating only in methodology to the way in which control has long been exerted over food production and supply.²⁸² Toshka could be considered a physical manifestation of biopolitics at work; under global pressure, the pursuit of national food self-sufficiency has been magnified to justify large-scale territorial transformations claiming agricultural opulence. The control over capital, water, land topography, population, and agricultural and food production is a recurrent story of power struggles over territory, people, and resources, and Toshka appears in such a context as yet another paradigmatic case of the contemporary deployment of biopolitics: an infrastructure with acutely visible spatial consequences and outcome of a particular political economy of food.

²⁸¹ Michel Foucault, *The History of Sexuality*, trans. Robert Hurley (New York: Vintage Books, 1976/1988), 140.

²⁸² See Michel Foucault, *Society Must Be Defended: Lectures at the Collège De France, 1975–1976*, eds. Mauro Bertani and Alessandro Fontana, trans. David Macey (New York: Picador, 2003).

3. FOOD TERRITORIES

3.1 EFFECTS OF THE POLITICAL ECONOMY OF FOOD ON THE BUILT ENVIRONMENT

Inputs

Production

Transportation

Trading

Processing

Distribution

Consumption

Financing and Governance

3.2 TERRITORIAL RECIPROCITY

3.3 SPACE, FOOD, BIOPOLITICS



3. FOOD TERRITORIES

How can one understand the towns without understanding the countryside, money without barter, the varieties of poverty without the varieties of luxury, the white bread of the rich without the black bread of the poor?

Fernand Braudel, *Civilization and Capitalism—15th–18th Century*, vol. III: *The Limits of the Possible* (London: Book Club Associates, 1981), 29.

The built environment is a complex composite commodity comprising innumerable different elements—roads, canals, docks and harbors, factories, warehouses, sewers, public offices, schools and hospitals, houses, offices, shops, etc.—each of which is produced under different conditions and according to quite different rules. The ‘built environment’ is then a gross simplification, a concept which requires disaggregation as soon we probe deeply into the process of its production and use.

David Harvey, *The Urbanization of Capital* (Oxford: Blackwell, 1985), 115.

Following the events in 2011 now known as the “Arab Spring,” G8 member-countries agreed to grant loans to so-called “Arab states in transition,” that is, to politically unstable nations with little leverage to negotiate the terms of the credit. Tunisia and Egypt were two of the countries offered such conditional financial packages.¹ Some years have passed since a street vendor’s self-immolation triggered the wave of popular unrest that swept across the Middle East. And even though the authoritarian ruler Zine el-Abidine Ben Ali was overthrown as a result, Tunisia’s debt has since doubled and imports increased—including that of wheat.² In January 2018 in the streets of Tunis, baguettes were once again seen held over the heads of angry Tunisians as a symbol of protest against high food prices, inflation, unemployment, and austerity measures that came with IMF reforms.³ These protests are poignant reminders that when bread is wielded at demonstrations in this context, it most often stands for much more than a general concern for food security. In addition to signifying demands for democracy, social justice,

¹ Jihen Chandoul, “The IMF Has Choked Tunisia. No Wonder the People Are Protesting,” *The Guardian*, January 17, 2018, <https://www.theguardian.com/commentisfree/2018/jan/17/imf-tunisia-people-rioting-2011-economic-reforms>.

² Morgan Hass, “A Strong but Fatigued 2017 Campaign,” in *Grain and Feed Annual Report—Tunisia*, ed. USDA Foreign Agricultural Service (Washington: USDA, 2017).

³ Mathieu Galtier, “Tunisie: À Tebourba, une colère de première nécessité” *Libération*, January 11, 2018, http://www.liberation.fr/planete/2018/01/11/tunisie-a-tebourba-une-colere-de-premiere-necessite_1621817.

employment, and freedom, bread is also an emblem of popular defiance against ineffectual leaders as well as interference of global actors in national and local policy-making. Having provided the initial impetus for this investigation, urban 'food protests' arguably serve as a timely gauge of the complex interplay of situated practices and world-directing forces at large, disclosing subtle, yet tangible interactions between food systems, the global market, urban economy, and local processes of spatial transformation, while providing insight into how the world food system works as an agent of territorial organization in specific contexts.

This work presents a multi-scalar study of the world food system and its impact on territorial organization, with particular focus on the spatial dynamics of the world's food system in local settings. The two main parts of the research are identified and then supplemented with concluding remarks in related subsections.

1) The materiality and operative procedures of the grain supply chain are investigated following the model of Global Commodity Chain analysis. The key role of agriculture in the capitalist economy is unambiguous, for food production and its global distribution constitute joint drivers of how world space is structured and determine in large part how the current political economy of food operates at a trans-geographical scale. The current world food regime is characterized by the increased global trading of food, the consolidation of capital at every level of the chain, the rise of bio- and agro-technologies, as well as adverse changes in diets, all of which is taking place against the backdrop of declining farm subsidies, liberalization reforms, state deregulation, and ongoing urbanization.^{4 5} This part of the research reveals how the global networks of power and finance controlling today's world food system have measurable spatial impacts locally rather than functioning merely as abstract conduits of influence from afar. At every step of the grain chain, from a seed of Hard Red Winter Wheat planted in a field of Minnesota by a well-equipped and highly-subsidized farmer to the state-funded loaf of *baladi* bread sold for 5 piasters to a housewife in Imbaba, grain flows are powered by global capital and conducted from financial centers, while being managed by large trading houses, grain brokers, transportation agents, food administrators and other such agents who are grounded somewhere on the planet in a local context. All generated and connected by the commodity chain, the aggregation of these acts is translated into a cascade of local interactions that play out in specific territorial arrangements and relations.

⁴ Harriet Friedmann, "The Political Economy of Food: The Rise and Fall of the Postwar International Food Order," *The American Journal of Sociology* 88 (1982).

⁵ See Richard B. Le Heron, *Globalized Agriculture: Political Choice* (Oxford: Pergamon Press, 1993).

2) The second part of the study engages the world food system as a defining agent in local settings by surveying specific spatial effects of this system in the context of Egypt. The built environment is read through the lens of case studies at different scales, each aiming to divulge political, economic, and social strands of the food-space link in actual habitats. While the circulation and accumulation of capital proceeds unevenly worldwide via distended operations of the grain chain, peculiarities of the built environment are treated as indicators of how the global food system becomes determinate in circumstances on the ground.

Key questions arise concerning these two interrelated parts of the research. How does the political economy of food contribute to spatial production? Can the observable effects that the capitalist food system has on the built environment shed light on unseen agencies of the grain chain? How do political, economic, and spatial practices related to food interact to produce today's territorial conditions? The physical impacts of the world food system on the built environment are presented as findings that suggest working answers to such questions. With regard to the commodity chain of grain, the research provides evidence of how global forces act upon local realms, for example, through economic policies concerning food subsidies, food production, and food security in the Egyptian context, revealing widespread spatial tensions between market liberalization and the political economy of food as well as situated conflicts between the nation's food policies and its economic management relative to neoliberal imperatives at large.

The notion of *territorial reciprocity* is forwarded to challenge the conventional treatment of space as a passive beneficiary of global change emanating solely from capitalist world centers. It is argued instead that territorial arrangements have a reciprocating effect on the global and local forces acting upon them. This is to say that situated territorial relations and distributed global forces are co-constitutive. By addressing the relational dynamics between sustenance and space, the work discloses how space—from architecture to territory—is shaped by, and in turn shapes political, economic, and social practices. These clarifications are meant to highlight understudied links among food as requisite for human life, space as connective agent of multiple practices, and political economy as mediating apparatus of food-space relations. Building on Michel Foucault's concept of "biopolitics," it is argued that food constitutes a regulatory instrument for the political control and management of life.⁶ With this concept in mind, the research seeks to understand not only how populations are regulated and administered through a particular political economy of

⁶ See Michel Foucault, *Society Must Be Defended: Lectures at the Collège de France. 1975–1976*, trans. Graham Burchell, eds. Michel Senellart, Francois Ewald, and Alessandro Fontana (New York: Picador, 2003).

food, but also aims to explain the spatial dynamics of the food system as governed under neoliberal agendas.

To conclude, the title 'Food Territories' is intended to bring the notions of 'territorial reciprocity' and 'biopolitics' to bear on those spaces of Egypt investigated herein, the objectives being to contribute to critical methods of spatial analysis, to extend discourses on the organization of space and the formation of territory, and to link the study of architecture and urbanism to an examination of the currently operative political economy of food.

3.1 EFFECTS OF THE POLITICAL ECONOMY OF FOOD ON THE BUILT ENVIRONMENT

To examine physical impacts of the grain chain on the built environment, one might begin by localizing the myriad of agents responsible for material input, production, trade, processing, transportation, distribution, and consumption, while designating the links between respective agents as well as the corresponding spaces in/through which each operates (i.e., corporate headquarters, production facilities, municipal office). But the magnitude of any agent's specific activities—their immediate agency—reaches far beyond a tangibly stationed location. For the locally effective spaces of any particular agent are systemically connected to more extensive, often less evident influences indexed to dominant political and economic narratives informing how the world food chain operates in different regions. Mapping worldwide geographies of grain thus requires working back and forth between locally situated actions and globally extensive structures of the food system to track their distended interactions as well as their concrete impacts on people and place. Drawing on research and fieldwork in Egypt, such a geographic survey is used to investigate the spatial impacts of the grain chain in terms of how it transforms physical and social territories in the country.

Financing and Governance

The spatial effects of the international food regime are pervasive. They take various physical forms within the built environment via transnational directives that are integrated into national political and economic policy-making. More often than not, localized spatial outcomes of such domestic policies are driven by compulsory agendas for market-driven capitalist growth dictated from afar, suggesting that those international financial institutions active in the world food system hold sway over other actors involved in world trade—globally and locally—and thus have direct influence on how territory is organized in location-specific sites.

Financial agents such as the IMF and the World Bank as well as other agencies (i.e. national banks, funds, credit agencies, sovereign wealth funds, hedge funds) constitute major international operators of the world food system. Defining agendas for policy-making and the terms of aid allocation, while also guiding economic trends and devising related investment strategies, these institutions underwrite the corporate control of food resources by private companies associated with the food chain.⁷ The strategies promoted by IMF and World Bank to

⁷ David Burch and Geoffrey Lawrence, "Towards a Third Food Regime: Behind the Transformation," *Agriculture and Human Values* 26, no. 4 (2009).

increase global trade in the name of world food security, which in the process also impose considerable debt on developing nations, transforms space at all scales. The spatial impact wielded over land use, resources, populations, and the built environment is proportional to the increased financial power of these institutions: “In 2016, World Bank IBRD/IDA agricultural assistance to (...) Africa and South Asia were \$7 billion and \$8 billion respectively.”⁸ The sections that follow summarize the range of influence at various stages of the chain and trace their significance for territorial organization, with opening citations from corresponding World Bank and IMF documents used to illustrate the respective positions of the institutions.

Inputs

Wider uptake and more intensive use of improved seed, fertilizer, and other inputs would go a long way to closing the African ‘agricultural performance deficit.’

Derek Byerlee, Andres Garcia, Asa. Giertz, Vincent Palmade, and Tugba Gurcanlar, "Growing Africa. Unlocking the Potential of Agribusiness," (Washington DC: The World Bank, 2013), xxii.

Dynamiting the desert: this ruthless, repeated, ground-moving act reveals the extent of how transnational commodity flows impact space. Mining is in fact—along with seeding—an essential cog of the global commodity chain. Critical natural resources linked to food production like phosphorites (phosphate-bearing rocks) are mined with dynamite in open pits and are then shipped, processed, re-imported, and applied worldwide to soils depleted after harvest. Phosphate fertilizers involved in the global commodification of resources can thus be considered as active spatial agents in the food system.

In Egypt, the three main extraction sites that utilize this mining method are located in desert areas (the Sebaya mines near Luxor in the Red Sea desert, the El Qusier mine near the Red Sea, and the Abu Tartur mine in the Western desert) and are connected by road or rail to global transport networks.⁹ Considering that Egypt is the third largest phosphate rock exporter worldwide after Morocco and Jordan, specially built port facilities (Safaga Port, Hamrawein and Abu Ghusun ports on the Red Sea) are used to export the mineral commodity to global markets (i.e., India).¹⁰ 60 percent of its extraction is sold raw abroad; the rest is processed and used locally.

⁸ The World Bank, "Food Security," *Agriculture and Food*, accessed January 5, 2018, <http://www.worldbank.org/en/topic/agriculture/brief/ensure-food-security>.

⁹ "Minerals Yearbook Area Reports, Africa and the Middle East," in *International Review*, ed. Government Printing Office (Reston: United States Geological Survey, 2011).

¹⁰ Dana Cordell and Stuart White, "Tracking Phosphorus Security: Indicators of Phosphorus Vulnerability in the Global Food System," *Food Security* 7, no. 2 (2015).

The use of agricultural fertilizers in Egyptian is extremely high and is equivalent to that of the Netherlands in terms of hectare usage.¹¹ In part, this is because the Aswan High Dam has blocked the annual accumulation of silt so crucial to soil fertility, but is also due to the use of inorganic fertilizers initiated by the Green Revolution. Economic reforms of the 1990s saw the penetration of non-state private investors into the agriculture sector who brought with them ‘modern’ techniques relying heavily on chemical supplements. Today, multinational companies are engaged in the local fertilizer production industry, with chemical giant Nutrien, for example, holding 26 percent of the shares of the local MISR Fertilizers Production Company.^{12 13} Financed by Chinese investors, the construction of a phosphate processing plant is also underway in Abu Tartur.¹⁴ Such correlations among local production industries, global trade practices, and transnational transportation flows has become commonplace. Further correlations between natural resource extraction and the global fertilizers market result in modes of territorial organization that regiment geopolitical spaces, regional topographies, as well as the formats of local and global infrastructure, all structuring the world’s productive hinterlands in compliance with neoliberal imperatives for growth. It must be said that rock phosphate mining does not only immediately transform the Saharan desert or the shores of the Red Sea, insofar as the mineral is integral to flows of the food commodity chain that it sustains and thus has global spatial impact as a systemic agent. Organizational forms—the mines and their attendant infrastructure, the mining-towns in the middle of the desert, the roads and harbors purposely constructed to export the rock—delineate a spatially-specific territory of appropriation governed by political and economic motives. Moreover, the sheer number and size of the extraction sites attest to the expansion in scale and speed of world resource exploitation, if not of “accumulation by dispossession” via ecological plunder and environmental degradation perpetuated by the often destructive advances of capital-led growth.¹⁵

¹¹ Ray Bush, *Counter-Revolution in Egypt's Countryside: Land and Farmers in the Era of Economic Reform* (London: Zed Books, 2002), 90.

¹² Belaruskali (Russia, Ukraine), ADM, E.I. Du Pont De Nemours & Company and CF Industries Holdings (U.S.A.), Yara International (Norway), Nutrien (U.S.A.), Bayer Crop Science (Germany), and Sasol (South Africa) in "Egypt Agrochemicals Market," in *Egypt Market Shares, Forecasts and Trends (2017 – 2022)* (Hyderabad: Mordor Intelligence, 2017).

¹³ *Nutrien Fact Book 2018*, (Saskatoon: Nutrien, 2018), 5.

¹⁴ Teresa Matich, "China to Build Massive Phosphate Mine in Egypt," *Investing News Networks*, August 3, 2016, <https://investingnews.com/daily/resource-investing/agriculture-investing/phosphate-investing/china-to-build-massive-phosphate-mine-in-egypt/>.

¹⁵ David Harvey, *A Brief History of Neoliberalism* (Oxford: Oxford University Press, 2005), 159.

Production

The World Bank estimates that agriculture and agri-business together could command a US\$ 1 trillion presence in Africa's regional economy by 2030.

Byerlee, "Growing Africa. Unlocking the Potential of Agribusiness," vii.

Subsidy reform will have positive effects on growth by eliminating distortions, rationalizing energy use, increasing exports revenues in oil exporters, enhancing competitiveness, and strengthening budget structure.

Carlo Sdravovich et al., "Subsidy Reform in the Middle East and North Africa: Recent Progress and Challenges Ahead," (Washington, DC: International Monetary Fund, 2014), x.

Worldwide, wheat is obtained from cultivated soil, either by small- and medium-size farms or by large commercial facilities. Specific forms of territorial organization are correlated with these modes of food production. Taking into account land use, irrigation, workforce and crop rotation management, seed procuring and planting, applications of pesticides and fertilizers, harvesting and storage, it would be hard to deny that farming is a trans-scalar practice of spatial organization.

Historically noteworthy because it has been shaped by centuries of agricultural operations and exploitative practices, the Egyptian countryside is a territory of production that today harvests only 40 percent of the local demand for wheat.¹⁶ The characteristic longitudinal shape of its fields—*feddans*—developed on the basis of land subdivision and inheritance laws.¹⁷ Repeated across the Nile Delta and Nile Valley, this grid determining both the means of irrigation and terms of tenure regulates the productive landscape—the 'Old Lands' of rural Egypt.¹⁸ In the 1990s under IMF supervision, the economic reform and structural adjustment program (ERSAP) brought about a major shift in land use. Policy changes saw the conversion from sustenance agriculture to export-driven horticulture, the dismantling of the welfare state, and the deregulation of crop patterns. Occurring concurrently was the repeal of redistributive land deals and the eviction of smallholders from the *feddans* they had received under Gamal Nasser's 1950s reforms. International agencies encouraged wholesale agricultural modernization via

¹⁶ Food and Agriculture Organization, "Country Brief on Egypt," in *Global Information and Early Warning System on Food and Agriculture*, ed. FAO GIEWS (Rome: FAO, 2016).

¹⁷ A *feddan* is a narrow strip of farmland connected to a road and to a water channel, linked via larger canals to the Nile.

¹⁸ 'Old Lands' designate the fields on the Nile Valley and Nile Delta. 'New Lands' is a term which refers to fields acquired via land reclamation projects on deserts.

technological advances in order to increase cash crop exports and generate foreign exchange through the purchase of grain imports, an arrangement that would thoroughly integrate Egypt in globalized trade circuits.¹⁹ But said reforms did not deliver the promised prosperity and the purported modernization of farming is stalled, at least in the 'Old Lands.'²⁰ This raises a key question, namely, if agriculture modernization has for all intents and purposes failed, what are the actual spatial impacts of the political economy of food on Egypt's productive landscape?

The fallout of an agriculture sector being pulled into the machinations of the global food system must be considered against the persistent drive to expand Egypt's productive territory ever further into the desert. Instigated under Nasser, the politicized recasting of agriculture and urbanization on desert land as the solution to Egypt's food security and over-population gained traction under Anouar Sadat. As the 'Old Lands' failed to adapt to agricultural modernization, neoliberal policies literally seized the nation's 'New Lands'. For his part, Hosni Mubarak handed over desert expansion projects to the private sector to produce cash crops for exports, basically absolving his administration from the customary pledge of land reclamation for national food security. The continuous erosion of state support for traditional agriculture practices in time resulted in more and more investment being poured into the development of the 'New Lands.' Desert plots were—and still are—apportioned to the financial or military elite at bargain rates. The desert has thus been reorganized as a lucrative, privatized frontier, where high-tech capital-intensive agriculture manned by docile workers thrives with the support of massive, profit-oriented agricultural infrastructure put into place on the fringes of the Delta, in the Saharan Oases, and in Upper Egypt. Satellite images of this ongoing re-territorializing process reveal kilometers of peculiar green patches on the sandy plains. Made of central-pivot irrigation fields and watered by pumping the Nubian Aquifer or with canals served by Lake Nasser and the Nile, these projects, in truth, have had only limited success. The vision of developing the desert for profit is without a doubt a direct spatial result of interrelated global modes of food production, distribution, and consumption as maneuvered by private and semi-private entities. Satisfying liberal agendas for export-oriented production rather than fulfilling the originally stipulated goals for local sustenance provision, these large land reclamation projects give spatial expression to the interest-laden directives of the political economy of food, perpetuating in due course unjust

¹⁹ See Joel Beinin et al., *Egypt: The Moment of Change* (London: Zed Books, 2013).

²⁰ Ray Bush, "More Losers Than Winners in Egypt's Countryside," in *Counter-Revolution in Egypt's Countryside: Land and Farmers in the Era of Economic Reform*, ed. Ray Bush (London: Zed Books, 2002).

resource allocation and uneven capital accumulation through a reorganization of Egypt's productive landscape.

Local areas of production are undergoing profound transformations, particularly in disputed rural areas at the periphery of cities. Privatization reforms have stripped farmers of their rights, and the ratification of Law N°96/1992 that leaves them vulnerable to impromptu evictions reversed the time-honored tenancy guarantees of Nasser's Agrarian Reform Act of 1952. Predictably, agriculture policies and agendas hostile to rural development have tended to favor technology and land reclamation, while pushing for the increased integration of local production with global markets. The informal city grew amidst this contested geopolitical landscape, where age-old farming suffered decades of neoliberal reforms. Around Cairo, densely urbanized areas mirror the former land tenure patterns and supplant agricultural land in an unabated process of incremental growth. Following tacit, practice-based rules, informal urbanization is supported by a well-regulated, yet extra-legal housing market in its own right. Its distinct architecture and urban forms developed on the basis of agrarian land subdivisions, combined with ultra-efficient rationalities for constructing affordable housing. Dwellers of these incrementally built neighborhoods are exceedingly dependent on governmental bread subsidies, which are sustained by wheat purchased abroad. Egypt relies heavily on the United States, Europe, and countries from the former USSR for grain imports to satisfy its food subsidy program, the exorbitant cost of which puts a heavy burden on national budget. Still, the nation's enduring reliance on global grain markets has engendered a general indifference toward those territories traditionally reserved for food production. The capacity of the 'New Lands' to offset the loss of traditional fields to salination, pollution, and urbanization are widely heralded, though, in actuality, such claims are misleading. For the domestic food system, geared as it is to producing crops for export to repay debts accrued due to excessive importation, does not fulfill the grain requirements for feeding an increasingly urban population.²¹ This in mind, a deep socio-spatial reorganization of the Egyptian rural landscape is currently underway: Agriculture land is increasingly being consumed by informal urbanization, forcing the country in turn to rely increasingly on foreign imports for its requisite grain supply. Can this transformation be considered a direct consequence of the transnational flows of commodities? Is the bricks-and-concrete belt of informally constructed buildings on the periphery of Cairo born of the political economy of food? The effects of global market-driven agrarian policies are clearly being played out in the built form of Cairo's poor

²¹ Harriet Friedmann, "Distance and Durability: Shaky Foundations of the World Food Economy," *Third World Quarterly* 13, no. 2 (1992).

neighborhoods, where an array of local and non-local factors have led to the disintegration of the domestic food production system and the concomitant disempowerment of rural population, which in tandem has facilitated informal urbanization. True to form, those territories that do supply some 75 percent of Egypt's demand for wheat have been relocated elsewhere.

This reorganization of territories of production illustrates how domestic agriculture has been for the most part surrendered to large-scale food production as insistently advocated by global players like the World Bank Group. The annulment of subsidies for local farming and public trusts for seeds and fertilizers, the dismantling of welfare benefits and local cooperatives, the fiscal austerity measures mandated by structural adjustment programs, the assault on traditional practices of land and water management, the commodification of land, the erosion of farmers' rights (i.e., land tenure reforms, rent controls) have all gone hand in hand with the introduction of new technology-intensive agribusinesses, the creation of privileged zones where land tenure is distributed to private companies, as well as the handover of spatial planning to private contractors. Such political-economic shifts and the spatial transformations that they engender are without a doubt detrimental to world food production. Desert land development, hydro-infrastructure, rural migration to cities, and urbanization bring about tangible changes that, far from manifesting only local responses to the food system, can also be understood to reflect transterritorial dictates emerging from global food trade imperatives.

Transportation

Efficient transport and logistics are critically important to agricultural marketing and are a key component of prices. (...) At the global level, gains in trade and GDP growth could be significantly magnified by the liberalization of transport services.

Ian Gillson and Amir Fouad, "Trade Policy and Food Security: Improving Access to Food in Developing Countries in the Wake of High World Prices. Directions in Development," (Washington, DC: The World Bank, 2015), 111.

Of all sequences of the grain commodity chain, transportation systems are perhaps the most spatially influential agents of the world's political economy of food. The role of international grain mercantilism in capital accumulation and the enduring power it has granted to industrialized nations over developing ones through imbalanced trade relations has been a long time in the making.²² Contemporary global wheat trade—in the hands of commodity giants—is increasing

²² See Fernand Braudel, *Civilization and Capitalism - 15th-18th Century, vol. II: The Wheels of Commerce*, trans. Sian Reynolds (London: Book Club Associates, 1983).

steadily and is forecasted to reach a record high in the following years, driven by relatively low market prices, stagnant local production in import countries, and an accelerated rise in consumption due to rampant urbanization—most notably in Africa.²³ The logistics systems responsible for global grain transportation have duly responded to the world increase in grain trade—in accordance with World Bank appeals—by creating new sites to enable evermore grain circulation. The rush to meet the demand of developing countries is reflected, for example, in the relocation of production territories to extra-national spaces, notable expansions in storage and harbor facilities, overabundance of new loading and unloading infrastructure, and a marked surge in marine traffic worldwide.

Egypt is the worldwide leader in wheat imports, with 10-11 million tons purchased yearly on global markets for a total sum of USD two billion.²⁴ The coordination of national food policies with global grain market directives orchestrates a cross-border movement of internationally sourced wheat brokered by buyer cartels and private trading houses. These transnational operations have a multi-scalar impact on the local built environment. Facilities in production areas, multi-modal transportation networks, massive storage facilities, cross-border maritime routes, and numerous building-scale installations form the material armature of the more intangible commodity grain chain. The intermittent grain flows—moving from Russian production zones and their regional storage facilities, switching to Black Sea grain terminals, traveling through the Bosphorus straits and across the Mediterranean Sea, docking at Alexandria grain berths, and arriving at the nation's mills and reserves to feed urban areas of Egypt—is enabled by diverse transport systems and mobility infrastructure that, in bridging great distances, require vast amounts of fossil fuels. What could be referred to as an 'architecture of grain' emerges along these synchronized channels of global food trade, constituting as much a space of protocols as it does an engineered network of pieces.

Deriving from sanctioned food dependency computations, a transaction is authorized by Egypt's public wheat buyer office GASC (General Authority for Supply Commodities) for purchasing grain and the so-called "wheels of commerce" are set into motion.²⁵ After issuing its request for tender, GASC selects one among several offers from international traders and

²³ Foreign Agricultural Service/USDA, "Sub-Saharan Africa Drives Growth in Global Wheat Imports," in *Grain: World Markets and Trade* (Washington: United States Department of Agriculture, 2018).

²⁴ Ibid.

²⁵ Braudel, *Civilization and Capitalism- 15th-18th Century: The Wheels of Commerce*, II.

proceeds to negotiate a grain contract—more often than not for Russian grain.²⁶ This single act moves some 50,000 tons of wheat (one *Handymax* cargo shipment) stored in any one of Russia's abundant grain terminals. From there, grain is shipped as cargo via precisely calibrated infrastructural circuits that serve as supply lines from the hinterlands to international marine routes. Needless to say, capital flows accompany grain shipments, with an average cost of USD 10 Million per USD 200/ton, for instance, circulating from Egypt's national bank to an international trader account.

Operative buildings (i.e., farms, offices, logistics company headquarters), supplementary structures (i.e., warehouses, storage spaces), and sizable infrastructure (i.e., grain elevators, harbor loading berths and terminals, train and road networks, marine routes) in sum form the spatial armature of the global food chain, manifesting a logistical network of compliant, generic architecture and infrastructure tuned to respond to standardized protocols of trade and perform routine operations. It has been said that each part of the chain is but a “dumb component that gains intelligence in multiples.”²⁷

Considering the acute demand for grain in Egypt, one must ask to what extent does this basic foodstuff constitute a driving force in shaping the built environment and organizing territorial relations? To reiterate, the nation's dependency on foreign grain markets requires complex logistics and the construction of specific infrastructural arrangements that, in effect, fabricate new sites, while reconfiguring entire existing areas. Part of the harbor of Alexandria—grain berths, storages, conveyor belts, silos, and mills of El Dekheila—is testimony to the degree of spatial reorganization brought on by the operative political economy of food. Legible at the architectural, urban, national and international scales, grain transportation infrastructure forms the tangible landscape of food dependency that spans thousands of kilometers. With such observations in mind, Egypt's reliance on grain imports must be examined in the context of increasing grain trade worldwide. Other countries like Indonesia, Algeria, Morocco, and Tunisia drive this upsurge as well, engulfed as they are too by the “wheat complex” that props up the hegemony of western countries in the post-war food regime. This structural imbalance, not only underwrites the West's domination of the world food market, but also has created dependencies wherever a food aid program, a ‘Food for Peace’ campaign, or subsidized import reform has been implemented.²⁸ In the wake of decades of indebtedness and structural

²⁶ Reuters Staff, "Lowest Offer at Egypt's Gasc Wheat Tender at \$213/T," Reuters, March 6, 2018, <https://af.reuters.com/article/africaTech/idAFL5N1QO3M0>.

²⁷ Keller Easterling, *Organization Space: Landscapes, Highways and Houses in America* (Cambridge, Mass: MIT Press, 2001), 200.

²⁸ Friedmann, "Distance and Durability: Shaky Foundations of the World Food Economy."

adjustment programs, global market integration, the undoing of domestic agriculture, all of which has been eagerly overseen by international financial institutions and private companies, the dependence of poorer nations on cheap food imports is by now fully consolidated and institutionalized worldwide. And the architecture of grain that sustains systemic reliance throughout the world is key to an ever-expanding global landscape of accumulation and circulation that services an unjust food system.²⁹

Trading

Encouraging more trade in food—not less—is essential for achieving food security.

Gillson and Fouad, "Trade Policy and Food Security: Improving Access to Food in Developing Countries in the Wake of High World Prices. Directions in Development," 106.

One of the highest priorities is to accelerate the regional integration of markets by implementing trade liberalization schemes.

Byerlee, "Growing Africa. Unlocking the Potential of Agribusiness," xxii.

Having considered the involvement of state enterprises, broker agencies, and private trading houses in the global handling of wheat as well as the physical infrastructure that supports the grain trade, still another spatial corollary of the food system relates to the actual settings of international trading and financial institutions and the power invested there. Despite the end of the era of the "Atlantic-centered food regime", grain-trading firms have nonetheless maintained the prestige and privilege associated with their strategic global positioning in the Northern hemisphere.³⁰ Geographic analysis shows that the major traders still operate largely from export hubs in North America and Europe. The price-setting epicenter of grain trade remains Chicago, home of the Chicago Board of Trade (CBOT), followed by Geneva—where the World Trade Organization is headquartered. Both cities emerged as trading hubs due to their specific historical circumstances and have retained their global dominance to date, which says much about the role of grain trade in the development of urban areas as William Cronon has observed about Chicago in *Nature's Metropolis*.³¹ The prominent CBOT building, for example, was built as a key facility for deal making and the heart of lucrative cash-for-wheat transactions, containing pits and

²⁹ Anthony Weis, "The Perilous Dependence on Cheap Food Imports - Food and Market Approaches," *The Transnational Institute*, 2012: 1-7.

³⁰ Harriet Friedmann, "The Political Economy of Food: A Global Crisis," *New Left Review* I/197 (1993).

³¹ See William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton, 1991).

octagonal-shaped amphitheaters where open-outcry trading still takes place. This aspect of trading, however, is giving way to the digitalization and dematerialization of financial transactions and CBOT accordingly sold its signature edifice in 2012.³² Ultimately, as the volume of the world's grain trade continues to rise, the spaces required for such transactions, wherever they may be, are becoming less tangible as they become all the more generic. This is why the corporate architecture associated with the contemporary grain trade hardly garners sustained interest despite the decisive power shifts that have taken place in the sector. In point of fact, the relocation of rural headquarters to urban and suburban buildings signals the need for proximity to key trading centers rather than to production areas per se, as witnessed, for example, with the transfer of 900 Archer Daniels Midland (ADM) employees from the provincial Decatur, Michigan offices to a prestigious, yet mainstream, high-rise in downtown Chicago that had formerly served as the headquarters of United Airlines.³³ Cargill Inc. also relocated from its secluded pastoral mansion to a rather bland business complex in central Wayzata, Minnesota. Even more telling of the sectorial shifts underway is the relocation of Bunge's headquarters from South America to New York just before appearing on the stock market in 2001. Both Bunge Ltd. (New York) and Louis Dreyfus' headquarters (World Trade Center, Amsterdam) are located in active business areas of lead cities in anonymous high-rises as well. The very fact that there is little sign of their presence in any given city is suggestive, as if their power is reinforced to the very degree that these grain giants play down their central role in the world order.

The increase in trade and the resulting aggressiveness of the market have also pressured grain traders to reconsider their modes of operation.³⁴ The consolidation among large food-related businesses underscores this trend. In 2018, ADM and Glencore both announced their consideration of a takeover of Bunge, a merger that would reduce selling options for farmers and possibly shift power centers in the industry once again.³⁵ Regardless of who wins the bid, this merger, however, will most certainly strengthen the already significant bargaining leverage of the Northern hemisphere as the world's *locus* of financial power. Considering that large grain traders

³² "'Open Outcry' Is in Retreat but Futures and Options Trading-Volumes Surge," *The Economist*, January 5, 2017, <https://www.economist.com/news/finance-and-economics/21713854-market-now-mainly-electronicbut-still-booming-open-outcry-retreat>.

³³ Archer Daniels Midland Company, "ADM Opens Global Headquarters and Customer Center in Chicago," news release, August 25, 2014, <https://www.adm.com/news/news-releases/adm-opens-global-headquarters-and-customer-center-in-chicago>.

³⁴ Neil Hume, "Tough Times for Big Grain Traders," *Financial Times*, August 8, 2017, <https://www.ft.com/content/1266eefa-7c10-11e7-9108-edda0bcb928>.

³⁵ Tom Polansek and Rod Nickel, "ADM Pursues Big Ag Merger with Grain Trader Bunge," *Reuters*, January 19, 2018, <https://www.reuters.com/article/us-bunge-m-a-archer-daniels/adm-pursues-big-ag-merger-with-grain-trader-bunge-source-idUSKBN1F82N4>.

poised to expand their trading activities to the recipient countries themselves, “the regional integration of markets” as advocated by the World Bank will certainly have drastic spatial ramifications as well, with corporate operations moving ever deeper into productive hinterlands and thereby increasing the likelihood of even more dispossessed populations around the globe.³⁶ ADM claims “500 crop procurement locations, 270 ingredient manufacturing facilities, 44 innovation centers and the world’s premier crop transportation network,” a network that commands a worldwide territory of trade.³⁷ In Egypt, ADM operates transportation services and a grain sales office in central Cairo. In another upscale neighborhood of the Egyptian capital, Egypt’s main grain buyer, state-trading GASC (the General Authority for Supply Commodities), operates from a 1960s administrative block in Garden City, which, because this venue also happens to be within the Ministry of Supply and Internal Trading, constitutes a convenient form of cohabitation, insofar as GASC’s budget for purchasing wheat on world markets is drawn directly from the national budget. Being intricately tied to the operations of the global food system, what do such facilities reveal about that system’s influence on the organization of space? Again, the structures themselves, wherever they may be, are patently ordinary and non-specific. But, mapping the relative world locations of headquarters and financial centers discloses concerted spatial patterns of capital accumulation as well as purposeful territorial distributions of trade. Although specific urban centers appeared as distinct vantage points of world trade in the 1990s, the increased significance of transnational flows of capital—and concomitant restructuring of state spaces—has reconfigured global–local relations by giving rise to inter-territorial networks of cities and attendant productive hinterlands, all connected to varying degrees by an integrated world economy.³⁸ The global reach of grain trading giant ADM, to cite but one prominent player, is a case in point, with its regional headquarters located in Switzerland, Brazil, Singapore, and China plotting out, country after country, revealing trajectories of capital-led accumulation and circulation. These, in effect, recast sites of company management as strategic territories for perpetuating food dependencies through uneven growth.³⁹

³⁶ Derek Byerlee, Andres Garcia, Asa. Giertz, Vincent Palmade, and Tugba Gurcanlar, *Growing Africa. Unlocking the Potential of Agribusiness*, (Washington D.C.: The World Bank, 2013), xxii.

³⁷ ADM Worldwide, "ADM Worldwide," Archer Daniels Midland Company, accessed May 6, 2018 <https://www.adm.com/adm-worldwide>.

³⁸ Neil Brenner and Robert Keil, "From Global Cities to Globalized Urbanization," in *Critique of Urbanization: Selected Essays* (Basel: Birkhäuser Gütersloh, 2017); David Harvey, "Foreword to Uneven Development by Neil Smith," in *Uneven Development. Nature, Capital, and the Production of Space* (Athens, Georgia: The University of Georgia Press, 2008).

³⁹ ADM Worldwide, "ADM Worldwide."

Processing

Further market liberalization is needed. (...) After liberalization, as milling restrictions on the private sector were relaxed, consumers benefited from reduced transport and milling margins.

Byerlee, "Growing Africa. Unlocking the Potential of Agribusiness," xxii.

There is no clear evidence that either public or private management of the wheat supply chain is more efficient in terms of transit time and cost.

Julian Lampietti et al., "The Grain Chain: Food Security and Managing Wheat Imports in Arab Countries," ed. IFC smart lessons brief (Washington, DC: World Bank, 2011), 32.

Grain traders are part of private companies involved in the global food chain, handling all industry-related matters from fertilizers to food processing. They buy, store, and sell grain. They also engage in the bio-fuels sector, offer transportation services, manage and own grain elevators as well as mills. Milling infrastructure, in particular, is a fundamental spatial component of the processing operations of the global food chain—from wheat to flour. What are the spatial dynamics of milling agent's activities? How does their physical form reflect the workings of the political economy of food?

Multinational firms run large-scale mills equipped with advanced technology to supply flour to cities and to the food industry. They own modern plants capable of producing a wide range of flours (i.e., whole wheat, standard patent and cake flour, pasta flour). The milling sector adjusted to market changes, with recognizable spatial effects. In the United States, for instance, a major wheat producing country with numerous milling companies, the industry disengaged financially and territorially from its traditional milling centers. The relocation of facilities to export destination sites overseas along with the integration of plants with increased milling capacity into food factories resulted in a decrease of inland mills in designated production areas. At the receiving end, that is, in those grain-importing countries that produce negligible volumes of wheat, this very trend was likewise registered in the increased construction of milling infrastructure owned by foreign grain traders.⁴⁰ The new mills are the materialization of a consolidated global food system, with vertically integrated grain trading houses investing abroad to benefit from cheaper labor, control more segments of the chain, and amass larger profits. These structures represent the institutionalized response to increasing local demand for bread and wheat products, while underscoring the growing importance of grain imports to

⁴⁰ Derek Byerlee, "The Political Economy of Third World Food Imports: The Case of Wheat," *Economic Development and Cultural Change* 35, no. 2 (1987), 320.

world food trade. It can be presumed that wheat consumption and related grain imports in the developing world are directed via forceful lobbying and preferential policy interventions by influential interest groups operative in both importing and exporting countries. Local and international milling industries, grain traders, and shipping businesses likewise shape national policies regarding wheat exports, while determining the construction of related processing infrastructure.⁴¹ The upshot is a veritable over-equipping of territories, with unnecessary, expensive, large-scale infrastructure built over and above market needs in contexts where, in fact, small-scale facilities would most often suffice.⁴² In East Africa, for example, milling capacity actually exceeds demand. In many cases and precisely because they are more often than not superfluous, newly built milling facilities have even prompted countries with little local need to actually import wheat for processing.⁴³ With this tendency well underway, milling facilities would seem to have both political and economic significance in their function as a spatial conduit for perpetuating wheat consumption and thereby increasing returns.

In Egypt, the flour-milling sector is vital, processing annually some 10 million tons of wheat imported by the government to sustain the nation's time-honored subsidized bread program. Partially liberalized in the 1990s, the sector remains largely managed through public holdings, even though private millers purchase wheat directly on the foreign market.⁴⁴ A telling example of the status of grain processing here is the Alexandria Flour Mill Company, a municipal building that sits as an ordinary, nonchalant link of the global food chain, save for its fortress-like appearance. The very fact that the compound is placed under military protection betrays a deep-seated concern for food supply with respect to the ever-looming threat of theft, looting, or attacks, while signaling just as well political tensions tied to the nation's reliance on foreign imports of grain to satisfy domestic bread demand. That particular mill in Alexandria, as with all modern mills of Egypt, are not only local, physical components of the global grain chain, but are also testimonies to the centrality of the commodity to life in this context. These form in conjunction with grain transportation infrastructure an additional material dimension of the landscape of dependency engendered by the global food order.

⁴¹ Byerlee, "The Political Economy of Third World Food Imports: The Case of Wheat," 312.

⁴² Teresa Acklin, "Flour Milling in East Africa," *World-Grain*, March 1, 1999, <http://www.world-grain.com/News/Archive/Flour-Milling-in-East-Africa.aspx>.

⁴³ Arvin Donley, "Sub-Saharan Africa Taking in More Wheat," *World-Grain*, June 15, 2016, http://www.world-grain.com/articles/news_home/Features/2016/06/Sub-Saharan_Africa_taking_in_m.aspx

⁴⁴ Salah Mansour, "Grain and Feed Annual Report-Egypt," in *GAIN report*, ed. USDA Foreign Agricultural Service (Washington: USDA, 2012).

Distribution

In Egypt, (...) the bread subsidy is now estimated to reach around 85 percent of the population.

Ian Gillson and Amir Fouad, "Trade Policy and Food Security: Improving Access to Food in Developing Countries in the Wake of High World Prices. Directions in Development," (Washington, DC: The World Bank, 2015), 106.

Reaching consumers: the distributive segment of the grain chain is largely amalgamated within an already globally consolidated industry. The operative strategies of large food distribution firms and their correlated impact on architectural and urban settings are well documented.⁴⁵ Comparatively less recognized than private retailers, public agencies play their part in regimenting distributive systems as well. It should be recalled that Egypt is one of the only countries to continue direct state spending on bread subsidies. Yet, these subsidies have been the subject of fierce scrutiny since the 1970s and consequently have been substantially reduced in compliance with IMF and World Bank loan conditions. With regard to the relationship between local public food policies and global market demands, what are the material expressions and spatial ramifications of this relationship?⁴⁶

The food subsidy program in Egypt includes specific subventions for *baladi* bread and *baladi* flour.⁴⁷ In urban areas, bread is baked and sold in licensed, public bakeries to those 70 million inhabitants with a valid smart card for 5 piasters a loaf—a price left unchanged since 1989.⁴⁸ Nearly 75 percent of the wheat available in the country is imported.⁴⁹ As unassuming buildings tucked deep into the urban fabric, these bakeries constitute the final stop in the commodity chain as so many points of sale of low-cost bread. At the receiving end of world grain flows, Egyptian customers see these bread outlets as the embodiment of national food policies, an instrument of wealth redistribution, a social safety net, and an apparatus of political stability in one modest local facility. Because a single bakery belongs to a larger, unified network of public shops,

⁴⁵ See Jesse LeCavalier, *The Rule of Logistics: Walmart and the Architecture of Fulfillment* (Minneapolis: University of Minnesota Press, 2017).

⁴⁶ Farrukh Iqbal, *Sustaining Gains in Poverty Reduction and Human Development in the Middle East and North Africa* (Washington, D.C.: The World Bank, 2006), 62.

⁴⁷ In Egyptian Arabic, *baladi* means local or traditional and *eesh baladi* signifies 'local bread.' It is a small flat pitta-like bread made of white flour.

⁴⁸ Egypt Today Staff, "Bread Subsidies Continue Despite Flour Subsidies Halt: Min," *Egypt Today*, July 13, 2017, <https://www.egypttoday.com/Article/3/11512/Bread-subsidies-continue-despite-flour-subsidies-halt-Min>.

⁴⁹ Akhter U. Ahmed et al., "The Egyptian Food Subsidy System: Structure, Performance, and Options for Reform," in *Research Report* (Washington, D.C.: International Food Policy Research Institute (IFPRI), 2001).

the aggregation of food distribution sites gives rise to an extra-territorial mechanism for conducting policies across the nation. Serving as a distended system for population management, the bakery is at once an architectural and political node, a localized material testament to the nation's entanglement in the global food system. Firstly, foreign imports supply Egypt's requisite stock of grain. Additionally, bread subsidies have fostered a long-term dependency among populations vis-à-vis the government, particularly in urban areas. This in turn has made the government overly reliant on subsidies as a tool to mitigate public discontent. As the local food system proves more and more unable to meet the growing demand for food due to accelerated urbanization and dubious food policies, the habitual reliance on foreign imports and global market trade is reinforced. And this dilemma shows no signs of diminishing, especially considering that for decades, Egyptian leaders, with persistent prodding by the IMF, have repeatedly attempted to reform the system, albeit with little success.⁵⁰ As seemingly unpretentious as they appear, *baladi* bakeries are actually local agents of an extensive web of power and coercion. On one hand, local populations receive their daily bread as part of the Egyptian government's pact with its people. On the other hand, global markets duly draw an increasingly excessive share from the national budget. These bakeries thus constitute as expensive a political tool for leaders as a contentious lifeline for vulnerable citizens, and the pressure is mounting for both sides. For the bars and grills fitted onto façades to pre-empt angry mobs from storming bakeries throughout Egyptian cities are revealing of the core significance and liability of these state-administered outlets. Forming a widespread network of thousands of architectural spaces, the bakeries serve as so many local devices of the world's political economy of grain, manifesting situated markers of the country's tenuous food subsidy system as well as of an imbalanced global food order.

Consumption

Because global population is expected to surpass 9 billion by 2050, food security remains among the most pressing development issues of our time. (...) International experiences illustrate the positive role that trade openness has to play in ensuring global food security.

Gillson and Fouad, "Trade Policy and Food Security: Improving Access to Food in Developing Countries in the Wake of High World Prices. Directions in Development," 1.

⁵⁰ "Egypt's Cities Seem Calm after 2 Days of Price Riots," *The New York Times*, January 20, 1977; Tamar Gutner, "The Political Economy of Food Subsidy Reform: The Case of Egypt," *Food Policy* 27 (2002); Middle East Eye Staff, "Egypt Bread Riots: Government Says 'Fight against Corruption' Behind Cuts," *Middle East Eye*, March 8, 2017, <http://www.middleeasteye.net/news/egypts-fight-against-corruption-sends-poor-bread-riots-1717772414>.

Bread, the proverbial staff of life, constitutes the final segment of the global grain chain and thus stands for more than sustenance alone. Protesters challenging the Mubarak regime with their chant for “bread, freedom, social justice” in Cairo’s Tahrir Square knew as much.⁵¹ This very call that elevated bread to a political-economic symbol of public discontent created along with it a collectivizing space for demanding reforms at all levels of the state. In Egypt perhaps more than anywhere else, bread has become the cornerstone of an ascendant food security discourse. Following the 1977 bread riots, governments defused popular protest by resorting to more bread subsidies and declaring to seek food self-sufficiency for the nation as epitomized by Sadat’s famous line: “Food for every mouth, a house for every individual, and prosperity for all.”⁵² Imported technology, land reclamation projects, and hydraulic infrastructure were to substantiate the pledge to secure resources for the population and, by correlation, were to secure the state against popular uprisings. Food security became in this way an enduring political leitmotif that has been brandished time and again, usually as the pretext of the latest grand project.

A series of monumental projects—the Delta Barrages, the Asyut Barrage, the High Aswan Dam, the Western Oasis Project, and Toshka—presented as national technological achievements called on large-scale hydraulic infrastructure as solutions to the country’s alleged food scarcity. The vastness of the enterprises should come as no surprise, since for hundreds of years, Egypt has labored to secure the flow of water down the Nile to guarantee its food supply through water management and irrigation. Consecutive leaders have turned to high-profile infrastructure projects that, because they involve massive territorial transformations, were meant to double as lauded accomplishments of nation building. The Toshka Project, for instance, manifests an infrastructural feat that includes the Mubarak pumping station—the largest in the world—and a 310-kilometer-long water channel, both of which are to funnel water from Lake Nasser to one million hectares of irrigation fields for crops. Part of the “New Nile Valley” vision to convert a portion of the state-owned Western Desert into an agricultural, urban, and industrial area slated to accommodate 20 percent of the Egyptian population, Toshka is supposed to irrigate 540,000 *feddans* (circa 560,520 acres) in its first phase using high-tech agro-equipment (i.e., central pivot and drip irrigation).⁵³ Because of its unprecedented scale, Toshka is heralded by the current administration as an act of national empowerment, enabling the country, as is said, to

⁵¹ Amira Mittermaier, “Bread, Freedom, Social Justice: The Egyptian Uprising and a Sufi Khidma,” *Cultural Anthropology* 1, no. 29 (2014).

⁵² Fouad N. Ibrahim and Barbara Ibrahim, *Egypt. An Economic Geography* (London; New York: I.B. Tauris, 2003), 115.

⁵³ Yahia Shawkat and MennatuAllah Hendawy, “Myths and Facts of Urban Planning in Egypt,” *Built Environment Observatory* (November 2016).

successfully manage the twin issues of rising population and food security. In reality, the project amounts to nothing less than a grand scheme for benefitting government elites and foreign corporations through technocratic development and agricultural commercialization. International agencies and national press backed the colossal project unconditionally due to the presumably sound pretense of safeguarding Egypt's food security. Inevitably, Toshka's exorbitant costs take a toll on the nation's budget, diverting much needed investment from other sectors such as rural development, agriculture in the 'Old Lands', or upgrading informal settlements. Meanwhile, the promised wheat yields that were said to alleviate the country's dependency on foreign imports and serve the bulk of state-subsidized bakeries in the process have yet to materialize. What have taken place instead are tangible, often questionable, socio-spatial transformations. The construction of Toshka and its attendant facilities required the excavation of 12 million cubic meters of earth, more than for construction of the High Aswan Dam.⁵⁴⁵⁵ The pumping station needed 148,000 cubic meters of concrete, prompting a local shortage of cement.⁵⁶ The scheme draws 5.5 cubic kilometers of Nile water for irrigation, yet remains plagued with setbacks stemming from over-salination and rapid rates of evaporation.⁵⁷ Some 13,000 Nubian families were expelled from their land at the Toshka site, as formerly rural, semi-public, semi-deserted spaces were turned into mechanized, privately managed zones of production. These are but a few of the notable spatial and social ramifications of Egypt's policies on food security that continue to be couched in official narratives concerning self-sustenance, water infrastructure, land reclamation, and the modernization of agriculture, all being issues clearly meant to play on popular sentiments regarding national identity and thus justify status quo operations of the current food order. It is argued on this basis that in their very materiality, Toshka and other comparable projects, embedded as they are in nation-building discourses of development that still have considerable purchase around the globe, express systemic tensions between a market-driven political economy of food and conflicting local imperatives for managing the cumulative needs of society.

⁵⁴ Sakamoto, "Mubarak Pumping Station Bringing Life to the Desert," 35.

⁵⁵ Wahby, "Technologies Applied in the Toshka Project of Egypt."

⁵⁶ Arthur Little, "Towards a Sustainable Cement Industry," ed. Battelle (Geneva: World Business Council for Sustainable Development, 2002), 24.

⁵⁷ John Waterbury and Dale Whittington, "Playing Chicken on the Nile? The Implications of Micro-Dam Development in the Ethiopian Highlands and Egypt's New Valley Project," *Natural Resources Forum*, 22, no. 3 (1998).

Conclusion

The spatial processes generated by the global food order raise questions about unjust geopolitical relationships indexed to sanctioned discourses of development. The investigation of trans-scalar transformations herein are intended to elucidate how political, economic, and spatial practices interact within the food system to produce current territorial conditions in distinct world settings, covering a range of interrelated phenomenon: the unsustainable exploitation of natural resources and attendant reconfiguration of territorial relations, the rerouting of rivers and formation of new lakes for land reclamation projects, the depletion of non-renewable water resources and displacement of populations for large agri-businesses, the destruction of local food systems through the defunding of rural development and ensuing rural migration to cities, the commodification of land, the dispossession of smallholders and the privatization of commonly-owned resources, discriminatory spatial development and the lack of public investment based on class and social status (i.e., access to transportation, housing, education facilities in rural and informal areas), the shift from local to transnational territories of production and reliance on an infrastructure-based food supply source, the control of urban population via food outlets, as well as the geopolitical consolidation of a world food order in the quest for evermore capital accumulation.

3.2 TERRITORIAL RECIPROCITY

Any architectural object is a constituent part of conditional territorial relations that position that object within a complex space of variables concerning, for instance, materiality, scale, use, function, location, as well as proximity to infrastructure and other services. The sum of such variables and the social relations that they temper in turn determines the way that territory is organized and how it performs. When considering market-driven processes of commodification, space is often viewed as an inactive plenum upon which outside agents act to effect a change of circumstances. For instance, Charles Waldheim and Alan Berger, in their discussion about engineering territories for the supply chain, explain, "These landscapes, the spaces of the new logistics economy, are designed and built."⁵⁸ Space is here presented as a passive body shaped and transformed by external forces. Challenging this predisposition, *territorial reciprocity* is here forwarded to maintain that territory is active in organizational processes and not merely the inert product of policies and practices. Building on the definition of reciprocity as a relation of mutual dependence, action, or influence, *territorial reciprocity* suggests that as "the pattern of activities (...) within the global political economy" act upon space, the consequential territorial arrangements act back upon global and local forces so as to sway or modify the course of development.⁵⁹ Along these lines, Neil Brenner claims that the "continuous collision between contextually specific, constantly evolving neoliberalization projects (...) rework inherited forms of regulatory and spatial organization."⁶⁰ On this basis, three registers of 'reciprocity' are identified within the context of the present work: *collaborative*, *adaptive*, and *resistant*. These distinctions offer a schematic outline of how territory is understood to operate in regard to neoliberal processes that drive the political economy of food. Case studies in the context of Egypt offer an opportunity to explore the concept of *territorial reciprocity* in more nuanced detail with respect to these three interconnected registers.

1) *Collaborative territorial reciprocity* can be understood as a spatial response to market-oriented logics that work to perpetuate the terms of global trade and reinforce the prevailing course of development. Modernized agriculture and related imperatives concerning food security, for example, sustain a high demand for rock phosphate to ensure high crop yields.⁶¹ Therefore, a

⁵⁸ Charles Waldheim and Alan Berger, "Logistics Landscape," *Landscape Journal* 27, no. 2 (2008).

⁵⁹ Neil Brenner and Jamie Peck and Nik Theodore, "After Neoliberalization?" in *Critique of Urbanization: Selected Essays* (Basel: Birkhäuser Gütersloh, 2017), 163.

⁶⁰ Ibid.

⁶¹ Cordell and White, "Tracking Phosphorus Security: Indicators of Phosphorus Vulnerability in the Global Food System."

thriving industry for extracting rock phosphate figures prominently in the currently operative food order. For the steady supply of this material supplement not only further fuels the world grain trade as it now operates, but also helps to consolidate the prevalent discourse premised on a constant, inexhaustible food supply. Expert warnings about the finite quantities of rock phosphate are conveniently ignored, and so a status quo narrative concerning global food production at all costs prevails, which is perhaps best summed up by the commercial slogan of Nutrien, the large fertilizers company: "Feeding the Future."⁶²

In this way, the operational imperatives of the food order determine the operational imperatives of a constituent industry, the concerted interactions of which have reciprocating effects on how territory performs to sustain the system's requisite relations of production.

2) *Adaptive territorial reciprocity* can be understood with respect to the global resilience of the food supply chain, specifically the resilience of logistical transportation networks that receive, transfer, and redirect all-important commodity flows. A case in point is the subsequent development of Russia's grain terminals in the Black, Caspian, and Azov seas as well as alterations to the Novorossiysk grain plant that followed the federation's contentious annexation of the Crimean peninsula in 2014. The sudden surge in storage and shipping capacity from these facilities repositioned Russia ahead of the United States as the world's top wheat exporter, demonstrating indeed that a change in local territorial relations can have a drastic effect on power relations and the world economy.⁶³ And because global trade practices cannot always intervene directly to influence particular domestic issues of this or that nation, alternative infrastructural responses are typically sought to overcome setbacks such as the lack of access to a specific market, as was the case when Ukraine's grain export ports were blocked due to the seizure of territory. For the abrupt blockage of these ports amounted to a menacing chokepoint in global trade that ultimately jeopardized commodity flows in general and food security in particular. In response, sanctions were posed, new trade negotiations were pursued, and alternative circulation routes for grain were sought to alleviate the impasse and safeguard food flows, with the resulting spike in global commodity prices supposedly justified by the broader mandate of keeping world development on course at whatever the cost through adaptive management of the supply chain.

3) *Resistant territorial reciprocity* can be detected in tensions that arise between distinct localities and the rather generic disposition of market-driven ideologies. A spatial counter-logic

⁶² Nutrien, "Fact Book 2018."

⁶³ Polina Devitt, "Worried About Russia's March on Grain Markets? It Could Be Worse," *Reuters*, November 3, 2017, <https://www.reuters.com/article/us-russia-grains-analysis/worried-about-russias-march-on-grain-markets-it-could-be-worse-idUSKBN1D30GK>.

to the dominant logic of modernization is evident in the agricultural specificities of Egypt. As a matter of fact, the modern mechanization of agriculture here has proven difficult to implement due to the prevalence of small land plots—Egypt has one of the smallest average plot size worldwide—and the lack of large-scale fertile areas prevented the wholesale implementation of large-scale, capital-intensive, commercial agricultural technology (i.e., central pivot irrigation, GPS-controlled harvesters).⁶⁴ Consequently, the rural ‘Old Lands’ were essentially viewed as unsuitable for modernization, a common preconception given added credibility by the long list of failed foreign-funded agricultural development projects.⁶⁵ In a spatial and social sense, the splintered, small-plot landownership patterns of agriculture in Egypt facilitate a resistant form of territorial organization through informal urbanization, that immediate and ever-expanding response to the need for affordable housing which continues to consume land once reserved for the production of food. Along with the popular reorganization of territorial relations that have taken hold in spite of longstanding government land use regulations, autonomous forms of local governance have emerged which are powerful enough to challenge authorities as well the prevailing neoliberal policies implemented to eliminate staple provisions like state bread subsidies. The effects of local territorial resistance are apparent in the IMF press release N°16/1501 announcing the approval of a USD 12 billion loan to Egypt: “The program focuses on (...) strengthening social safety nets by increasing spending on food subsidies and cash transfers. (...) About 1 percent of GDP out of the achieved fiscal savings will be directed to additional food subsidies.”⁶⁶ This particular policy reversal in the case of Egypt is echoed elsewhere as the IMF advised that it “does not recommend lifting bread subsidies” as did Jordan in 2017.⁶⁷

These three correlated registers of territorial reciprocity implicate territory as an active player in organizational processes at local and global scales, with the concession, however, that most collaborative and adaptive spatial responses to systemic changes adhere to the market-driven logic of the food system. Resistant territorial reciprocity, on the other hand, engenders, when

⁶⁴ Gary Vocke and Olga Liefert, "Wheat Outlook," in *World Agricultural Supply and Demand Estimates and Supporting Materials*, ed. World Agricultural Outlook Board Economic Research Service (Washington, D.C.: United States Department of Agriculture, 2013).

⁶⁵ Comptroller General of the United States, "U.S. Assistance to Egyptian Agriculture: Slow Progress after Five Years" in *Report to the Congress of the United States* (Washington D.C.: United States General Accounting Office, 1981).

⁶⁶ Randa Mohamed Elnagar, "IMF Executive Board Approves US\$12 Billion Extended Arrangement under the Extended Fund Facility for Egypt" news release, November 11, 2017, <https://www.imf.org/en/News/Articles/2016/11/11/PR16501-Egypt-Executive-Board-Approves-12-billion-Extended-Arrangement>.

⁶⁷ "Key Questions on Jordan," International Monetary Fund, accessed March 6, 2018, <https://www.imf.org/en/Countries/JOR/FAQ>.

possible, a contingent space of contestation against the currently operative system, while evincing the disruptive potential of territorial to foster social movements opposed to oppressive policies. This said, the concept of *territorial reciprocity* is advanced with the aim of developing an augmented understanding of how the built environment is affected by a globalized political economy of food as well as how the roles of territory actually steer agendas bearing on world sustenance.

3.3 SPACE, FOOD, BIOPOLITICS

Michel Foucault's concepts of "biopower" and "biopolitics" that pertain to inherent correlations of grain, security, governance, and trade provide a relevant subtext to the research.⁶⁸ According to Foucault, the recurring problem of grain scarcity and the allied measures taken by the state to prevent said scarcity make the issue of sustenance an issue of governance, and the question of food a question of power. It is important to note that Thomas Malthus was likewise preoccupied with the bond between the provision of food and practices of governing. Having set the matter of population growth in relation to the available means of sustenance, he argued that a persistent imbalance between these two broad variables would inevitably result in famine and war.⁶⁹ Malthus also equated land and territory to the needs of a population, a spatial connection taken further later by Foucault in his elucidation of a range of techniques deployed by states to control populations within a given territory.⁷⁰ To explain what he terms *governmentality* in reference to "the way in which the conduct of individuals or of groups might be directed (...) to control the possible field of action of others," Foucault claims that what is specifically targeted in political strategies of population control is "the basic biological features of human species."⁷¹ ⁷² By extension, it is reasonable to argue that those controls devised to manage food supply also belong to an administrative apparatus devised to govern populations (i.e., reproduction, hygiene, public health policies) by way of any array of technocratic procedures (i.e., statistics, categorization, cartography).⁷³

Considering the extent to which matters of governance have been penetrated by matters of the economy on a world scale, food systems arguably perform as a powerful conduit of biopower, food being understood doubly in this investigation not only in the biological sense as a

⁶⁸ See Michel Foucault, *Security, Territory, Population: Lectures at the Collège de France. 1977–1978*, trans. Graham Burchell, eds. Michel Senellart, Francois Ewald, and Alessandro Fontana (New York: Picador, 2009).

⁶⁹ See Luca Paltrinieri, "Biopolitics in the Twenty-First Century: The Malthus–Marx Debate and the Human Capital Issue," in *Foucault and the Modern International: Silences and Legacies for the Study of World Politics*, eds. Philippe Bonditti, Didier Bigo, and Frédéric Gros (New York: Palgrave Macmillan US, 2017).

⁷⁰ Mitchell Dean, "The Malthus Effect: Population and the Liberal Government of Life," *Economy and Society* 44, no. 1 (2015).

⁷¹ Michel Foucault, "The Subject and Power" in *Power: Volume 3: Essential Works of Foucault 1954–1984*, trans. Leslie Sawyer, ed. J. Faubion (London: Penguin, 2002), 326, 341.

⁷² Foucault *Security, Territory, Population: Lectures at the Collège De France. 1977–1978*, 1.

⁷³ See Foucault, *Society Must Be Defended: Lectures at the Collège De France. 1975–1976*.

basic resource vital to life, but moreover in the political-economic sense of Foucault as a systemic mechanism of control that is equally vital to keeping social and spatial relations in place.⁷⁴

Through the lens of specific case studies in Egypt, the research attempts to expand upon Foucault's critical reframing of the food system as just such a biopolitical regulator. Local conditions provide relevant evidence of how food-related policies and discourses regarding state subsidies, production, and security act as biopolitical instruments within the makeup of today's global food order. Furthermore, the research details how the food order, through such mechanisms of control, has direct socio-spatial influences in shaping the built environment. In brief, Egypt provides a timely context for investigating how historical national narratives, local political powers, social demands, global financial imperatives, and market-oriented policies interact as so many constituent forces of the food system's particular trans-territorial dynamics. Questions that abound as to how many more *baladi* bakeries will be supplied with state-subsidized flour, how much more agrarian land will be sacrificed to the growth of informal neighborhoods on the edges of the capital and other urban centers, or how much more desert and hinterland territories will be reclaimed for Toshka-sized projects of the future remain unanswered for now. But what is certain is that all such cases, regardless of scale or context, will continue to be swayed by the political and economic directives of the global food order. Still, another question lingers both near and far concerning when—not if—bread will again be raised as symbol of collective defiance in the city streets and peripheries of the world to protest those social and spatial inequities that continue to go unchecked in the name of providing food for all.

⁷⁴ David Nally, "The Biopolitics of Food Provisioning," *Transactions of the Institute of British Geographers* 36, no. 1 (2010): 37-53.

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Curriculum Vitae

Charlotte Malterre-Barthes (Lyon, 1977) is an architect, urban designer and contemporary scholar. She studied at the Ecole Nationale Supérieure d'Architecture de Marseille, at TU Vienna, and ETH Zurich. After interning at Coop Himmelb(l)au, she obtained in 2003 her diploma *magna cum laude* with 'a Women Social Centre in Baghdad', tackling political and social involvements of architecture. Charlotte collaborated with several offices (Balkrishna Doshi-Sangath, Rudy Ricciotti, OOS), and in 2009, funded the urban design practice OMNIBUS with Noboru Kawagishi. She is Program Director of the Master of Advanced Studies in Urban Design at the chair of Marc Angélil since 2014 and curates with Ciro Miguel and Vanessa Grossman the XII International Architecture Biennale of São Paulo on 'Everyday' (Sep-Dec. 2019). She holds a guest professorship at TU Berlin (2018-2019) investigating and challenging the predatorily *modus operandi* of real estate in the German capital. A research fellow at Future Cities Laboratory-Singapore in 2012-2013, Charlotte lectured and taught workshops at the AA, the Storefront for Art and Architecture, at Hong-Kong University, among others. Her works were widely published (AD, San Rocco, TRANS, Tracés, etc.) and exhibited (Swiss and Egyptian Pavilion at the Venice Biennale, Bi-City Shenzhen Biennale, Institut du Monde Arabe). With Marc Angélil, she edited the "Housing Cairo: The Informal Response," (DAM prizewinner 2016) and "Cairo Desert Cities" (Berlin, Ruby Press). Charlotte is also founding member of the Parity Group, a grassroots association within ETH committed to improving gender equality at the school and in the profession.

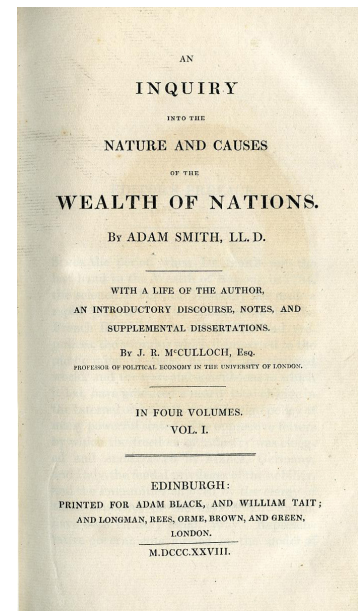
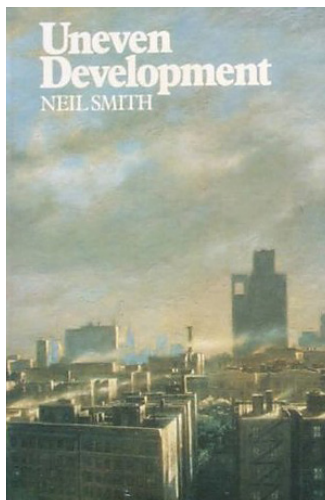
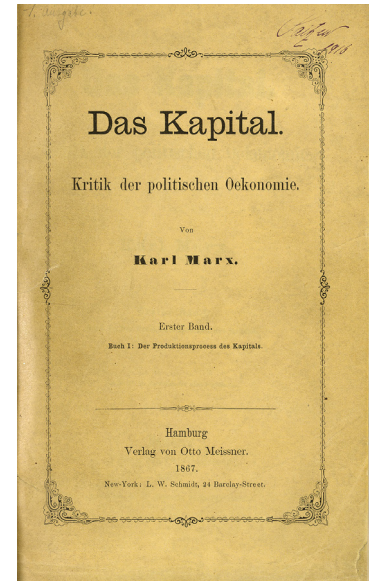
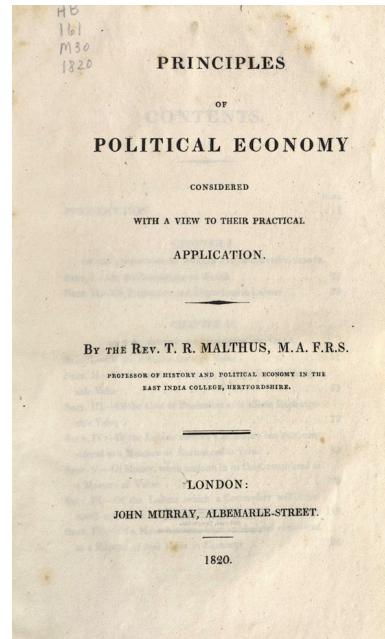
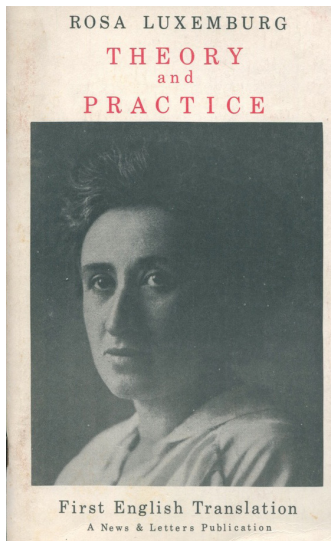
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Appendix

Introduction



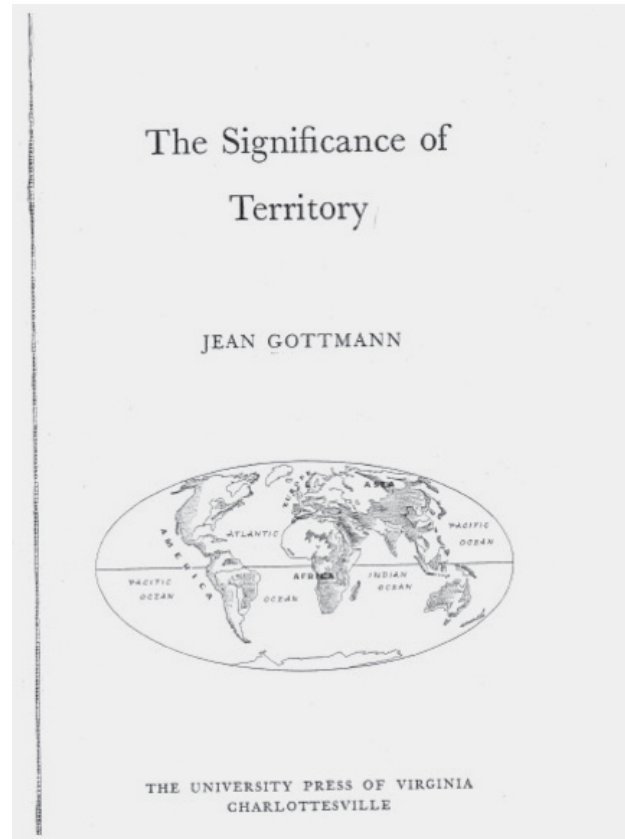
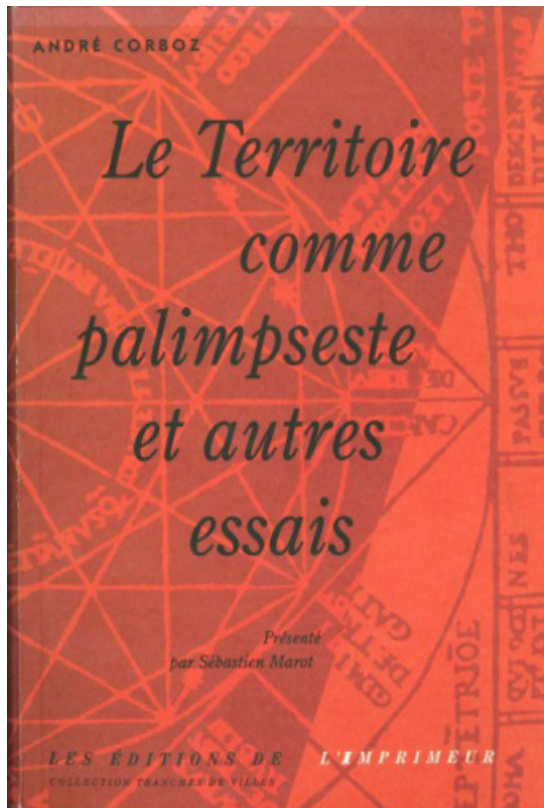
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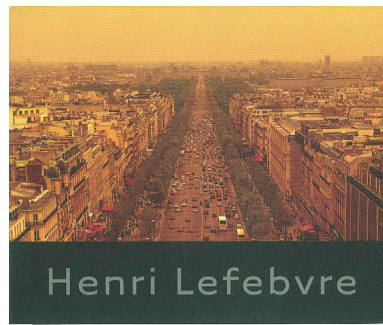
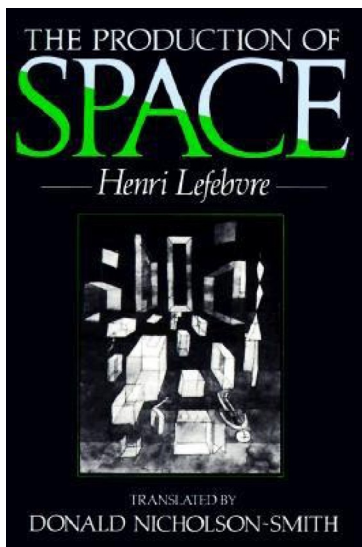
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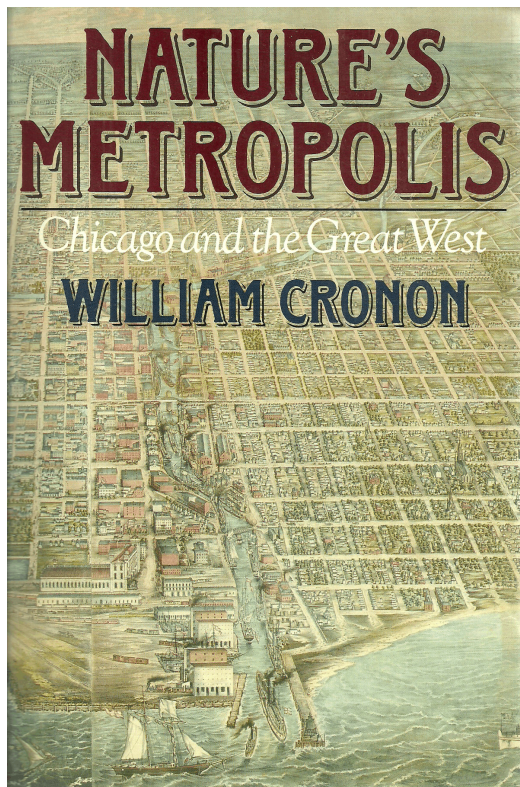
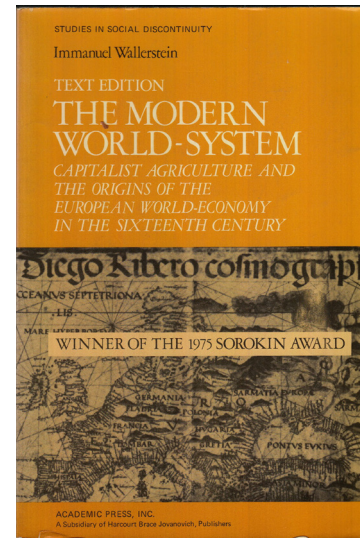
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The
Urban Revolution

Foreword by Neil Smith
Translated by Robert Bononno

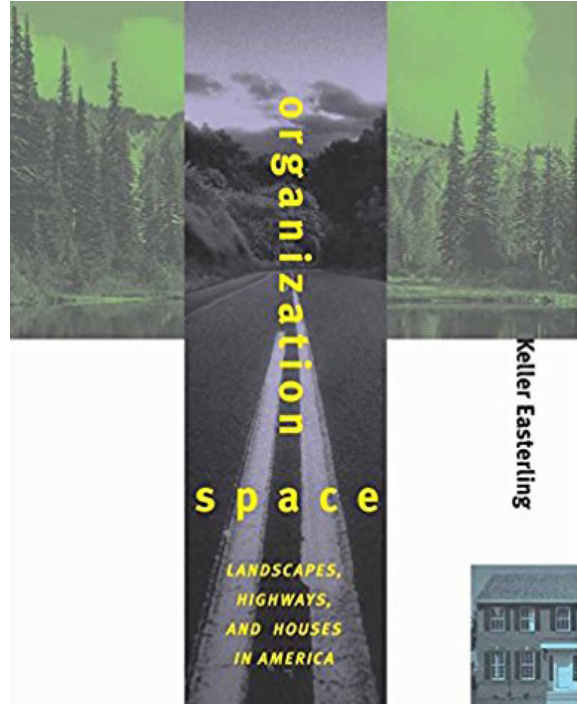
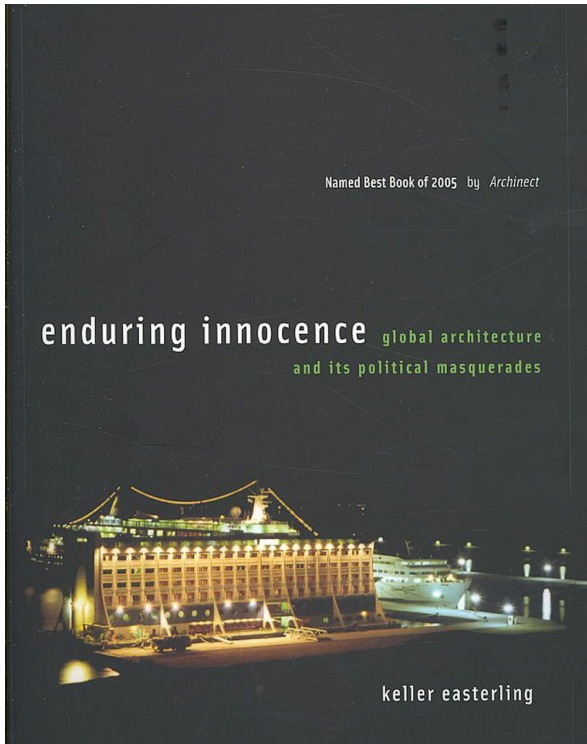


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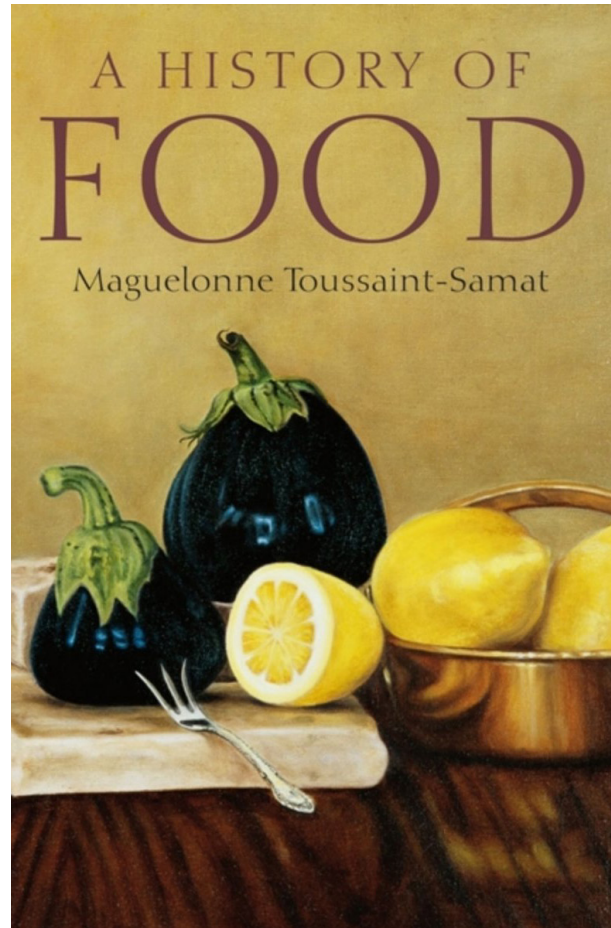
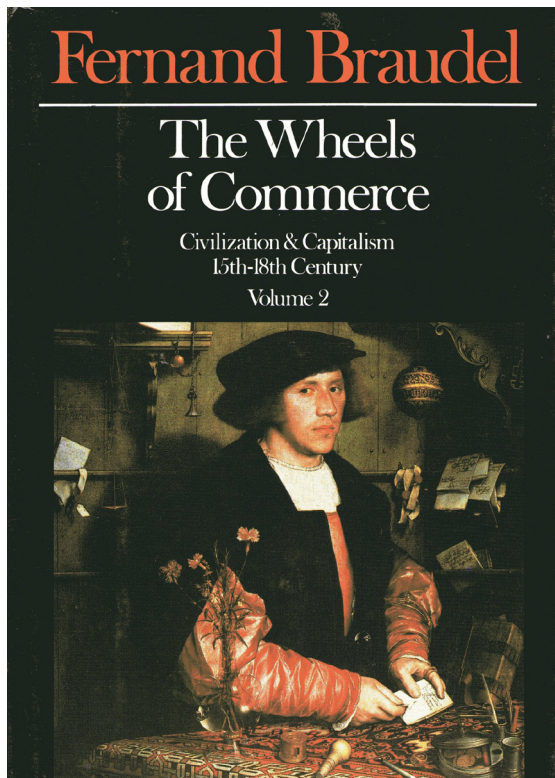
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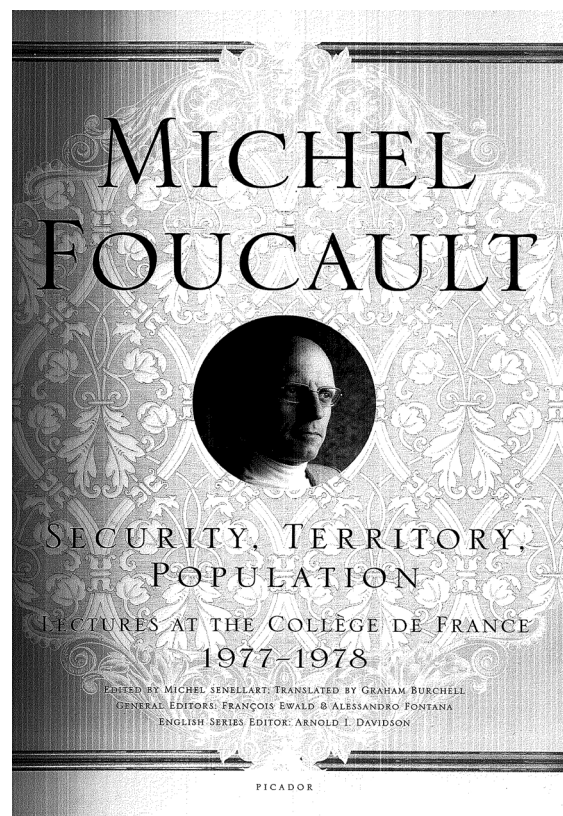
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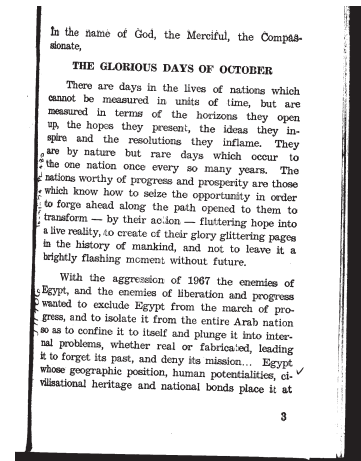
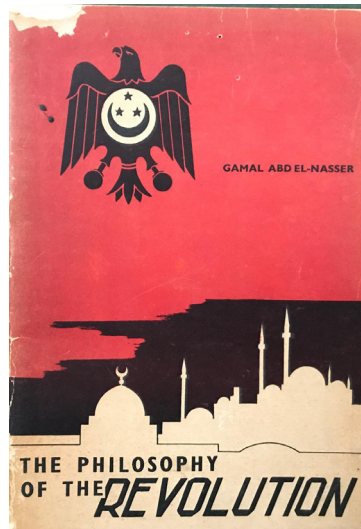
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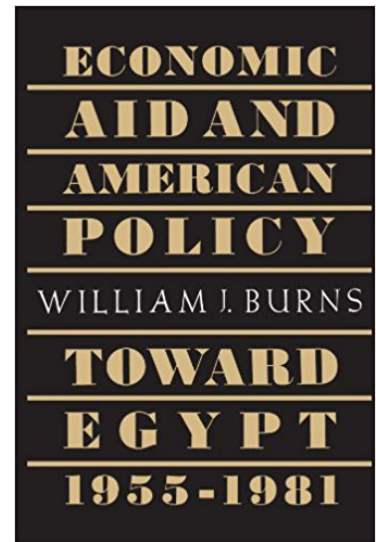


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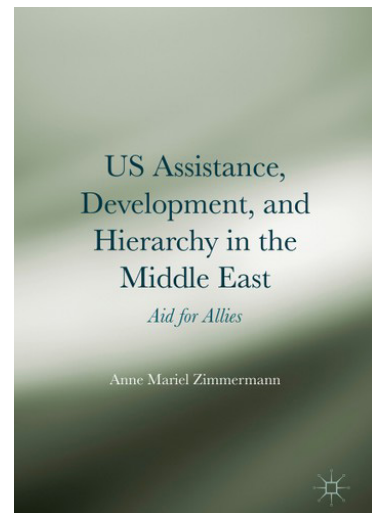
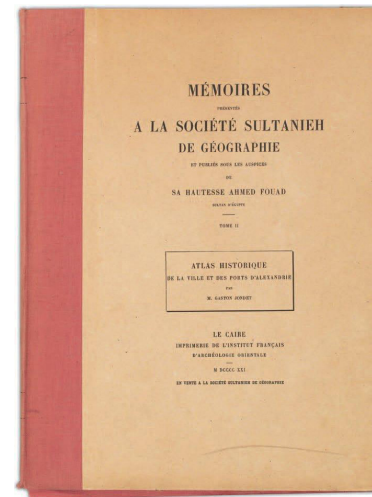
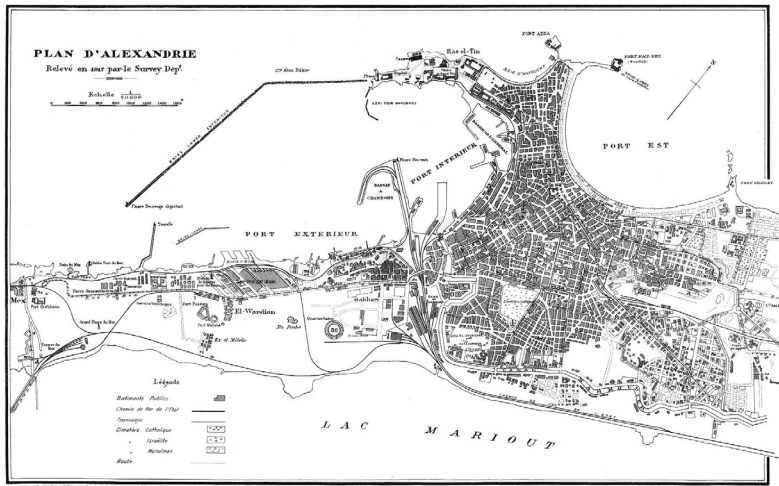
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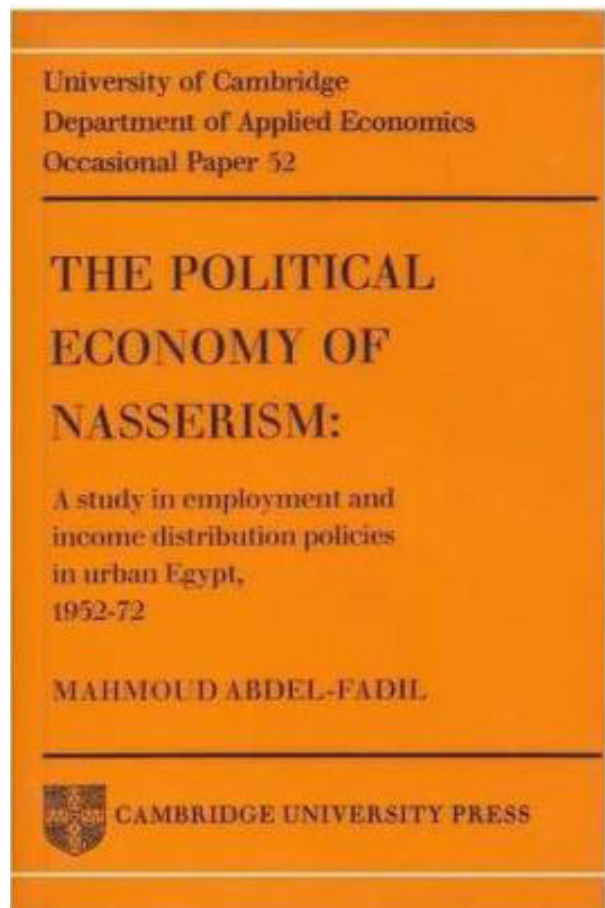
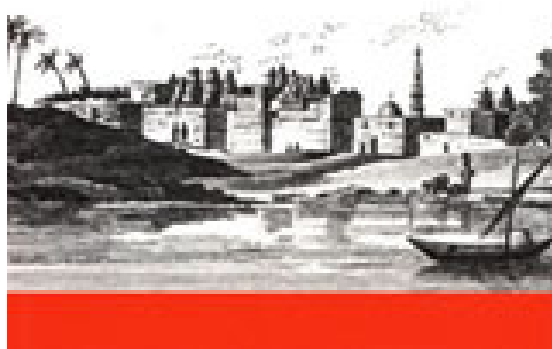
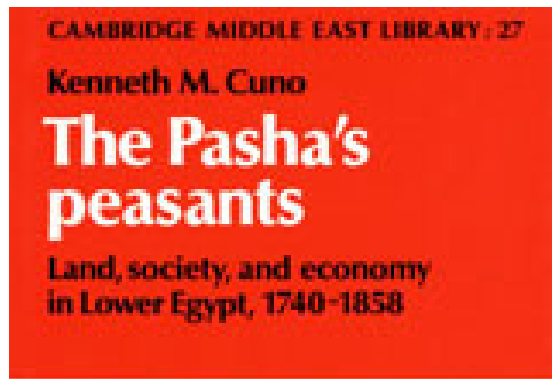
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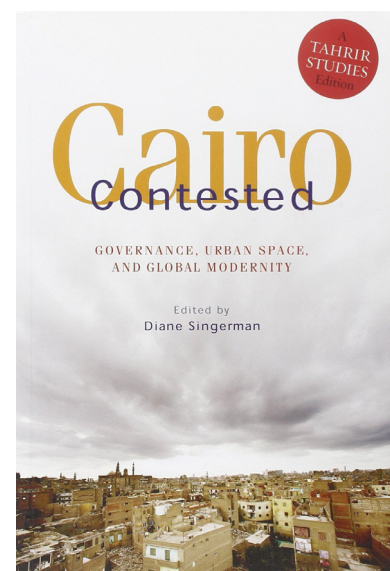
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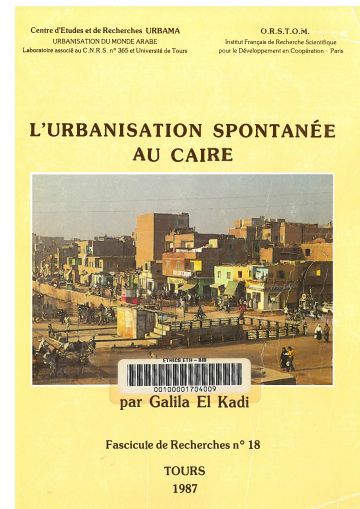
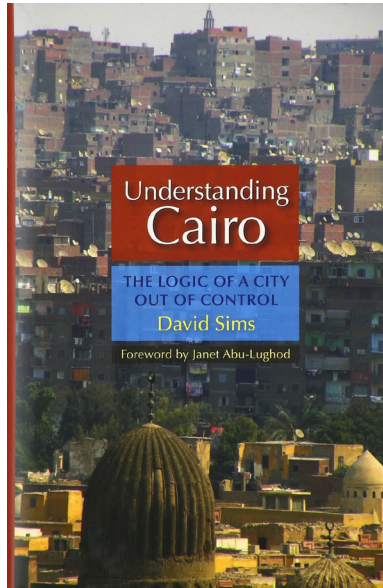
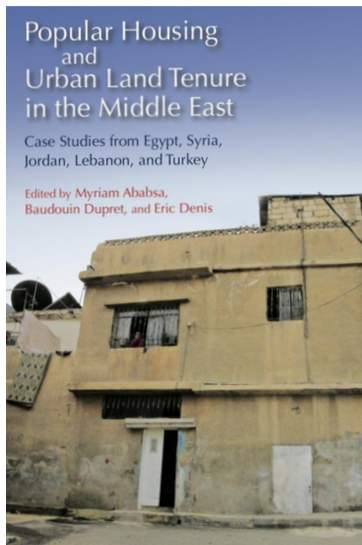


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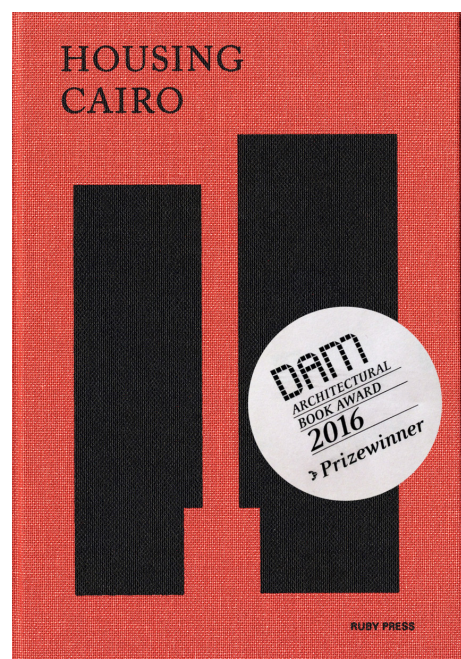
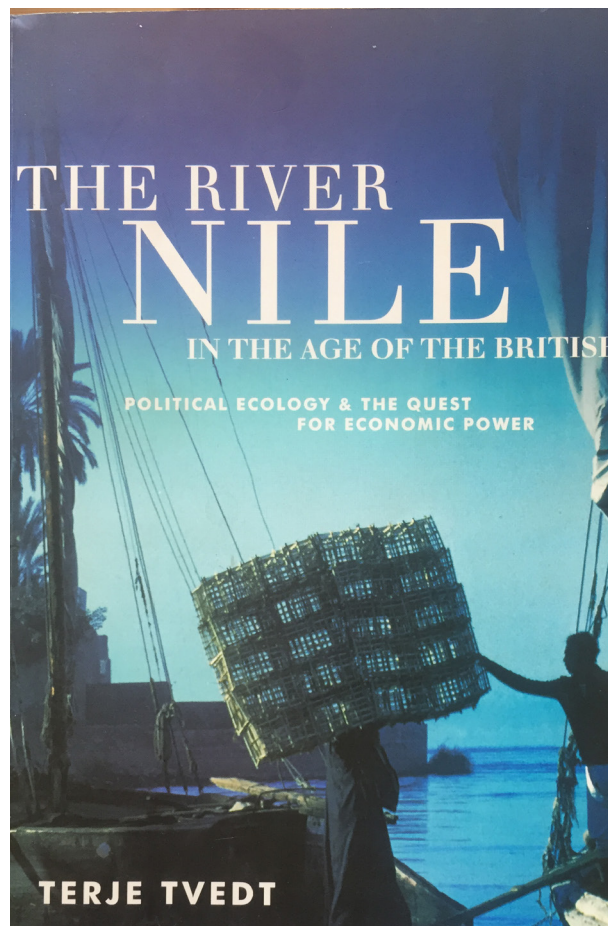
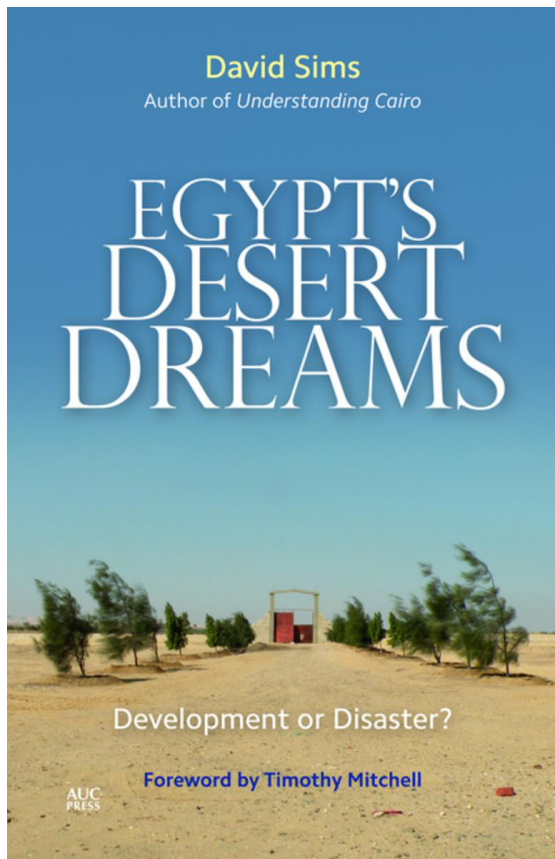


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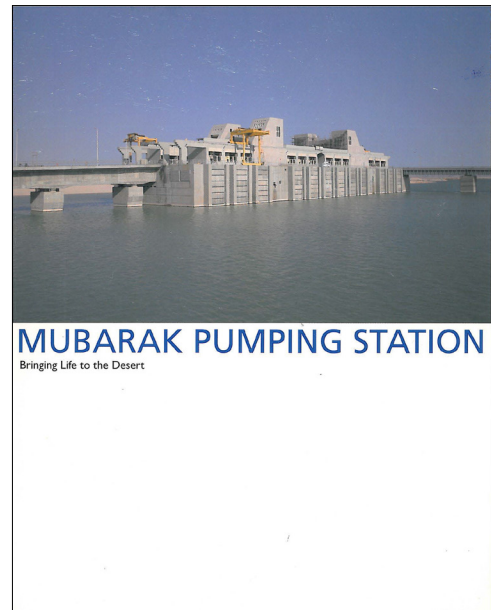
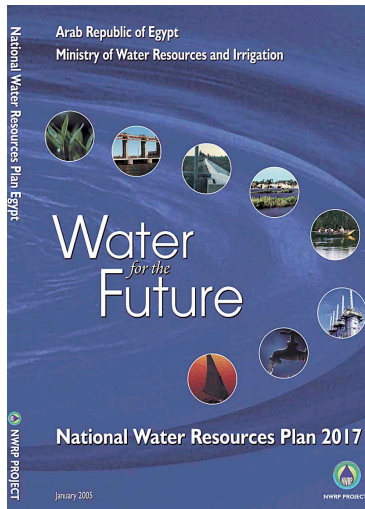
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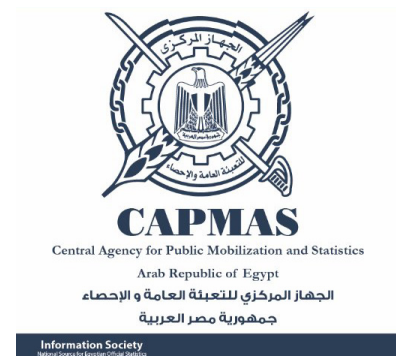
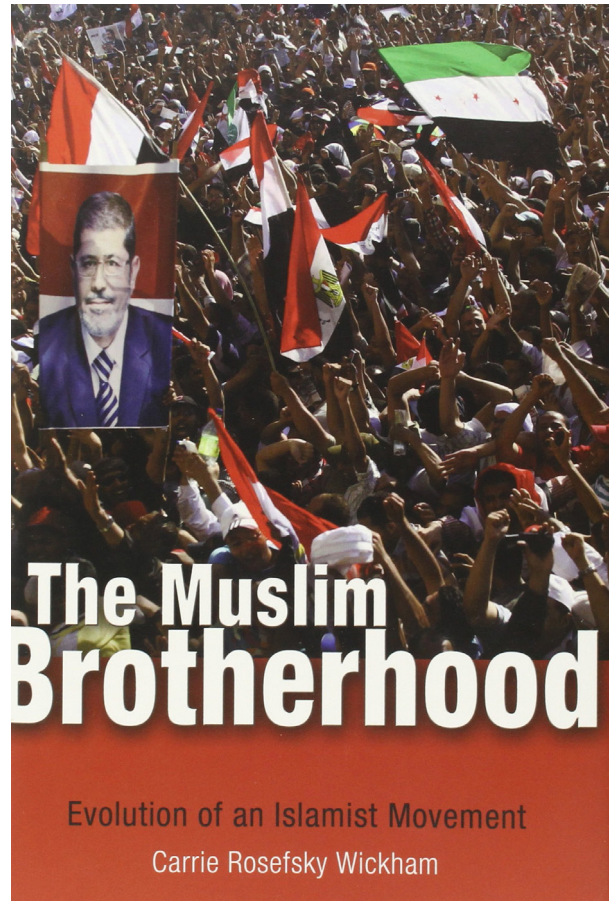
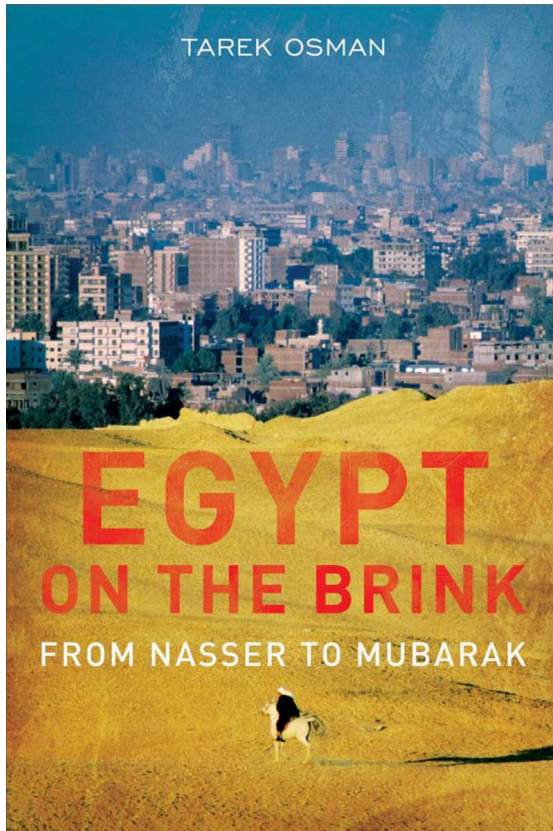
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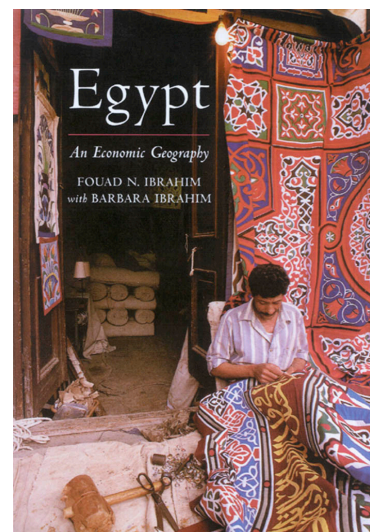
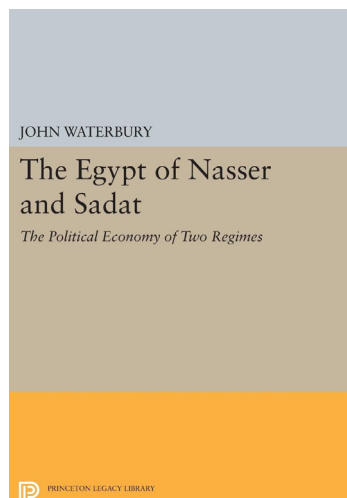
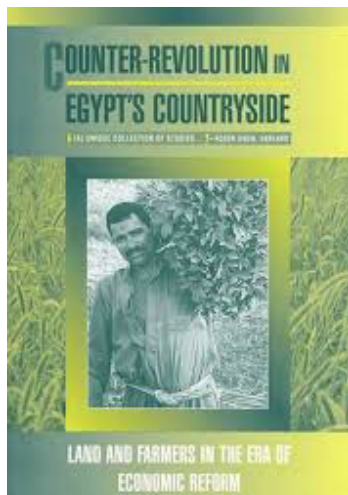
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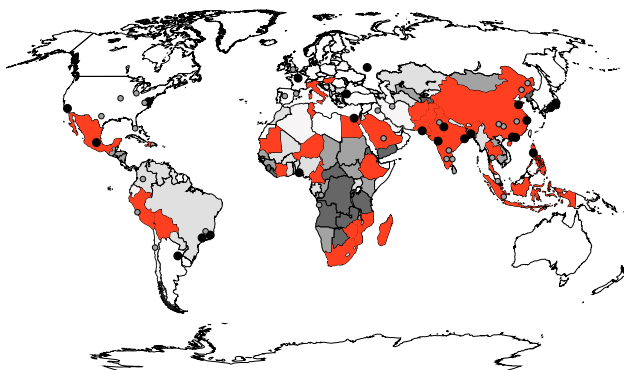


**ERADICATE
EXTREME POVERTY
AND HUNGER**

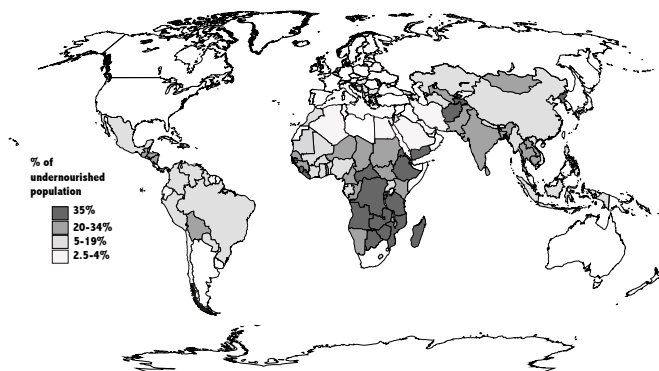


An Egyptian holds a piece of bread to protest against the high prices of goods in Tahrir square in Cairo February 8, 2013. (*Reuters/Mohamed Abd El Ghany*)

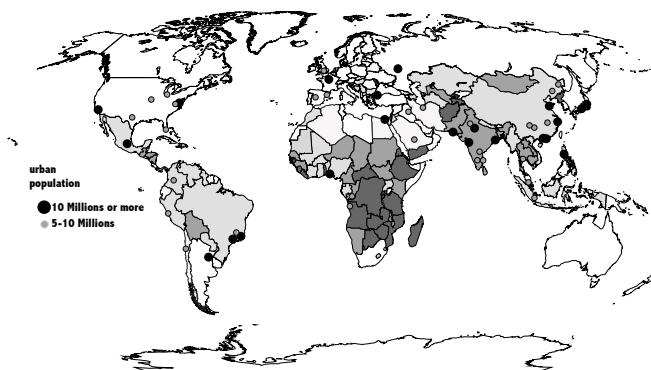
An Egyptian boy holding bread and flashing the victory sign shouts slogans at Cairo's Tahrir Square on 1 April, 2011 (*AFP*).



RIOTS
The Economist, 2008



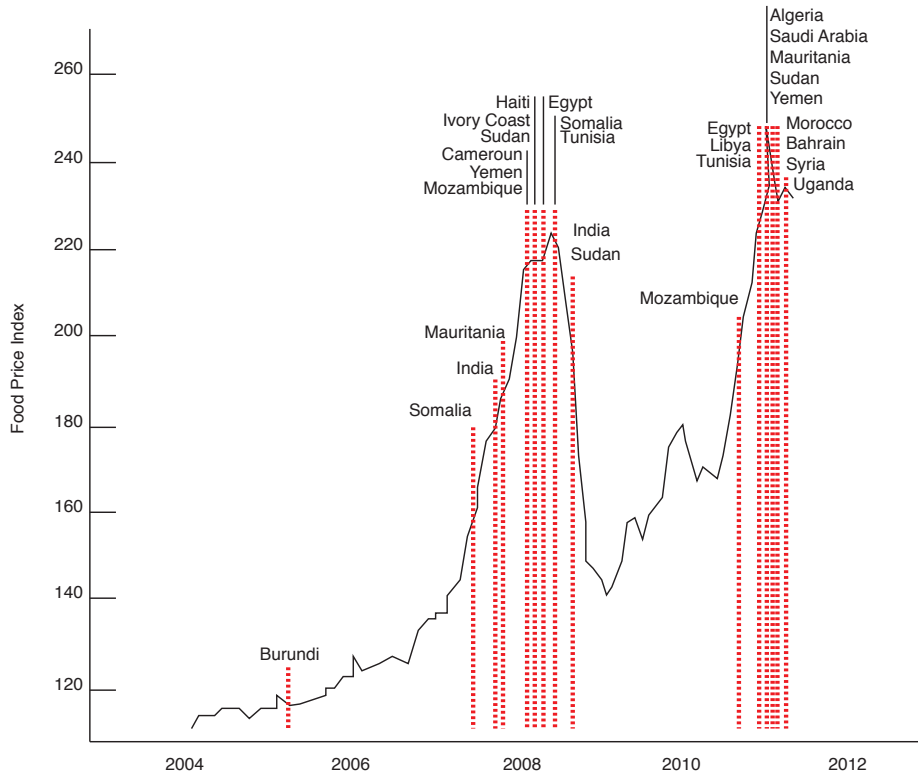
HUNGER
The Population Division of the Department of Economic and Social Affairs of the United Nations, 2011



URBAN GROWTH
UN Department of Economic and Social Affairs, Population Division: World Urbanization Prospects, the 2009 Revision

Possible interrelations between food systems, urbanization and poverty, at a global scale.

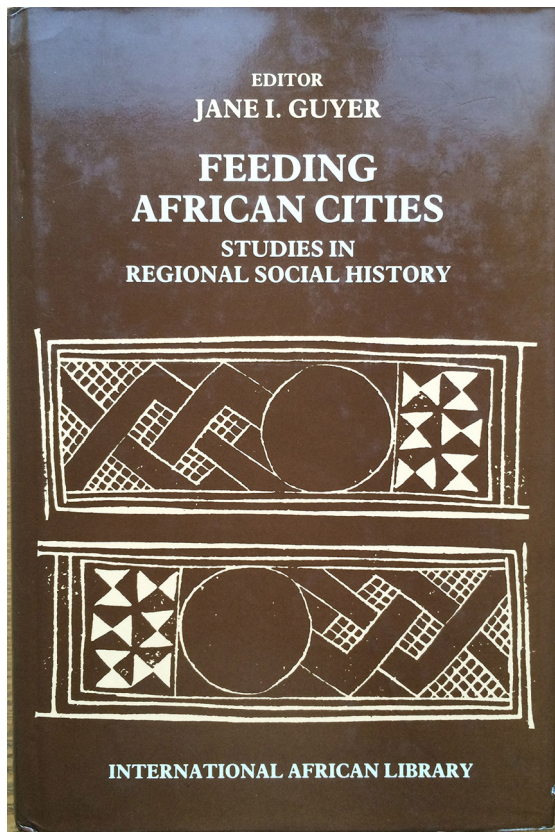
Maps of 1) Riots, 2) Hunger, 3) Urban Growth
(Source: Author)



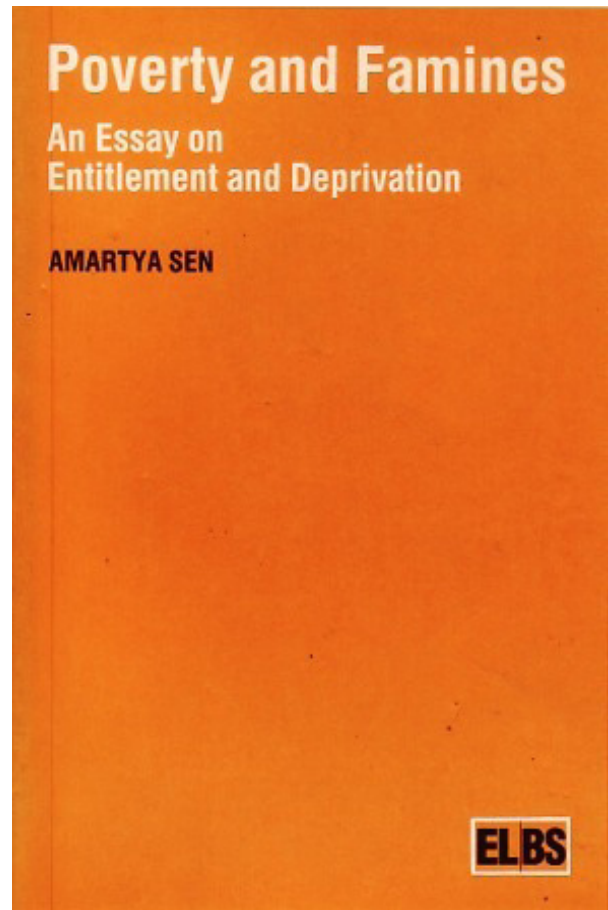
Correlation between food prices and food riots In Lagi, Marco, Karla Bertrand, and Yaneer Bar-Yam. "The Food Crises and Political Instability in North Africa and the Middle East." (2011): 1-15.



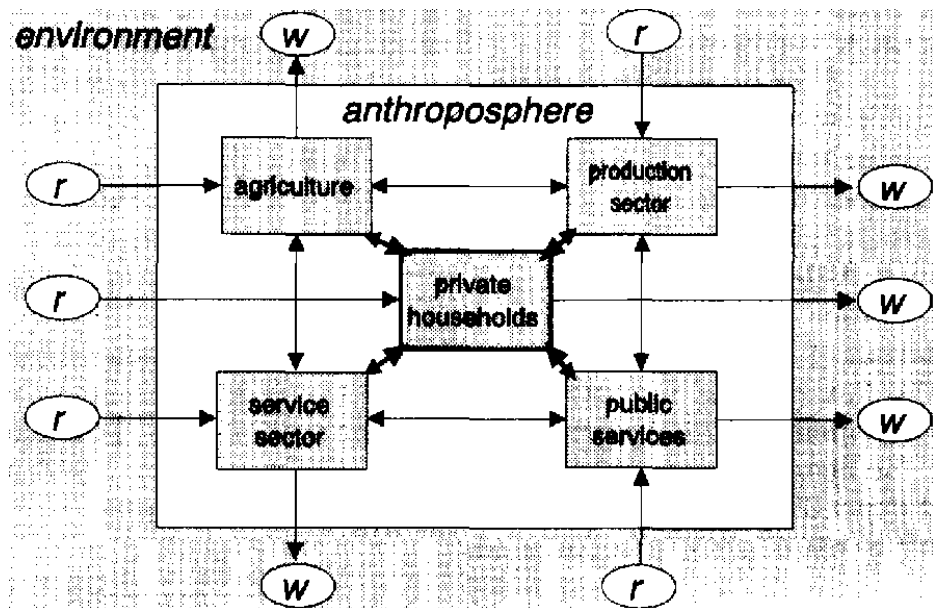
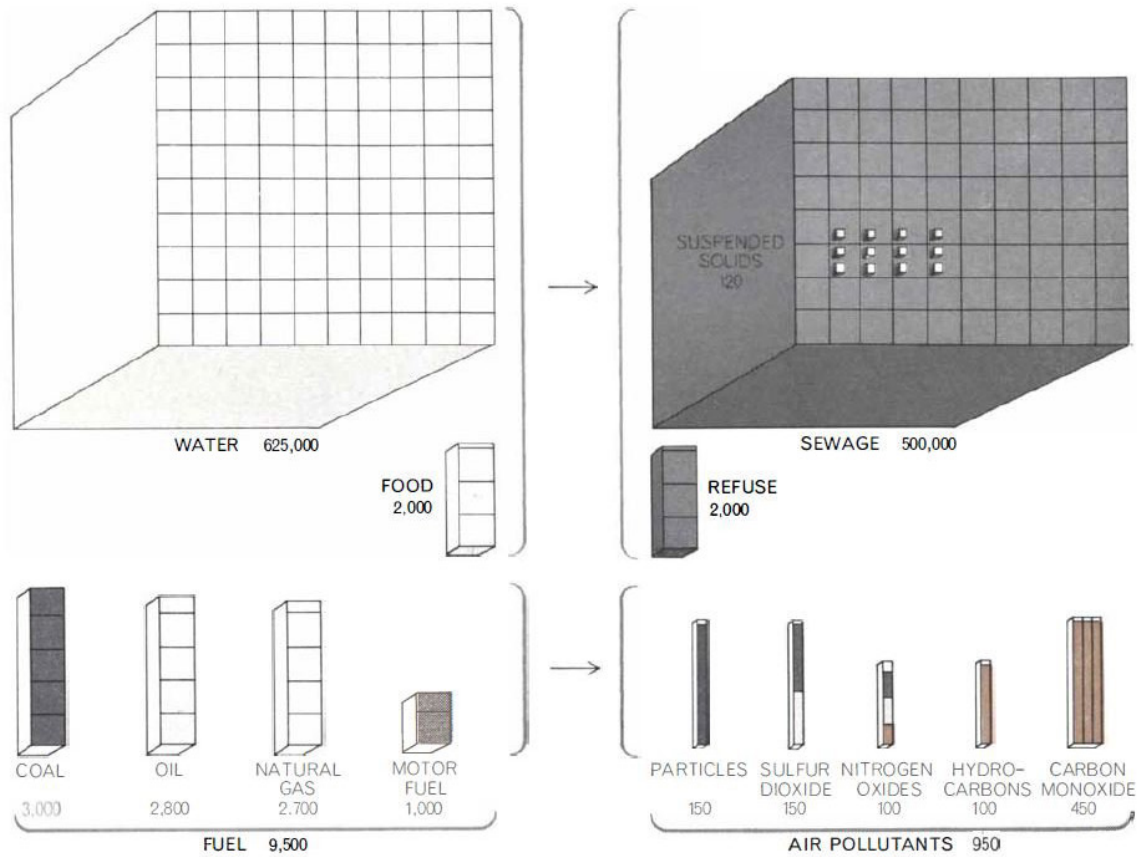
Collection of bread at protests across the Middle-East:
Yemen, Tunisia, Yemen, Egypt, Syria, Tunisia, Algria
(Reuters/AFP/Getty)



Feeding African Cities (International African Library)
by Jane Guyer.

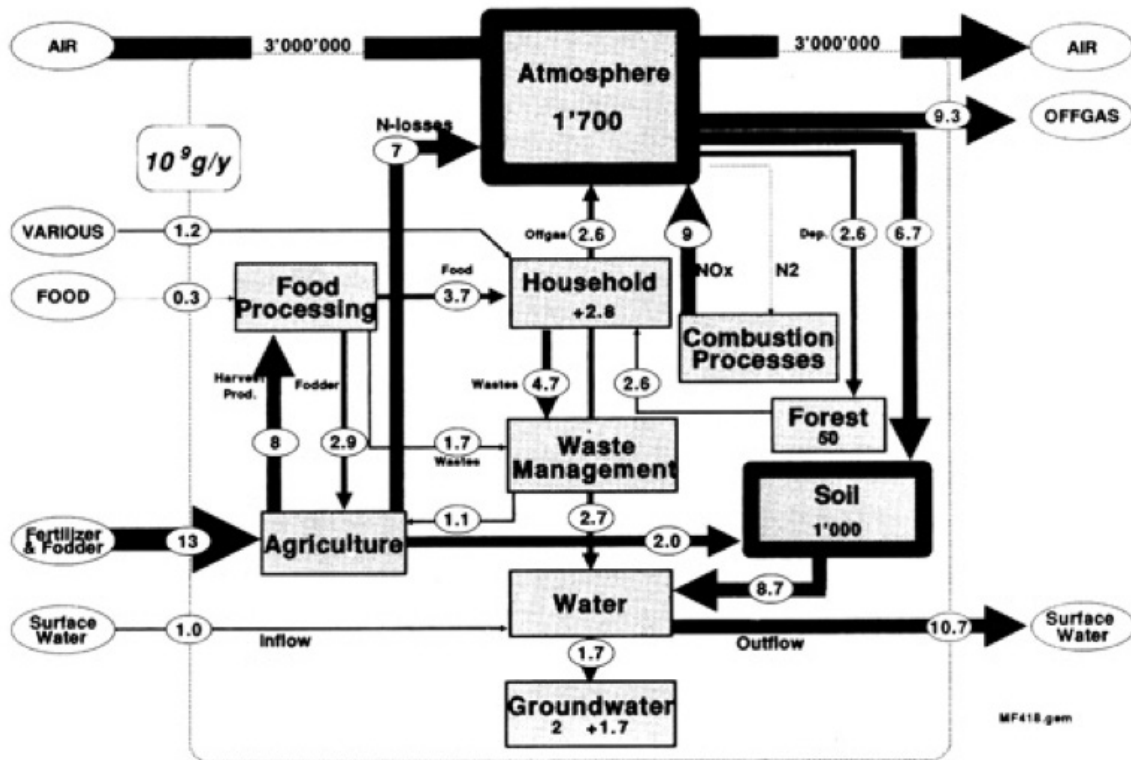


Poverty and Famines: An Essay on Entitlement and
Deprivation by Amartya Sen.

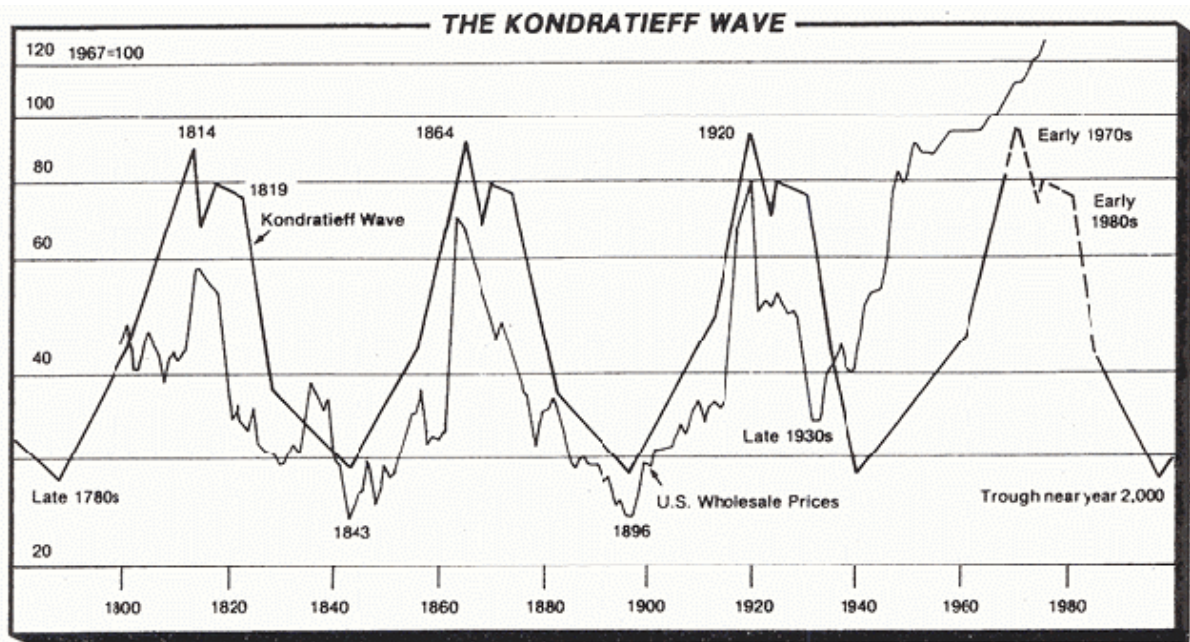


The graphic demonstrates the input-output transactions of a United States hypothetical city of 1 million people in Abel Wolman's 1965, "The Metabolism of Cities."

The anthroposphere as man-made system, In Peter Baccini and Paul H Brunner, *Metabolism of the Anthroposphere: Analysis, Evaluation, Design* (Cambridge, MA, USA: MIT Press, 2012).

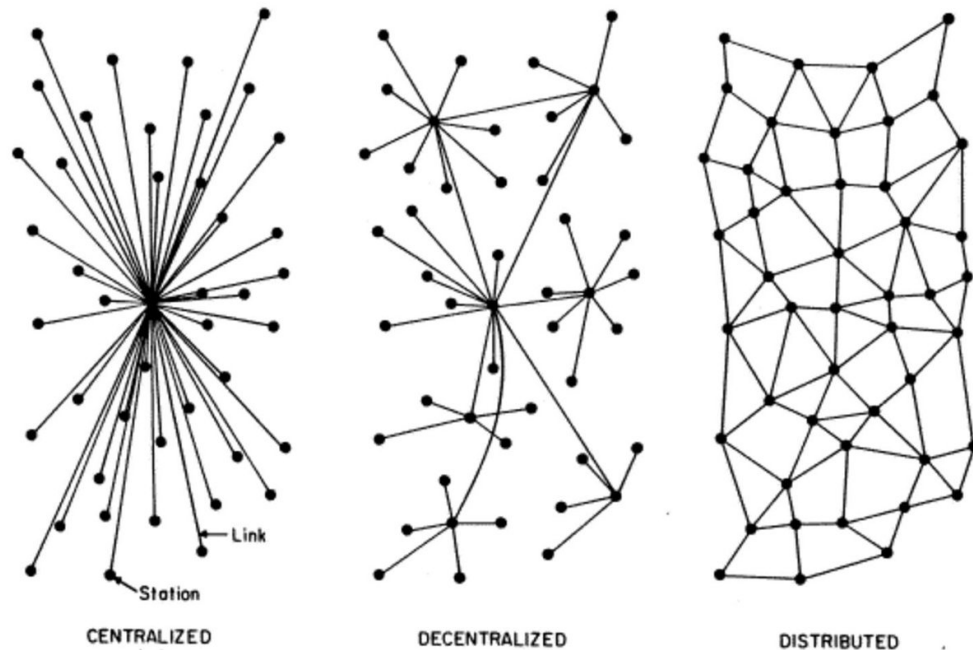
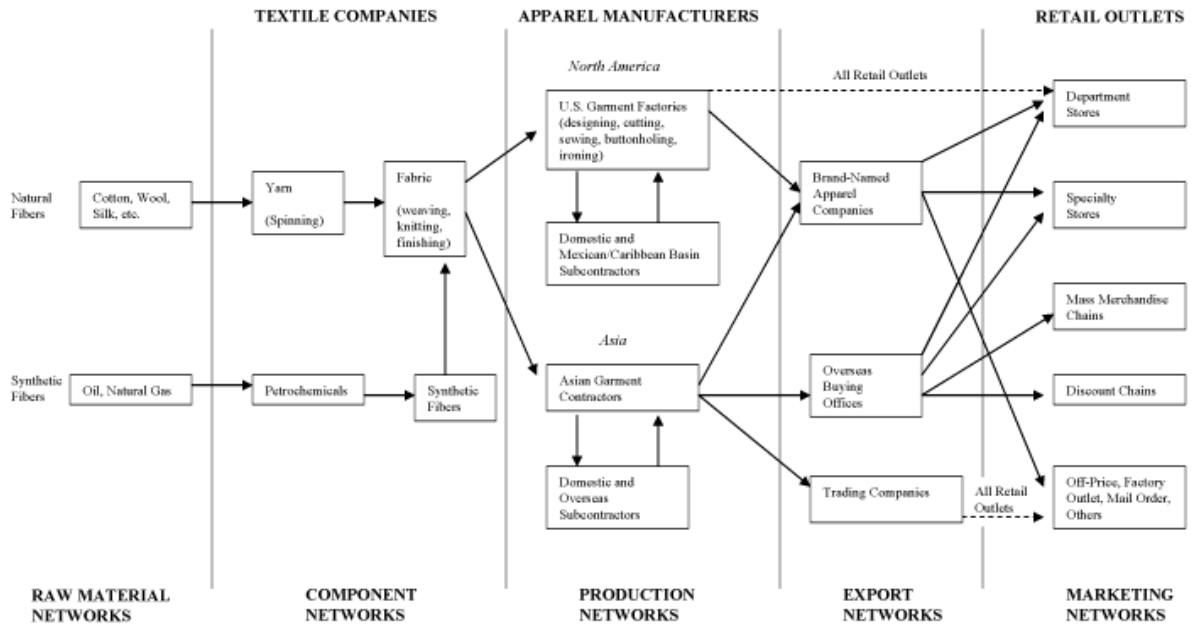


Material flux analysis showing the stocks and flows of nitrogen in an urban system as simulated in the Metaland model developed by Peter Baccini and Paul H. Brunner (ETH Zurich 1991), In Peter Baccini and Paul H Brunner, *Metabolism of the Anthroposphere: Analysis, Evaluation, Design* (Cambridge, MA, USA: MIT Press, 2012).



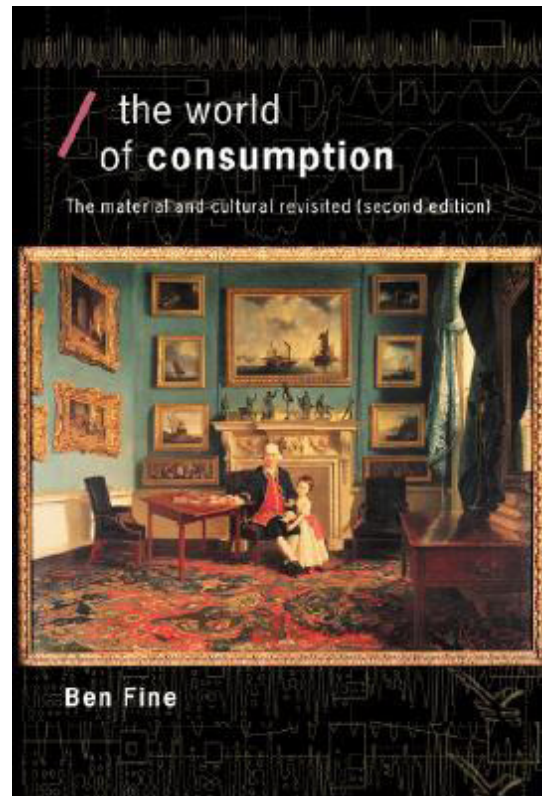
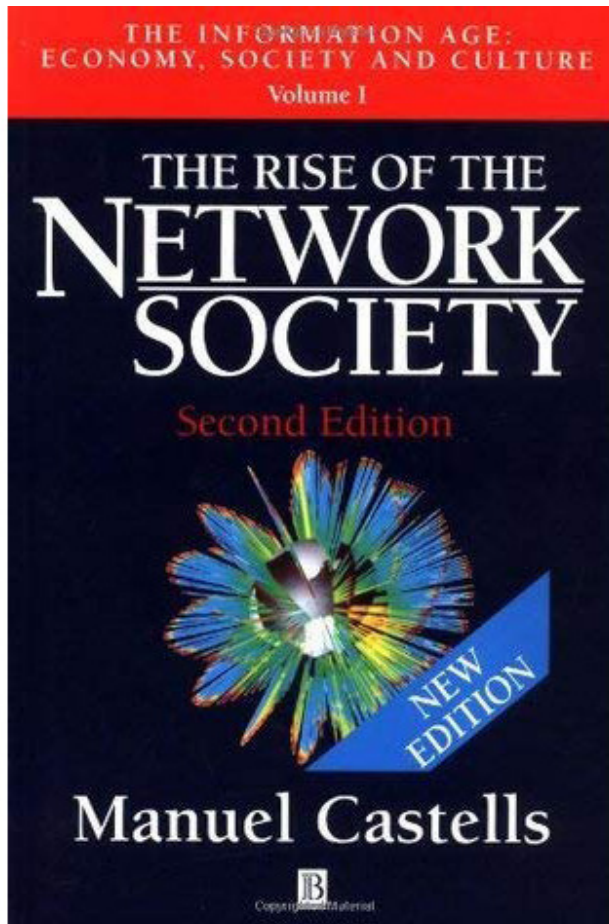
The Kondratieff Wave, see Immanuel Wallerstein, "Kondratieff Up or Kondratieff Down?," Review (Fernand Braudel Center), (1979).

The Apparel Commodity Chain



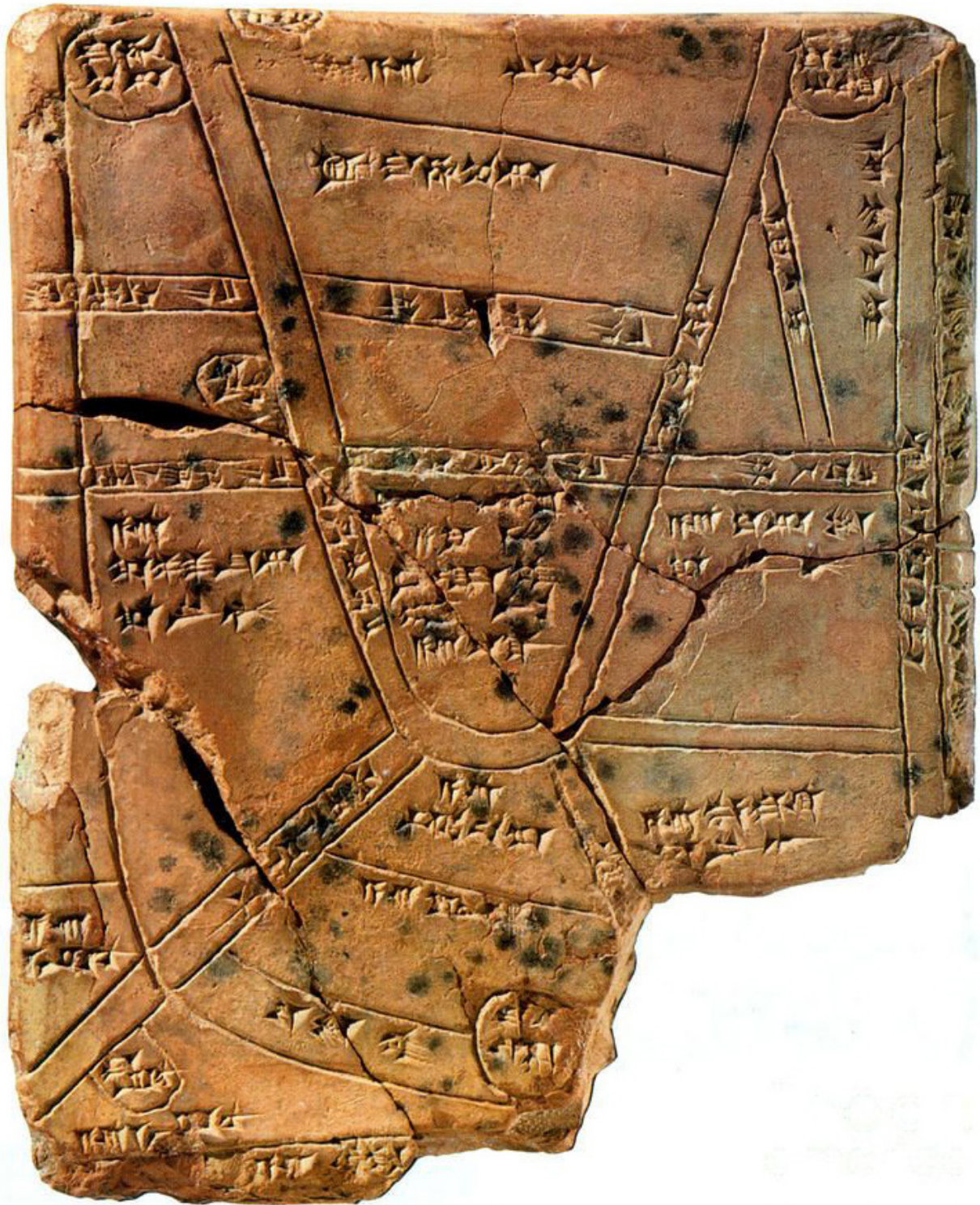
The Apparel Commodity Chain, in Terence Hopkins and Immanuel Wallerstein, "Commodity Chains in the World-Economy Prior to 1800," *Review (Fernand Braudel Center)* 10, no. 1 (1986).

Diagram by Paul Baran (1962) representing a distributed design, rather than a centralized or decentralized one., used often to illustrate Actor Network Theory (Paul Baran).

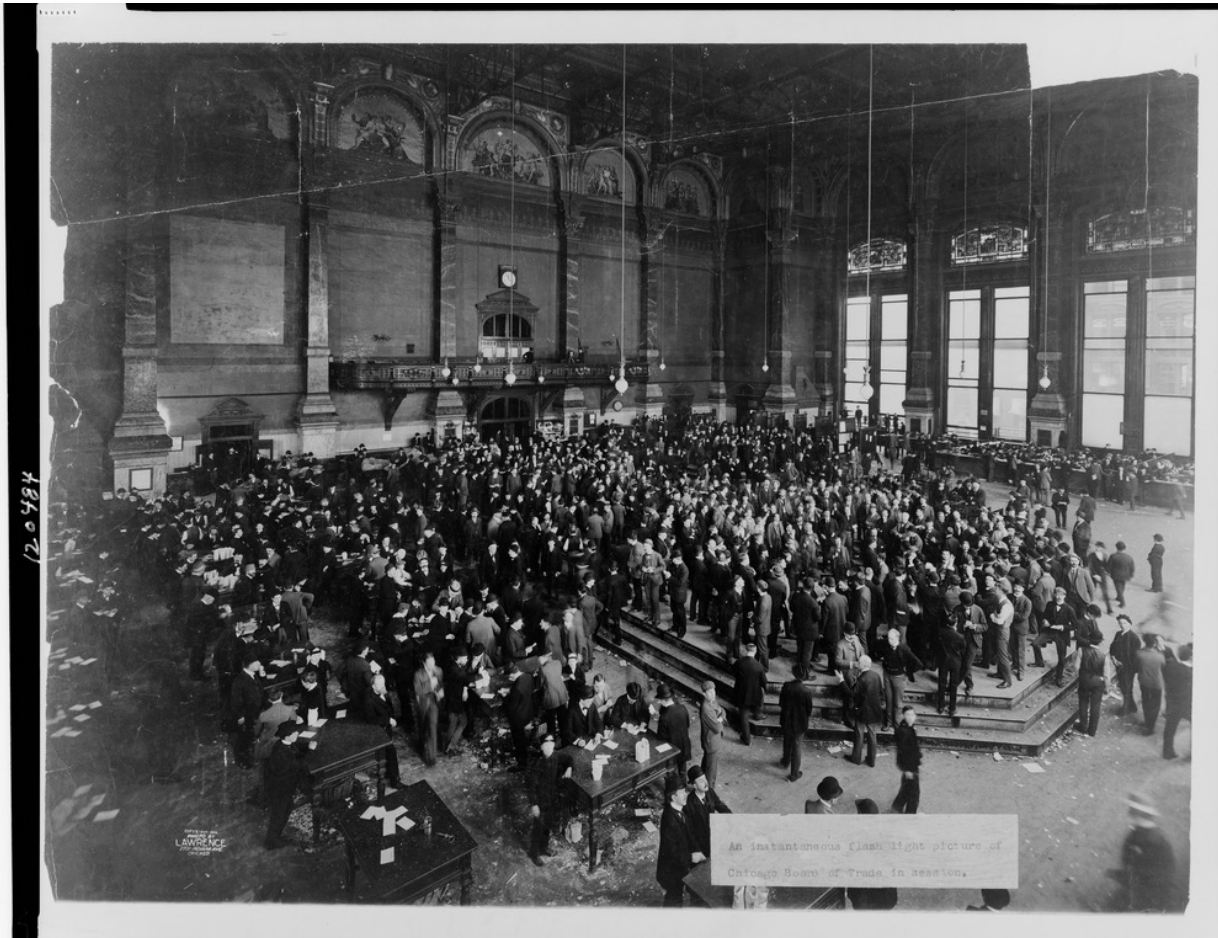


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Map of fields and irrigation canals near Nippur, Mesopotamia, on cuneiform tablet ca. 1300 B.C. (Science Source)



Open cry pit, Chicago Board of Trade (Geo. R. Lawrence, May 24, 1900.)



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Wheat Tenders

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NEW

EGYPT'S GASC SAYS SEEKS CARGOES OF (55.000 to 60.000) TONS OPTIONAL ORIGIN WHEAT FOR shipment (28April-8May) ,2018.

- CAIRO,28 March, The Egyptian state's main wheat buying agency said on Wednesday it wanted to buy cargoes of (55000 To 60000) tons of soft and /or milling wheat for shipment (28April-8May) ,2018.

(0900 GMT) Tomorrow and the results should come out around 4:30 p.m.(330 GMT) on the same day

Wheat bids should be free-on-board, with a separate freight offer.

- Vice chairman of GASC, said he was seeking cargoes of U.S. North pacific soft white wheat, U.S. soft red winter wheat,Or U.S. hard wheat, and/ or Canadian soft wheat.

- GASC was also seeking cargoes French milling wheat , Bulgaria milling wheat , Australian standard white wheat , Polish wheat ,German milling wheat, and/ or UK milling wheat (UKP or UKS variety) and/or Romanian milling wheat and/or Russian milling wheat and/or Ukrainian milling wheat and/or *{Kazakh milling wheat or Russian milling wheat at seller's option according to GASC Kazakh wheat specifications}* and/or *{Kazakh milling wheat or Ukrainian milling wheat at seller's option according to GASC Kazakh wheat specifications}* .



[-For contracting and purchasing terms book, Please go to the headquarter of GASC . 99 Kasr Eleini St. Cairo, Egypt](#)

[Back](#)

GASC gave the following breakdown of Wheat purchase Tender No.(27):*475000 tons wheat.

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Request For Tender (RFT) issued on its web site by the General Authority for Supply Commodities of Egypt (May 2018)



Subspecies of *Triticum aestivum*, *T. aestivum* subsp. *compactum* and *Triticum durum* (Köhler's Medizinal Pflanzen)



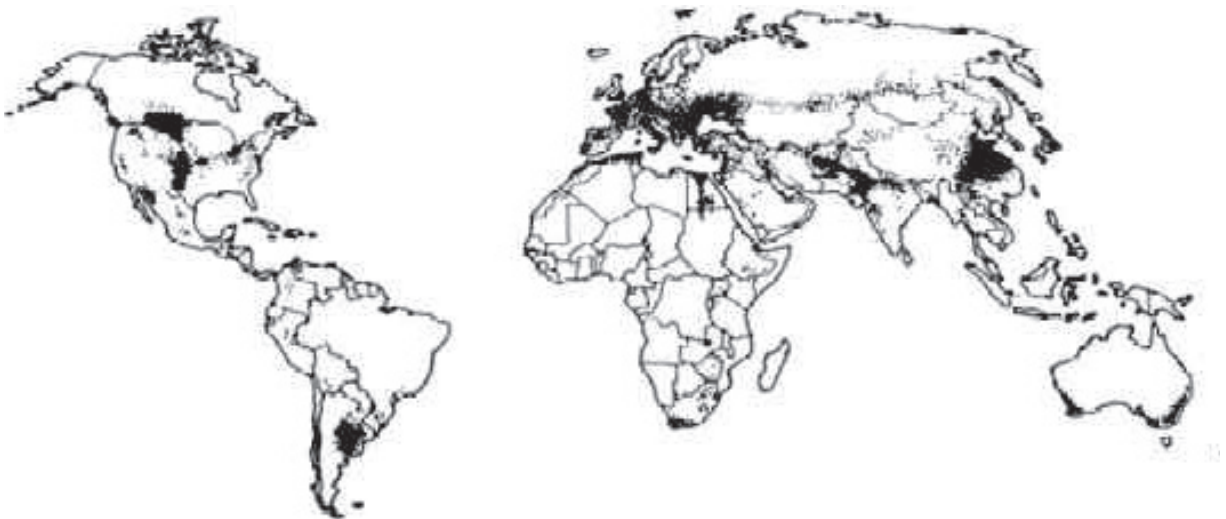
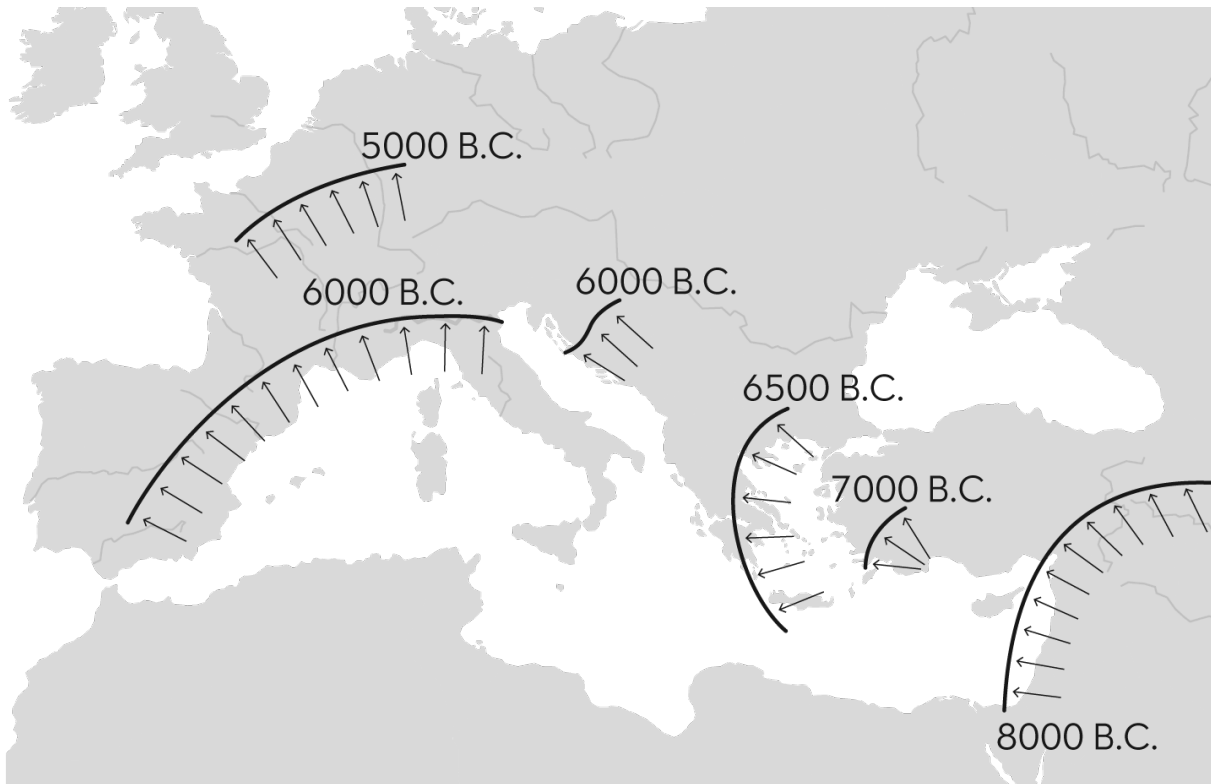
The court bakery of Ramesses III. "Various forms of bread, including loaves shaped like animals, are shown. From the tomb of Ramesses III in the Valley of the Kings, Twentieth Dynasty of Egypt." (the Oxford encyclopedia of ancient Egypt)



View of Variation On A Basic Item: Bread, MAN
transFORMS. Aspects of Design, Cooper-Hewitt
Museum, New York, 1976.



The Chicago Board of Trade building, the clock and the statue of Ceres (Wikipedia)



Spreading of wheat culture from Mesopotamia (Academia Alimentarium).

Major areas of wheat production worldwide (Goode's World Atlas, 1975, updated by CIMMYT, 1984)

WB1783

Soft White Winter

Northwest Region • Montana Region

WestBred®



- Excellent Yield Potential versus Existing Varieties
- Very Good Test Weight
- Excellent Yellow (Stripe) Rust Resistance

MANAGEMENT	Value
Adaptation	NWR, MTR
Class	SWW
Herbicide tolerance	-
Emergence	2
Maturity	M-L
Planting Rate	M-H
Type	A
Yield Potential	2
Plant Variety Protection	P
Limited Use License Agreement Required	Y
Crop System	IR, HR, DR
Contractual Agreement at Purchase	Y
Patent Protection	P

PRODUCTION	Value
Plant Height	M-T
Winter Hardiness	2
Test Weight	4
Standability	3

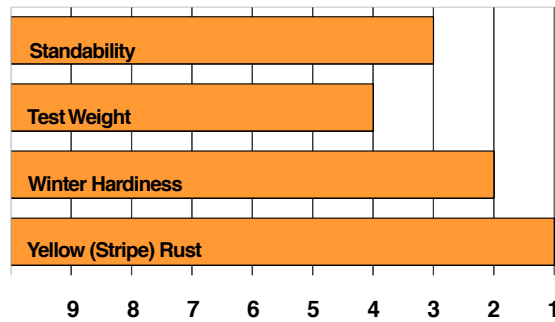
QUALITY	Value
Protein Content	4
Sprout Tolerance	3

AGRONOMIC TIPS

- Plant as a medium late maturing variety
- The variety is medium tall with average straw strength
- Plant on dryland and irrigated acres but best performance is under irrigation
- Plant at medium to medium high populations to help manage lodging

Based on WestBred conducted trials. Relative to other WestBred brand products.
Rating Scale: 1=Excellent,9=Poor.
Traits for which no rating value is shown were not rated for this product.

KEY CHARACTERISTICS

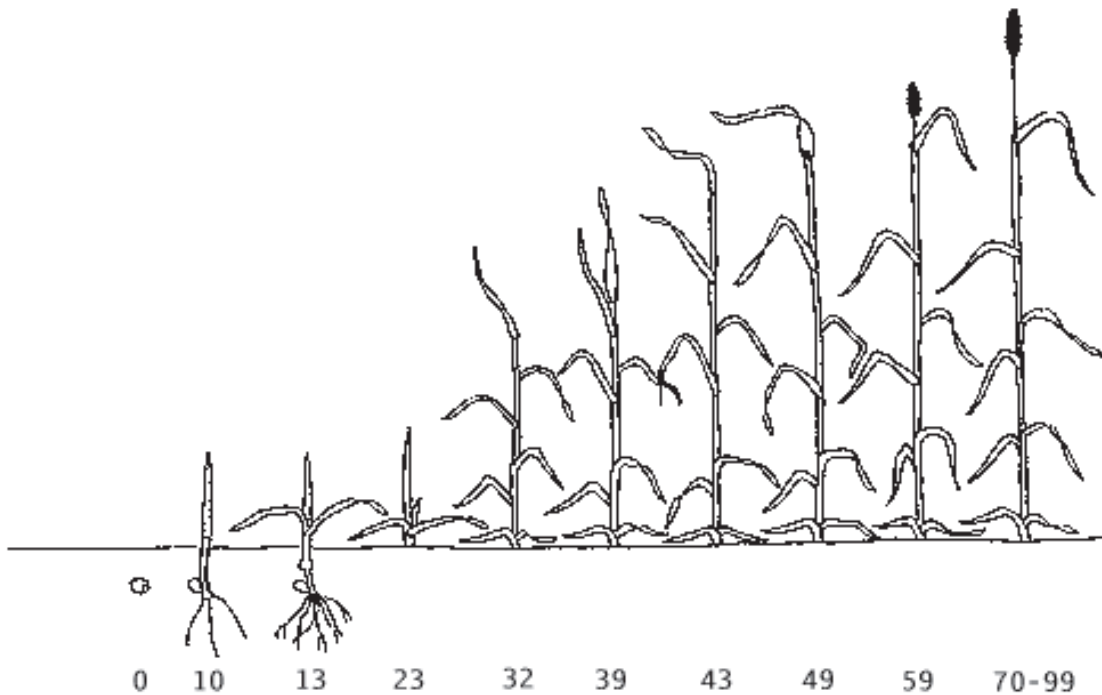


PEST and/or DISEASE PROFILE	Value
Fusarium Head Blight (Scab)	3
Leaf Rust	7
Septoria Tritici	7
Soil-Borne Mosaic	S
Stem Rust	6
Tan Spot	8
Yellow (Stripe) Rust	1

Product sheet for Certified Wheat Seed variety from WestBred®, sister company of Monsanto. These seeds are protected under the U.S. Plant Variety Protection (PVP) and unauthorized reproduction of the protected variety is strictly prohibited (Corporate Website).



Preparing for planting wheat beside the Mildura-Mungo road, Australia (Traveling Australia).



WHEAT: planting and harvesting calendar

AMIS participating countries	Crop / Region	Year N												Year N+1											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Philippines																									
Korea (Rep.of)																									
Russian Fed.	Winter																								
	Spring																								
Saudi Arabia																									
South Africa																									
Thailand																									
Turkey	Winter																								
Ukraine	Winter																								
	Spring																								
USA	Winter																								
	Spring																								
Viet Nam																									

Planting and Harvesting periods are not pictured for countries where production is nil or negligible.

■ Planting ■ Harvesting

The Zadok Growth Scale is a standardised reference scale used to evaluate and measure the plant growth stages in cereals (Wikipedia).

Crop calendar, wheat harvest (Agricultural Market Information System).



Wheat harvest, Kansas (YouTube Kansas Wheat).

Wheat stored outdoors, Kansas (Bloomberg News).

Wheat loaded in cargo, Argentina (Grain Central).

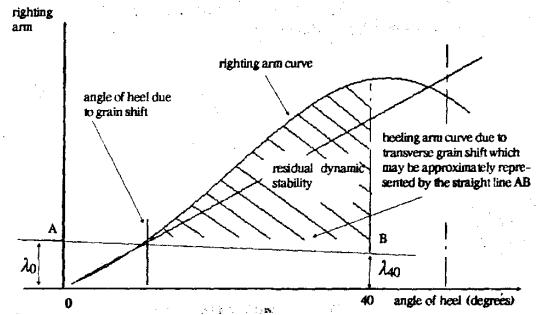


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INTERNATIONAL MARITIME ORGANIZATION

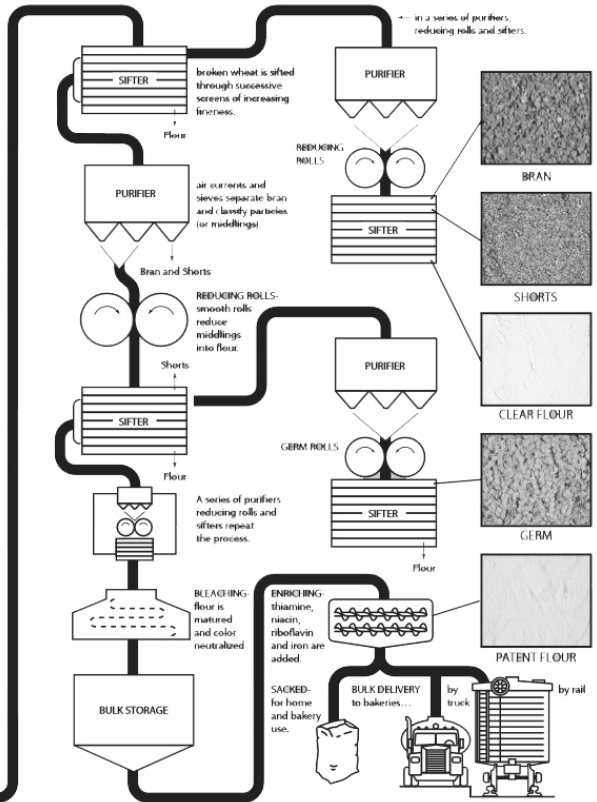
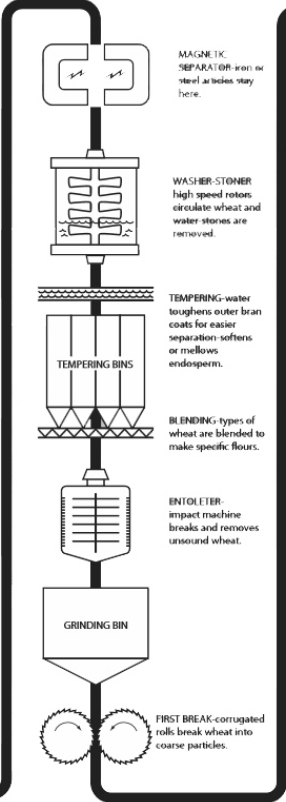
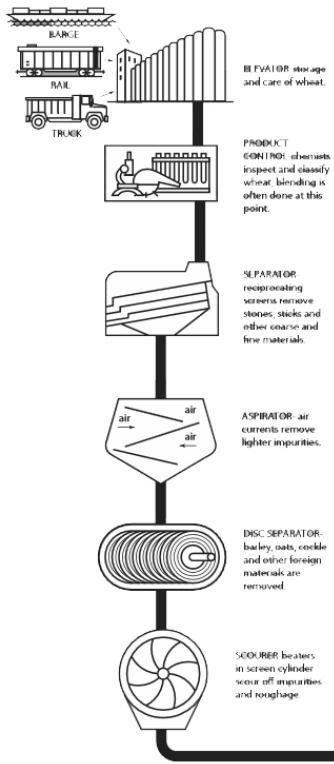
INTERNATIONAL CODE FOR THE SAFE CARRIAGE OF GRAIN IN BULK

(International Grain Code)



International Code for the Safe Carriage of Grain in Bulk, International Grain Code (London: International Maritime Organization, 1991).

IT STARTS HERE...



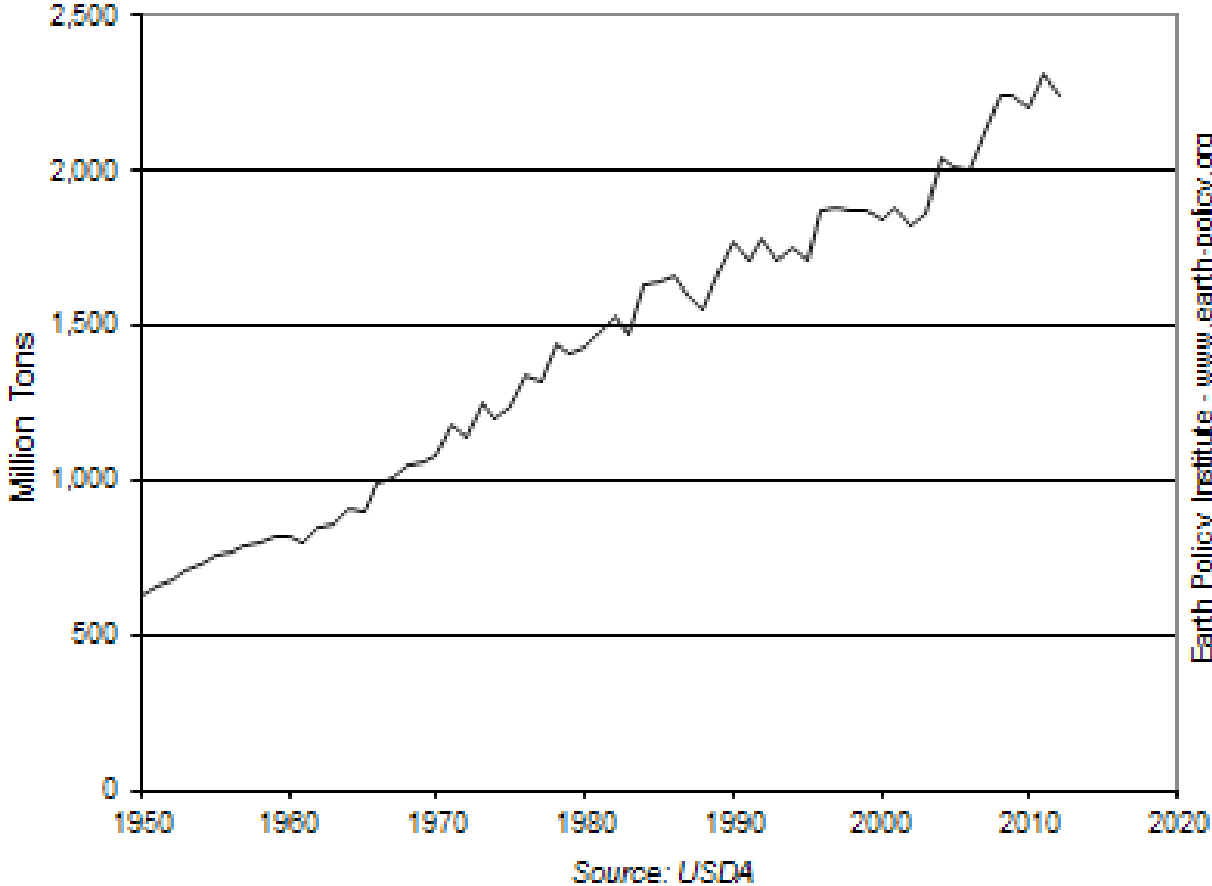
How flour is milled (Zerno Export).



Mechanized bread baking machine, India (Besto Oven Industries).

Baladi bread production at El Doueaa Bakery, Cairo (YouTube).

World Grain Production, 1950-2012



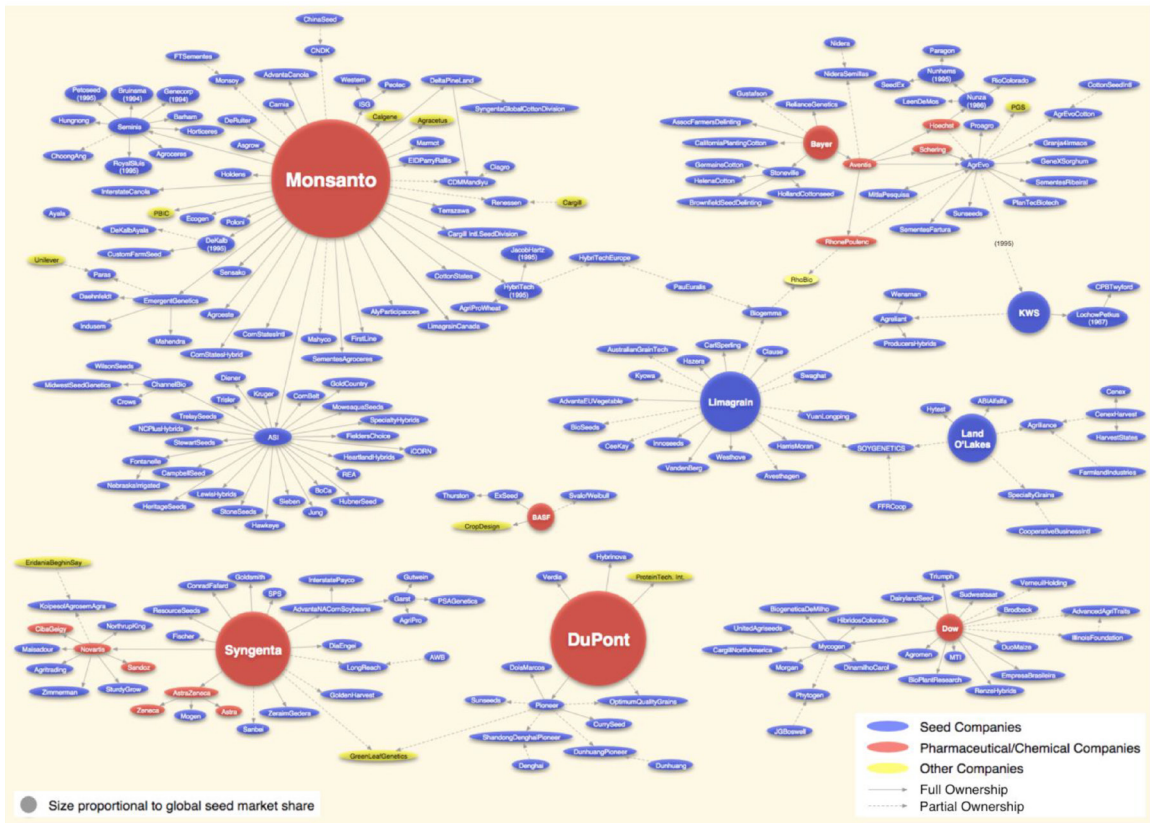
World grain production, 1950-2012 (Earth Policy Institute)

MONSANTO



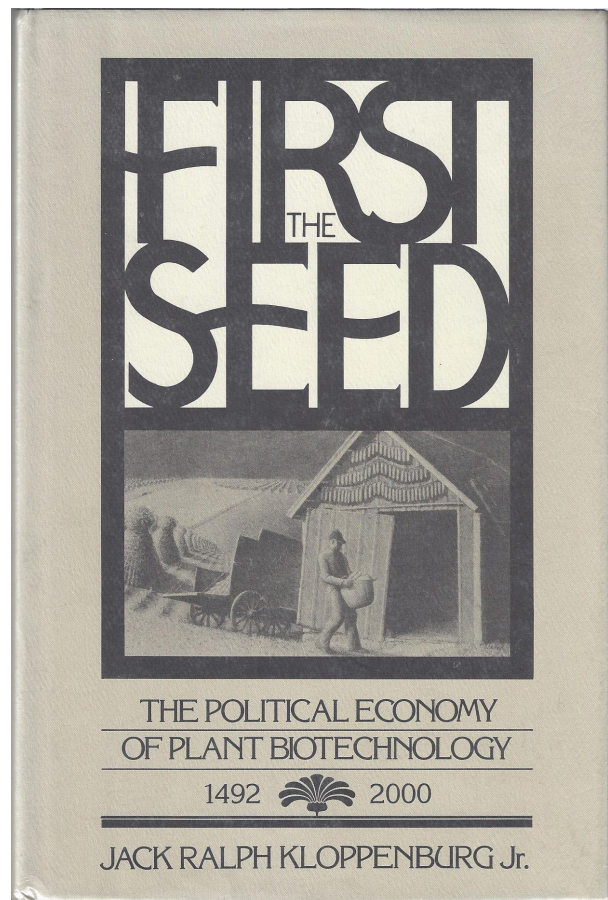
The green leaf on Monsanto's logo (Monsanto, 2017).

Belarusklai, Uralkali, Cargill, CF Industries, Mosaic, PotashCorp (now Nutrien), and Yara: the main input agents on the global market of fertilizers are agribusinesses or large chemical companies based in Western Europe and North America (Corporate websites).



Visualizing Consolidation in the Global Seed Industry: 1996-2008 (Philip H. Howard)

First the Seed: The Political Economy of Plant Biotechnology (Jack Kloppenburg)



Agent Orange: Background on Monsanto's Involvement

More than 40 years ago, Agent Orange was one of 15 herbicides used by the U.S. military as a defoliant in the Vietnam War to protect and save the lives of U.S. and allied soldiers. It was a unique mixture of two common herbicides (2,4-D and 2,4,5-T) that had been used separately in the United States since the late 1940s. The government named the mixture "Agent Orange" because of the orange band that was painted on containers of the material.

From 1965 to 1969, the former Monsanto Company manufactured Agent Orange for the U.S. military as a wartime government contractor. The current Monsanto Company has maintained responsibility for this product since we were spun-off as a separate, independent agricultural company in 2002.

From 1965 to 1969, the former Monsanto Company was one of nine wartime government contractors who manufactured Agent Orange. The government set the specifications for making Agent Orange and determined when, where and how it was used. Agent Orange was only produced for, and used by, the government.

Monsanto's official disclaimer on its webpage acknowledges its role in the production of Agent Orange.

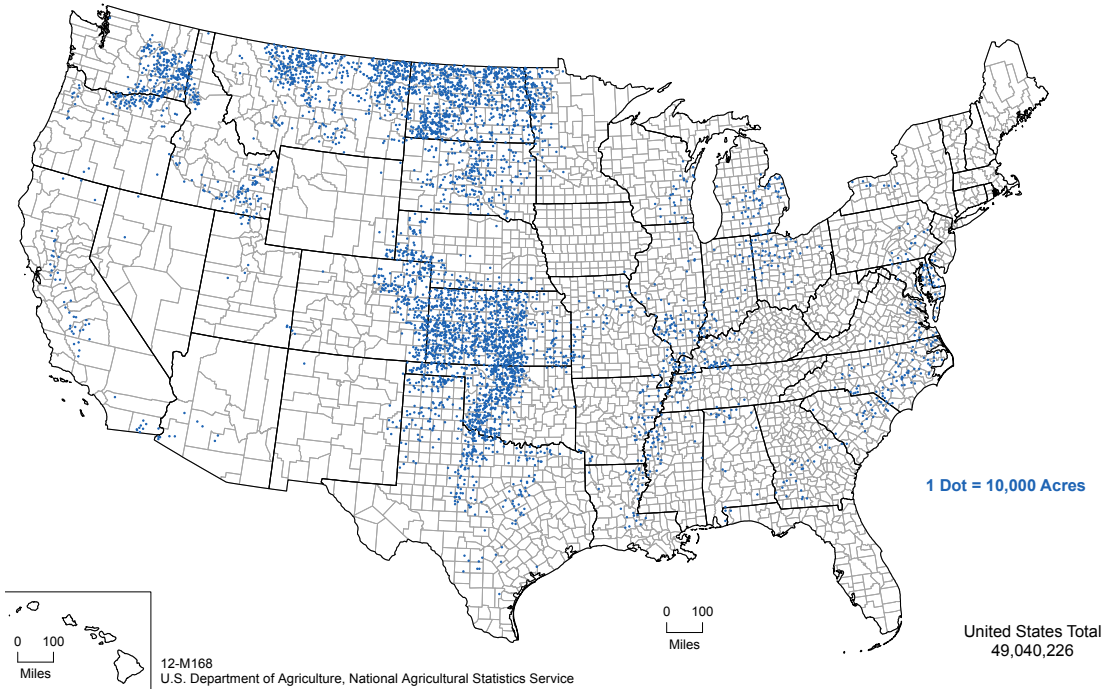
WestBred Assets is a sister company of Monsanto that works with smaller registered seed producers. Roundup has been "classified as probably carcinogenic to humans" by the World Health Organization in 2015.



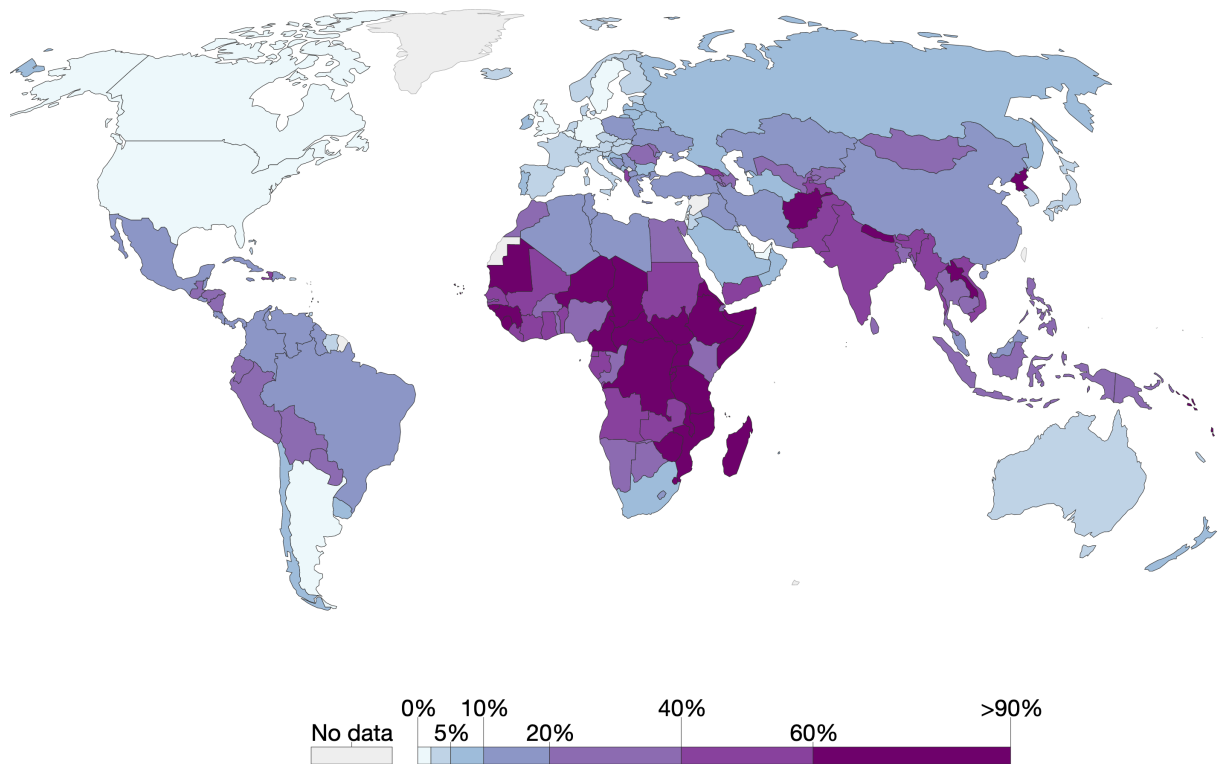


Dupont and Syngenta are the two other biggest company involved in the seed and pesticides business.

AgriPro, BASF, Bayer CropScience, Dow AgroSciences, Hyland: Acquisitions, collaborations and joint-ventures allow biotechnology companies to share knowledge and consolidate their market positions while remaining in competition.



US Census of Agriculture, wheat harvested acres in 2012 (US Department of Agriculture, National Agricultural Statistics Service)



World map showing the share of population employed in agriculture country by country. Three quarters of the labor force in a poor country like Madagascar are employed in agriculture. In rich countries like Germany or the UK it is only 1 in 100 who is employed in agriculture (World Bank, 2017).



El Tejar, the world's largest arable farming company, with about 1.1m planted hectares (© El Tejar)

Testimony of Steven H. Strongin
Managing Director
Goldman, Sachs & Co.
Permanent Subcommittee on Investigations
Committee on Homeland Security and Governmental Affairs
U.S. Senate

July 21, 2009

A. Executive Summary:

Chairman Levin, Ranking Member Coburn, and Members of the Subcommittee, we commend you for your leadership in addressing the factors affecting the integrity and functioning of commodity markets, which we view as a critical endeavor. We appreciate the opportunity to present our thoughts on the recently released Subcommittee report entitled, "Excessive Speculation in the Wheat Market." This is a substantial piece, which provides a rich and detailed history of the wheat market and raises critical issues, such as the importance of price convergence between the cash and futures markets.

I have been involved with commodity markets for the last 15 years, having helped construct and manage commodity index products for much of that time. I served as a member of the Policy Committee for the Goldman Sachs Commodities Index (GSCI) from 1996 to 2007, at which time the index was sold to Standard & Poor's and became the S&P GSCI™. I have continued to serve on the Policy Committee maintained by S&P.

When we first conceived of the GSCI, we did so with an eye toward improving liquidity in the commodity markets by helping fill the gap between the large number of commodity producers who wish to hedge their risk, and the more limited number of consumers who are willing to provide those hedges (as the Subcommittee report discusses). Since the inception of the GSCI, passive investments in commodity markets have been a crucial source of this liquidity. Yet, investors who have provided this liquidity have been, in our opinion, inappropriately characterized as speculators with no real economic interest in these markets, and the growth in index investment seen as creating an imbalance rather than correcting one.

In fact, most of these investors are large-scale asset allocators who seek to invest in markets in which capital is in short supply. In doing so, they aim to earn a reasonable long-run return by improving the underlying economics of the industry. They therefore require real economic justifications for their investments and rarely invest based on short-term speculative market views.

Their primary concerns mirror those of this Subcommittee. Namely, what is the realistic capital need of these markets? Will investment distort prices and therefore reduce long-run returns? And are these markets liquid enough that prices will not be distorted by the allocation of passive capital? Reflecting these concerns, the Policy Committee of the GSCI sought to structure the Index so that it provides the greatest possible liquidity, with the least possible market impact from passive investments. It has regularly assessed whether capital allocated to individual contracts exceeds the ability of these markets to absorb that capital. We would stress, as does the Subcommittee report, that this capital is needed to balance these markets and allow them to fulfill their desired function of allowing producers and consumers to operate more efficiently and manage price risk well.

With this in mind, we would like to turn our attention to the specific concerns raised and recommendations made in the Subcommittee's report. As we mentioned earlier, this is a

1

Russia, Crippled by Drought, Bans Grain Exports

By ANDREW E. KRAMER AUG. 5, 2010



Russians fought a fire near the village of Galovanovo, in the Ryazan region of Russia on Thursday.
Natalia Kolomoienko/Agence France-Press — Getty Images

MOSCOW — Prime Minister Vladimir V. Putin on Thursday banned all exports of grain after millions of acres of Russian wheat withered in a severe drought, driving up prices around the world and pushing them to their highest level in two years in the United States.

The move was the latest of several abrupt interventions in the Russian economy by Mr. Putin, who called the ban necessary to curb rising food prices in the country. Russia is suffering from the worst heat wave since record-keeping began here more than 130 years ago.

"We need to prevent a rise in domestic food prices, we need to preserve the number of cattle and build up reserves for next year," Mr. Putin said in a meeting broadcast on television. "As the saying goes, reserves don't make your pocket heavy."

During his years as president and prime minister, Mr. Putin has never hesitated to marshal the power of the state to protect Russian economic interests, and this decision showed that this has remained his prerogative even after he stepped down as president.

Mr. Putin has also proved adept at deflecting criticism of the government with grand gestures, and the export ban was widely seen as one of a series of populist moves by Mr. Putin to address rising resentment over the calamitous heat wave and the fires it has spawned.

Pressure was also brought to bear by multinational grain trading companies, which have been lobbying for the ban as a way to escape futures contracts drawn up before the drought, when prices were far lower. A Russian subsidiary of Glencore, the Swiss-based commodities trading company that has close ties to the Russian government, pressed hard as the scope of the drought's devastation became clear.

Steven Strongin, Testimony on "Excessive Speculation in the Wheat Market" (Washington: U.S. Senate, 2009); Andrew Kramer, "Russia, Crippled by Drought, Bans Grain Exports," The New York Times, August 5, 2010.



**COFCO
AGRI**

MAFF

**Ministry of Agriculture,
Forestry and Fisheries**

農林水産省



Trading Corporation of Pakistan (Pvt.) Limited
Ministry of Commerce, Government of Pakistan

Logos of the public wheat-trading agencies Chinese COFCO and Japanese MAFF (Corporate websites).

Logos of the main public wheat-trading agencies: GASC (General Authority for Supply Commodities, Egypt), Office Algérien Interprofessionnel des Céréales (Algeria), and Trading Corporation of Pakistan (Pakistan).



Agriculture

We connect producers and users of grain, oilseeds and other agricultural commodities through origination, processing, marketing, risk management and distribution. We also provide crop and livestock producers with farm services and products.



Animal Nutrition and Protein

We deliver animal nutrition products and services to producers in aqua, beef, dairy, pork, poultry and pet food. We also offer a full range of meat and poultry products to food companies and retailers.



Food

We serve food manufacturers, foodservice companies and retailers with high-quality food and beverage ingredients, applications and services. We also provide raw materials for animal nutrition and industrial applications.



Financial and Industrial

We provide Cargill customers and the company with risk management in energy, metals, ocean freight and commodities. We also offer financial solutions that facilitate trade and mitigate trade-related risks.



Cargill is the largest wheat-trading house by size, value and trading volume—thus is primarily a trading agent, but it is indirectly involved in almost all levels of the wheat chain (Cargill, 2018)



ADM and Bunge are the two largest wheat-trading houses after Cargill (ADM, Bunge, 2018)

André Group (now defunct), and Continental Grain traded 60 % of the global wheat trade in 1970.

 **LouisDreyfus**

 **TOEPFER**

The  Andersons[®]

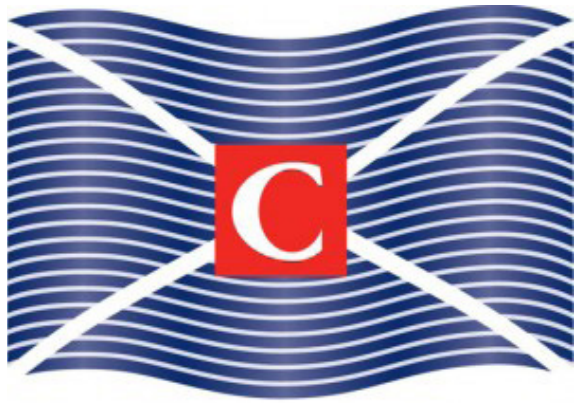
Apart from the four largest wheat-trading houses ABCD (ADM, Cargill, ADM, Bunge, Dreyfus), there are plethora of smaller commodity trading agents involved in the global commerce of wheat (Corporate websites).



CBH Grain, CWB, Gavilon, Glencore, Olam, Noble, Wilmar, Richardson, Viterro, GrainCorp, Mitsui, PH are only some of the commodity trading agents involved in the global commerce of wheat (Corporate websites).



European commodity trading agents: Axereal, Glencore, Soufflet, in Vivo, Lecureur, Nidera, Solaris, Vitol (Corporate websites).



CLARKSONS

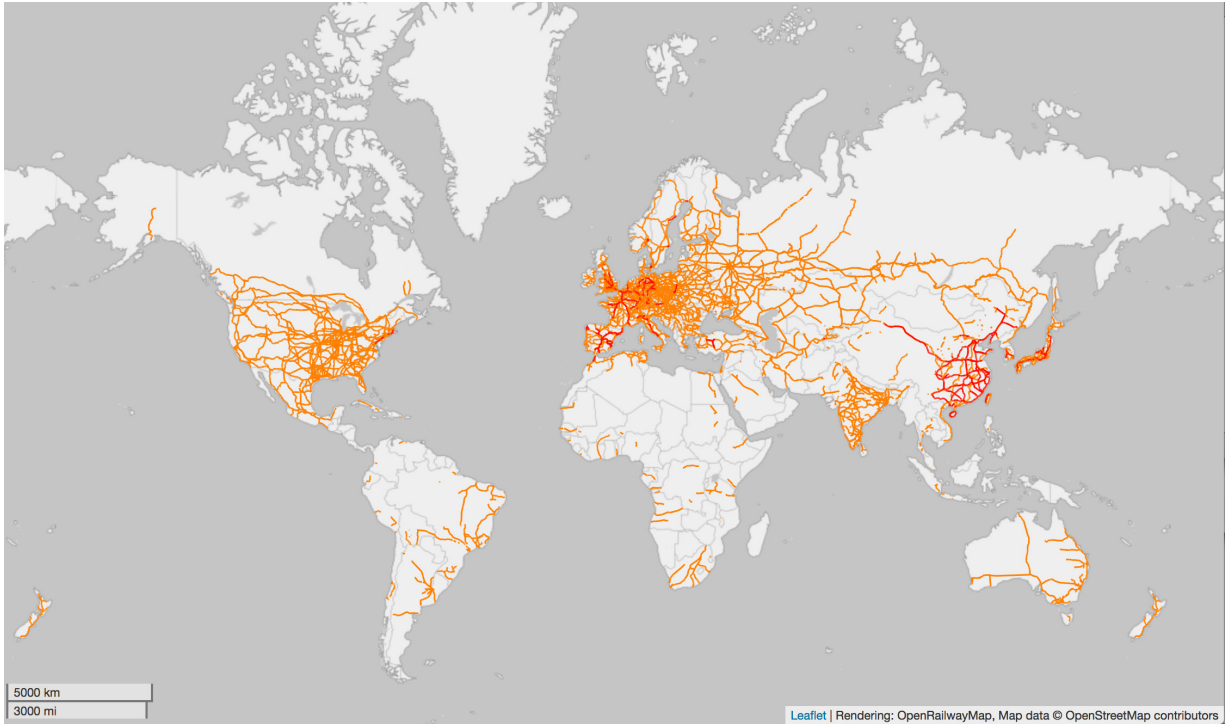


U.K. -based Clarksons' main overseas harbor office is in Alexandria, Egypt: the world's biggest shipbroker agency is based in the harbor of the world's top wheat importing country (Clarksons website).

Grain trucking, and barge grain transport is prevalent in North America, with the Mississippi River and the Illinois Waterway as principal water channels (Wikipedia).



Amid the other owners of barges (American Commercial Lines, Ingram Barge Lines, AEP River Operations, Alter Barge Line, Inc.), Cargill Marine and Terminal Inc. (Cargill) and Bunge North America (Bunge) are affiliates of major grain trading houses. BNSF is a major rail transportation agent (Corporate websites).



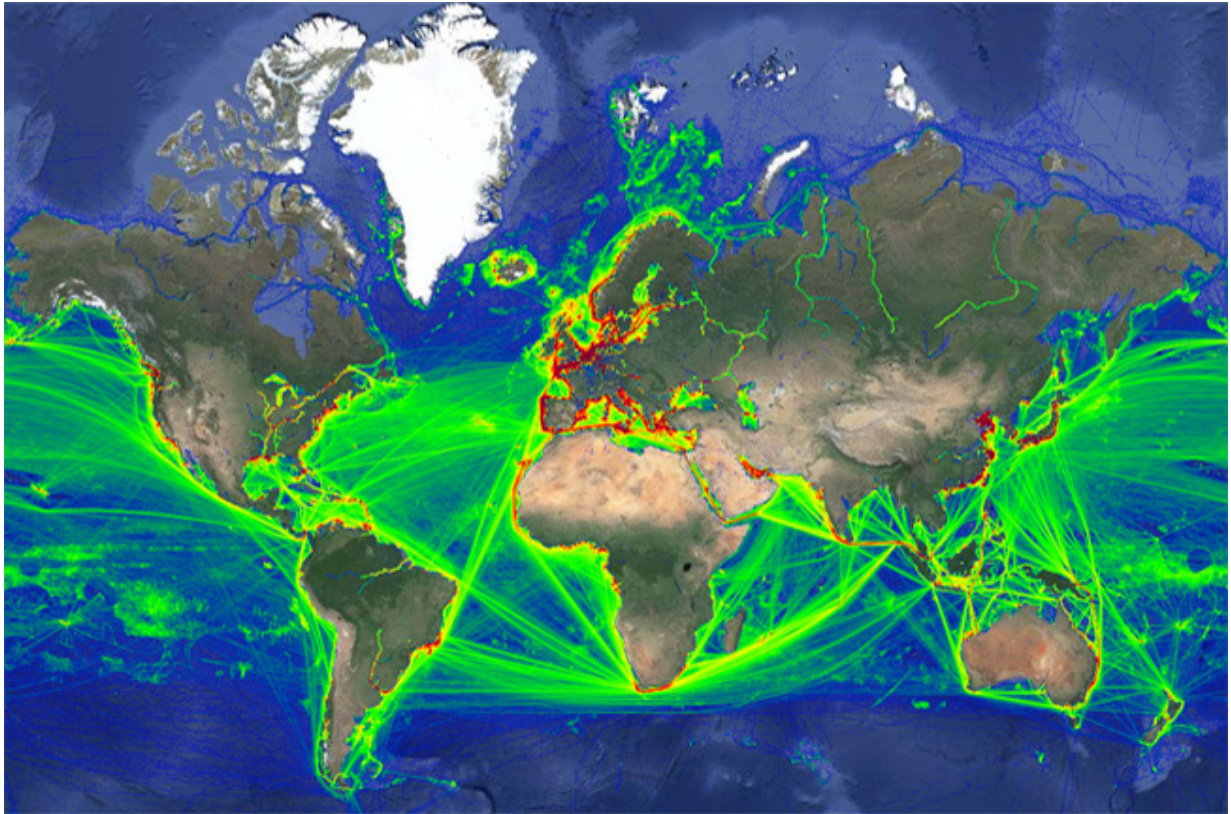
RAILION
DB Logistics



AMÉRICA LATINA LOGÍSTICA

Map of the rail network worldwide (Openstreet Map)

Key actors of the rail freight service in Europe Railion, SNCF, and in Latin America ALL (Corporate websites).



Map of the maritime traffic worldwide (<https://www.marinetraffic.com/>)

The Baltic Exchange Building in London (*The Wall Street Journal*) and Logo (www.maritimelondon.com)





বাংলাদেশ শিপিং কর্পোরেশন
Bangladesh Shipping Corporation



IRISL

 **HANJIN SHIPPING**

 **J. LAURITZEN**



Genco Shipping & Trading Limited

Public maritime shipping companies (Bangladesh, Iran, India, among a few others), and private companies (Hanjin, Lauritzen, Genco) involved in grain transport (Corporate websites).



Navios Maritime Midstream Partners L.P.



**AugusteaBunge
Maritime Ltd**



**LouisDreyfus
ARMATEURS**

Vertically integrated seaborne shipping companies (Navios) operates for grain traders and some grain-trading companies own fleets such as Louis Dreyfus Armateurs, AugusteaBunge Maritime (Corporate Websites).

Marubeni
Logistics



Mitsui O.S.K. Lines

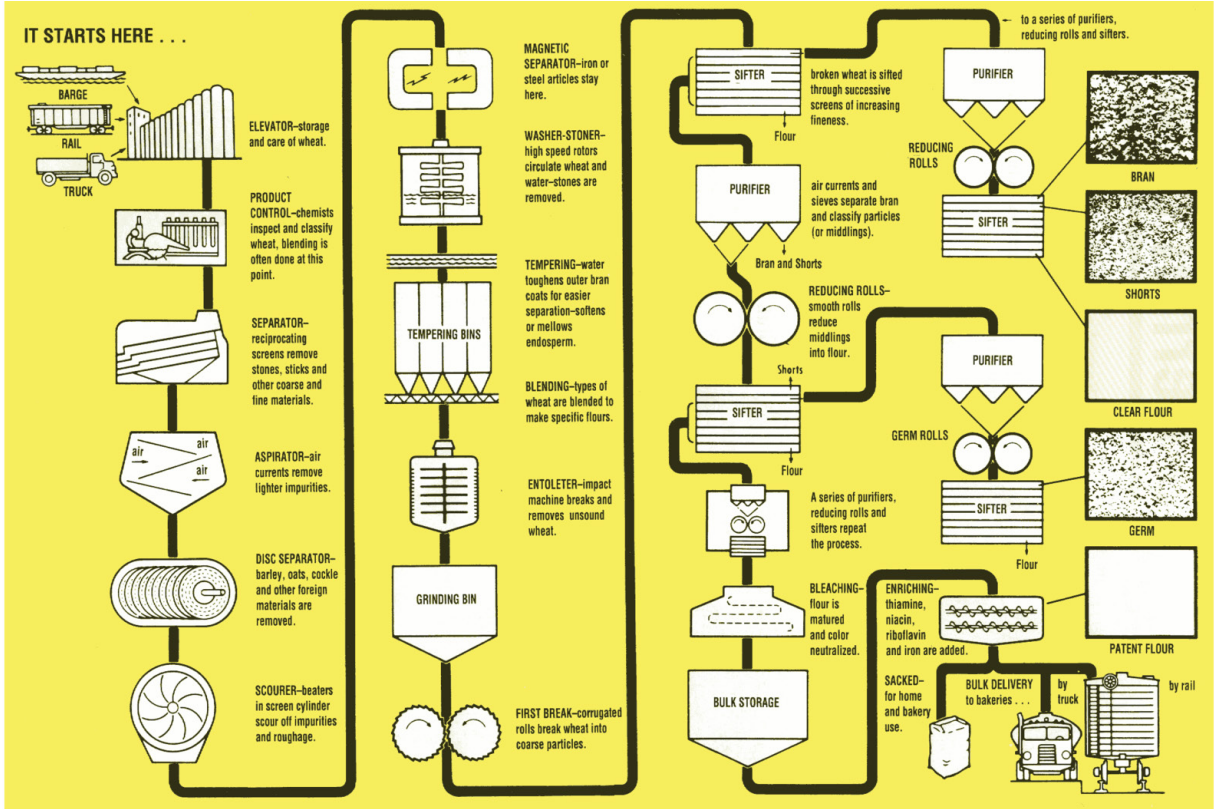
 **Lifting Global Trade.**

APM TERMINALS



Some grain-traders are also chartering companies such as Marubeni and Mitsui (Corporate Websites).

Port operators are essential transportation agents. A consolidates business, so called Global Terminal Operators such as APM, Hutchison and PSA are leaders (Corporate Websites).



How flour is milled (The Montana Department of Agriculture)



Farmer-owned with
global connections



ConAgra Mills®

HORIZON

MILLING®

A CARGILL JOINT VENTURE



CHS and Cargill have created Horizon Milling (Corpora websites),

The North Dakota Mill & Elevator in North Dakota is the only state-owned mill in the USA (North Dakota Mill & Elevator Facebook page).

ConAgra
Foods®



The merger of ConAgra Mills with Horizon Milling resulted in Ardent Mills as the largest milling agent of the USA (Corporate websites). General Mills is also a food processing agent, who competes with other major actors of the food industry.

Mondelēz



Paterson

GLOBALFOODS



RICHARDSON

Mondelez is one of the main food-processing actor of the industry (Corporate website)

Within the NAFTA, the USA, Canada and Mexico produce 24 million tons of wheat flour annually.



Germany is the leading milling nation and its biggest milling agents are mostly in private hands (Wikipedia).

Among France's leading four milling agents, both Nutrioxo and Axiane are farmers' cooperatives, while Moulins Soufflet is family-owned. Grands Moulins de Strasbourg is the only agent to be a publicly traded firm (Corporate websites, Wikipedia).



**GRANDI MOLINI
ITALIANI**



THE GORES GROUP



Italy's main processing agents of the country are pasta-producing firms (Wikipedia Commons).

In the United Kingdom, two milling firms control about 50 percent of the wheat flour output. Food industry Premier Food sold its milling activities to private equity The Gore Group, and ADM Milling is now the leading actor (Wikipedia Commons, Bytheglobal).



Russia's milling industry(Rusagro, Pava) is largely involved in food and meat production and owns large tracts of land, revealing the important vertical integration of Russian wheat milling firms into the sourcing of grain and landownership (Cbonds.com, Bloomberg).



五得利
WUDELI



**COFCO
AGRI**



PT. SRIBOGA RATURAYA

Indofood
THE SYMBOL OF QUALITY FOODS

China's wheat milling industry is in the hands of three key agents: privately-owned Wudeli Group, public agent COFCO and Singapore-based wilmar (miller-magazine.com, corporate websites).

Indonesia's two mail milling agents are Bogasari Flour Mill (subsidiary Indofood Sukses Makmur, a large food processing company) and Sriboga Raturaya



穀物ソリューション・カンパニー

SHOWA

昭和産業

NIPPONの食を元気に

NIPPON
日本製粉



NITTO FUJI FLOUR MILLING CO., LTD.

Four companies produce 80 percent of this wheat flour production. Nisshin Flour Milling Inc., Nippon Flour Mills Co., Showa Sangyo Co. and Nitto-Fuji are all quoted on the Tokyo Exchange as well. (Wikipedia Commons, corporate websites).



Among the international leaders of the agro-food business (Nestlé, ADM, Altria-Philip Morris-Kraft Foods, PepsiCo, Unilever, Tyson Foods, Cargill, Coca-Cola, Mars, Groupe Danone, ConAgra, Anheuser-Busch, Sara Lee, General Mills, Dean Foods), grain traders and millers feature prominently (Convergence alimentaire).

An agalati - a bicycle-bread-delivery boy in Cairo, Egypt (Bike for Bread).

Walmart 



Carrefour



Globally, among the 100 firms listed on the international stock exchange as food-retailers, the five retail leaders holding 13 percent of global food sales are identified by scholars as Transnational Supermarket Chains: Walmart, Carrefour, Tesco, Metro, Koger (Wikipedia Commons).



United Nations
**World Food
Programme**

World Vision



Save the Children®



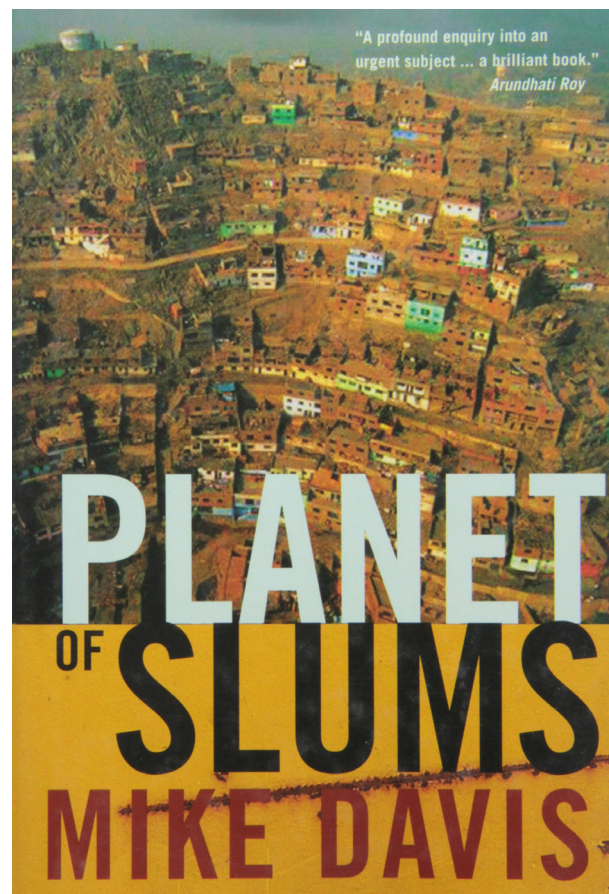
care®

About 1,400 partners in the network of civil society organizations collaborate with the World Food Programme (WFP) of the United Nations to distribute food. The largest NGO is World Vision International (WFP, worldvision.com). CARE and Save The Children are also engaged in food distribution worldwide (logolynx.com).



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

Two of the most influential financial agents in the current food regime are the International Monetary Fund (IMF or Fund), and the World Bank (Corporate websites).



The links between social discontents, urban food riots and IMF programs are acknowledged by several studies and essays such as by the economist Joseph Stiglitz (*Globalization and its Discontents*) and by urban theorist Mike Davis (*Planet of Slums*).

Stand-By Arrangements (SBA)					
Member	Date of Arrangement	Expiration	Total Amount Agreed	Undrawn Balance	IMF Credit Outstanding Under GRA
Argentina	June 20, 2018	June 19, 2021	40,714,000	20,500,290	20,213,710
Iraq	July 07, 2016	July 06, 2019	3,831,000	2,336,800	2,162,675
Jamaica	November 11, 2016	November 10, 2019	1,195,300	1,195,300	510,228
Ukraine	December 18, 2018	February 17, 2020	2,800,000	1,800,000	8,035,761
Total			48,540,300	25,832,390	30,922,374
Extended Arrangements (EFF)					
Member	Date of Arrangement	Expiration	Total Amount Agreed	Undrawn Balance	IMF Credit Outstanding Under GRA
Angola	December 07, 2018	December 06, 2021	2,673,000	1,958,000	715,000
Barbados	October 01, 2018	September 30, 2022	208,000	173,000	35,000
Bosnia and Herzegovina	September 07, 2016	September 06, 2020	443,042	316,217	169,100
Cote d'Ivoire	December 12, 2016	December 11, 2019	433,600	129,047	304,553
Egypt	November 11, 2016	November 10, 2019	8,596,570	2,865,520	5,731,050
Gabon	June 19, 2017	June 18, 2020	464,400	178,680	285,720
Georgia	April 12, 2017	April 11, 2020	210,400	90,400	155,000
Jordan	August 24, 2016	August 23, 2019	514,650	411,720	504,316
Moldova, Republic of	November 07, 2016	November 06, 2019	86,300	32,000	124,293
Mongolia	May 24, 2017	May 23, 2020	314,505	157,260	157,245
Sri Lanka	June 03, 2016	June 02, 2019	1,070,780	355,550	715,230
Tunisia	May 20, 2016	May 19, 2020	2,045,625	1,060,694	1,280,613
Total			17,060,872	7,728,088	10,177,120
Flexible Credit Line (FCL)					
Member	Date of Arrangement	Expiration	Total Amount Agreed	Undrawn Balance	IMF Credit Outstanding Under GRA
Colombia	May 25, 2018	May 24, 2020	7,848,000	7,848,000	0
Mexico	November 29, 2017	November 28, 2019	53,476,200	53,476,200	0
Total			61,324,200	61,324,200	0
Precautionary and Liquidity Line (PLL) ^{1/}					
Member	Date of Arrangement	Expiration	Total Amount Agreed	Undrawn Balance	IMF Credit Outstanding Under GRA
Morocco	December 17, 2018	December 16, 2020	2,150,800	2,150,800	0
Total			2,150,800	2,150,800	0

IMF Lending Arrangements as of January 31, 2019
(IMF).



VALUE. EVENT. EXIT.

Within the World Bank Group, the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA) are acquiring funds to finance projects, and via the International Finance Corporation (IFC) invests in private projects and private equity for profit, and recently undertook investments in transnational acquisition of vast tracts of agrarian land from developing countries with hedge fund Altima Partners (World Bank).



European Bank
for Reconstruction and Development



Asian Development Bank



IDB

Inter-American
Development Bank

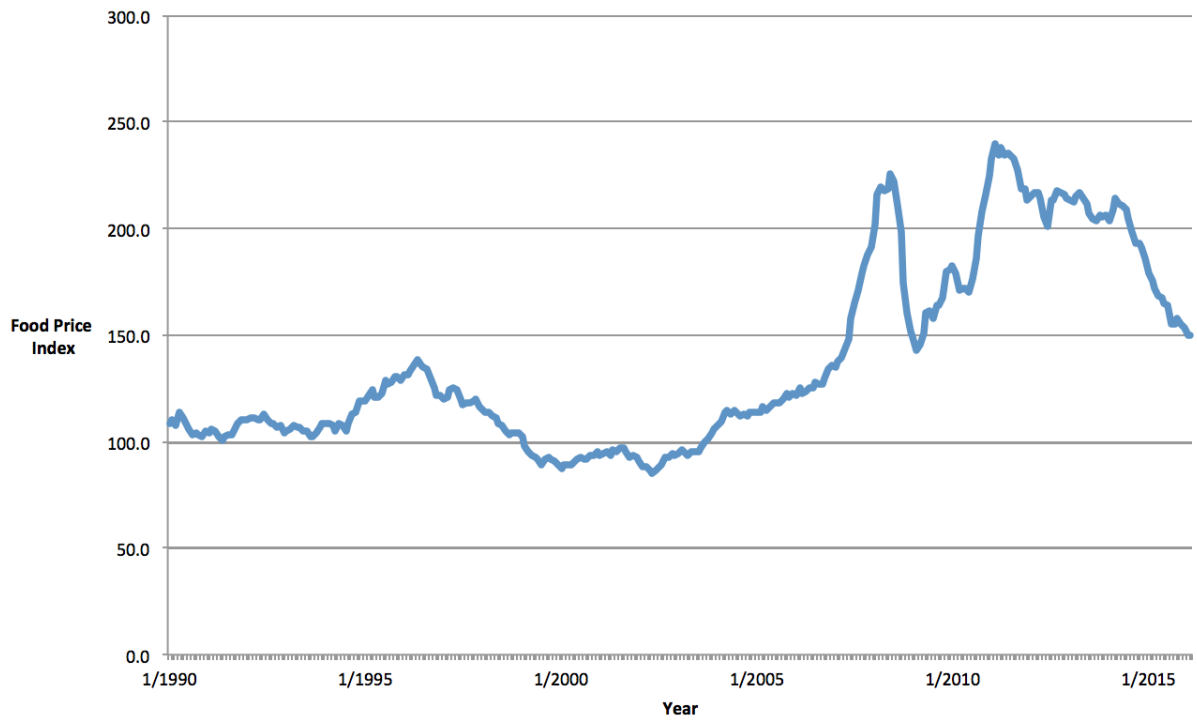


IFAD

INTERNATIONAL
FUND FOR
AGRICULTURAL
DEVELOPMENT

In line with the World Bank's economic ideology, regional financial banks are minor agents active in mechanisms of development aid, officially promoting economic growth and development, with a possible impact on food production structures (Banks websites).

A subsidiary of the United Nations, the International Fund for Agricultural Development (IFAD) is an international financial organ on the transition from traditional agriculture to the integration (IFAD website).



FAO Food Price Index 1990-2015 (Wikipedia/FAO).

Morgan Stanley

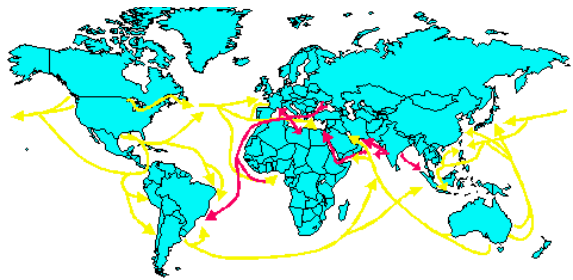
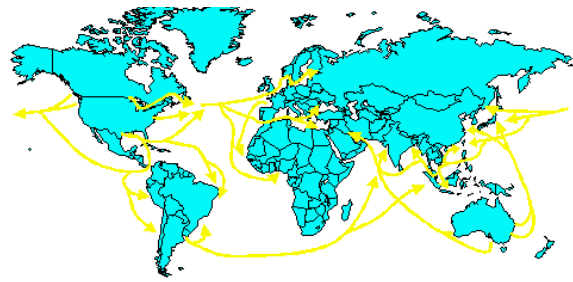
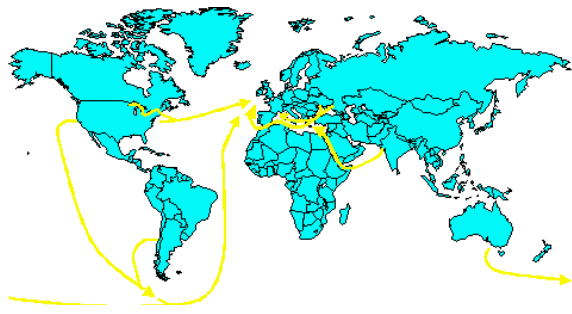
BLACKROCK



ALPCOT
CAPITAL MANAGEMENT



Financial agents like private equity banks (Morgan Stanley), hedge funds (BlackRock, Inc.) and investment groups (Black Earth Farming, Alpcot-Agro, Al Qudra) have been acquiring large tracts of farmland in developing countries (Corporate websites).

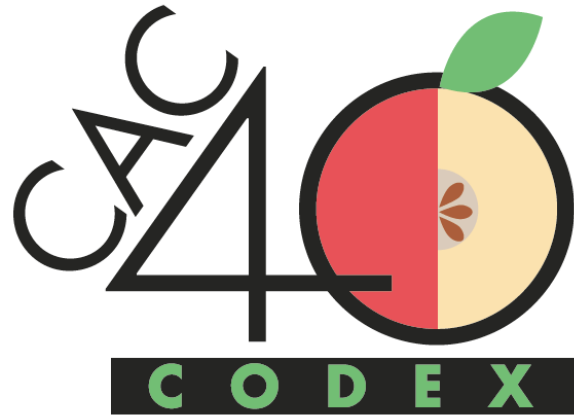


Major world grain routes, 1880, 1978, 2002 in Changing World Markets, Paul Dikerson (US Wheat-Trade Policy).



Initiated in 1947 during the Bretton Woods Conference, the General Agreement on Tariffs and Trade (GATT) is often grouped with the World Bank and the IMF as one of the most influential global governance bodies.

The WTO is an official institution with 160 members (Headquarters in Geneva, 640 employees), which settle trade disputes inherent in the process of liberalizing world trade (Corporate websites).



IFPRI

**INTERNATIONAL
FOOD POLICY
RESEARCH
INSTITUTE**

Initiated in 1947 during the Bretton Woods Conference, the General Agreement on Tariffs and Trade (GATT) is often grouped with the World Bank and the IMF as one of the most influential global governance bodies.

The WTO is an official institution with 160 members (Headquarters in Geneva, 640 employees), which settle trade disputes inherent in the process of liberalizing world trade (Corporate websites).

The International Food Policy Research Institute (IFPRI) is one of the most influential agricultural research institutional agents today (IFPRI).



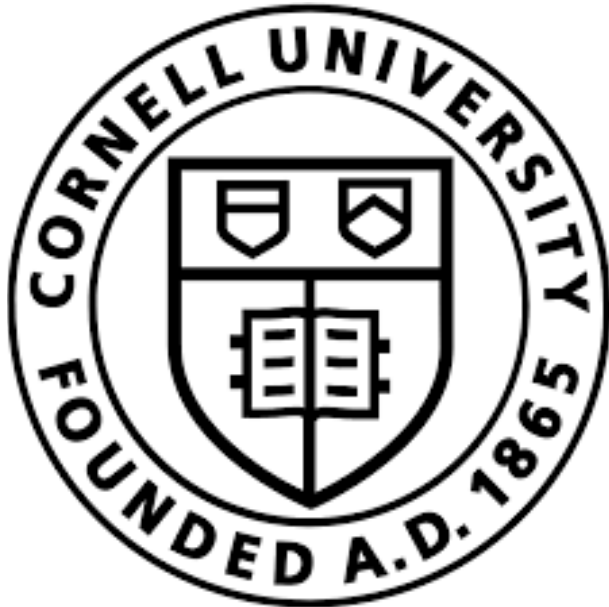
The IFPRI is one of the 15 research centers in the Consultative Group on International Agricultural Research (CGIAR) network, as well as the International Rice Research Institute (IRRI), created in cooperation with the Philippino government, the Rockefeller Foundation and the Ford Foundation—the initiating example of the influence of philanthropic structures over the food system through research (Official websites).

Other institutes were established following the creation of the IRRI in the 1960s (the International Centre for Maize and Wheat Improvement –CIMMYT- in Mexico, the International Institute for Tropical Agriculture –IITA- in Nigeria, the International Centre for Tropical Agriculture – CIAT- in Colombia) (Official websites).

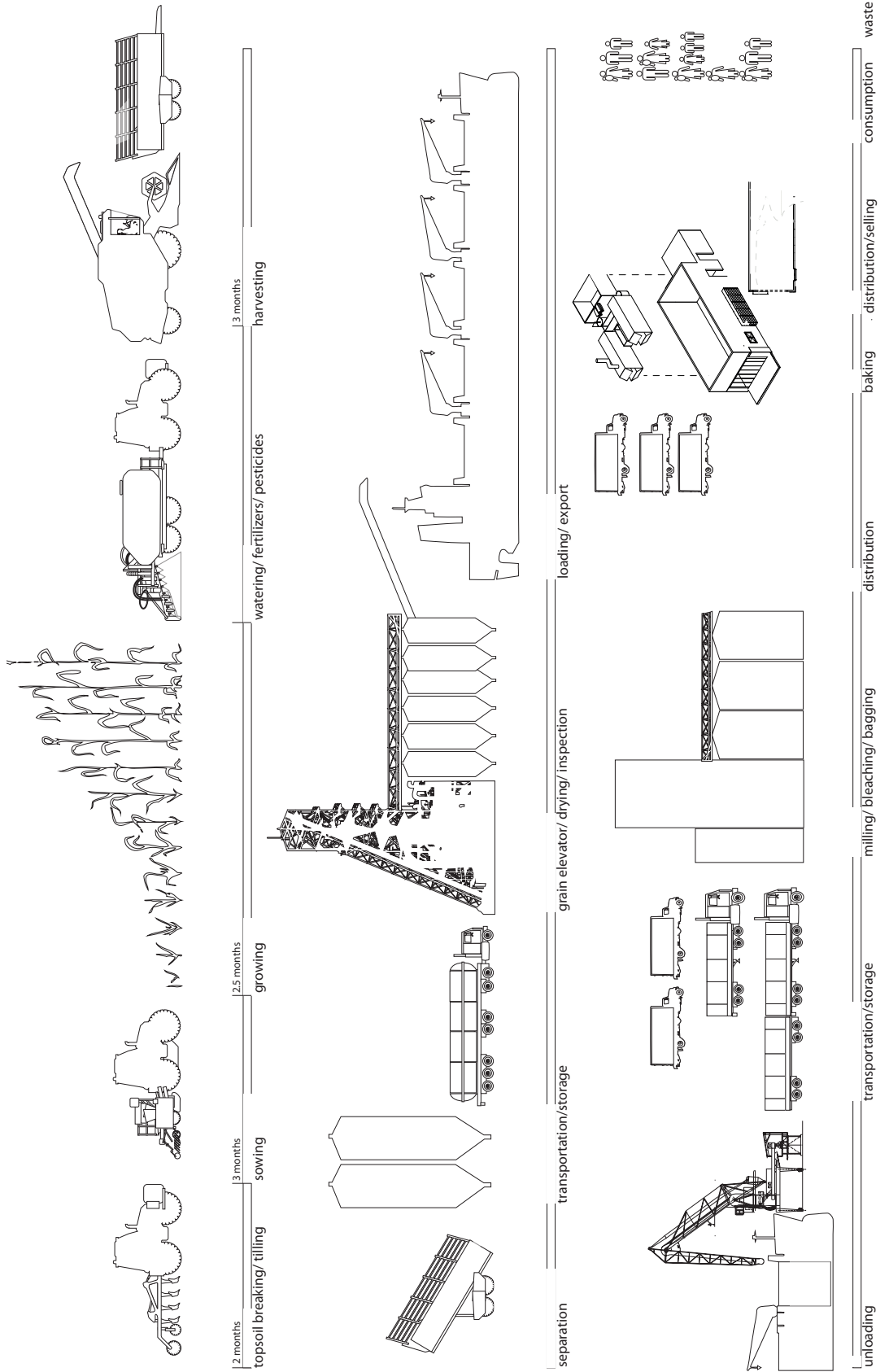


WAGENINGEN
UNIVERSITY & RESEARCH

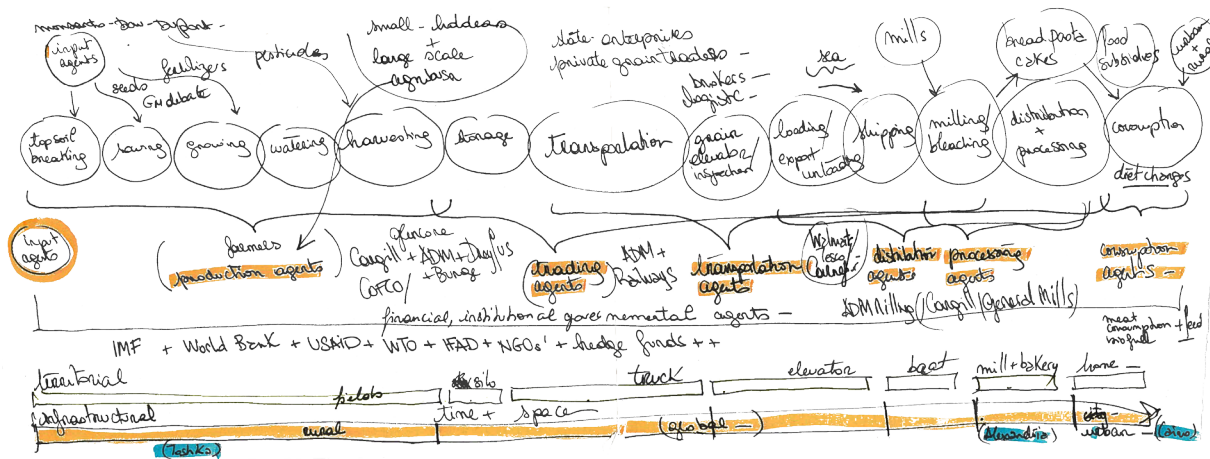
UC DAVIS
UNIVERSITY OF CALIFORNIA



Also instrumental to the production of knowledge on agriculture, food and biotechnology, universities are prominent institutional agents (Official websites).



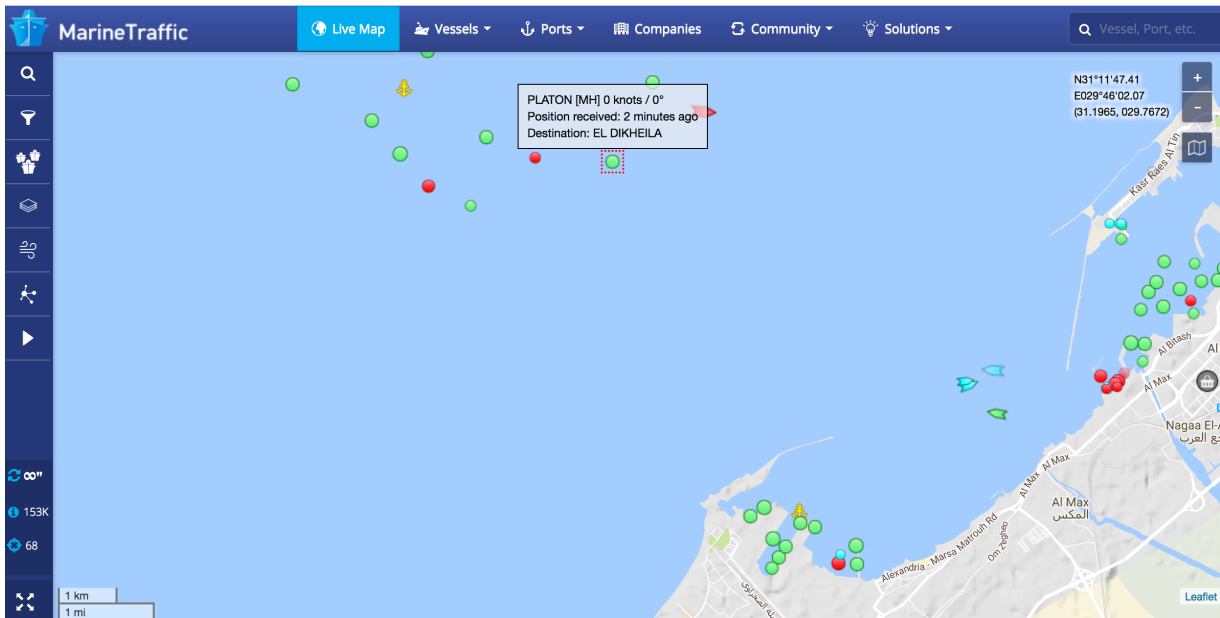
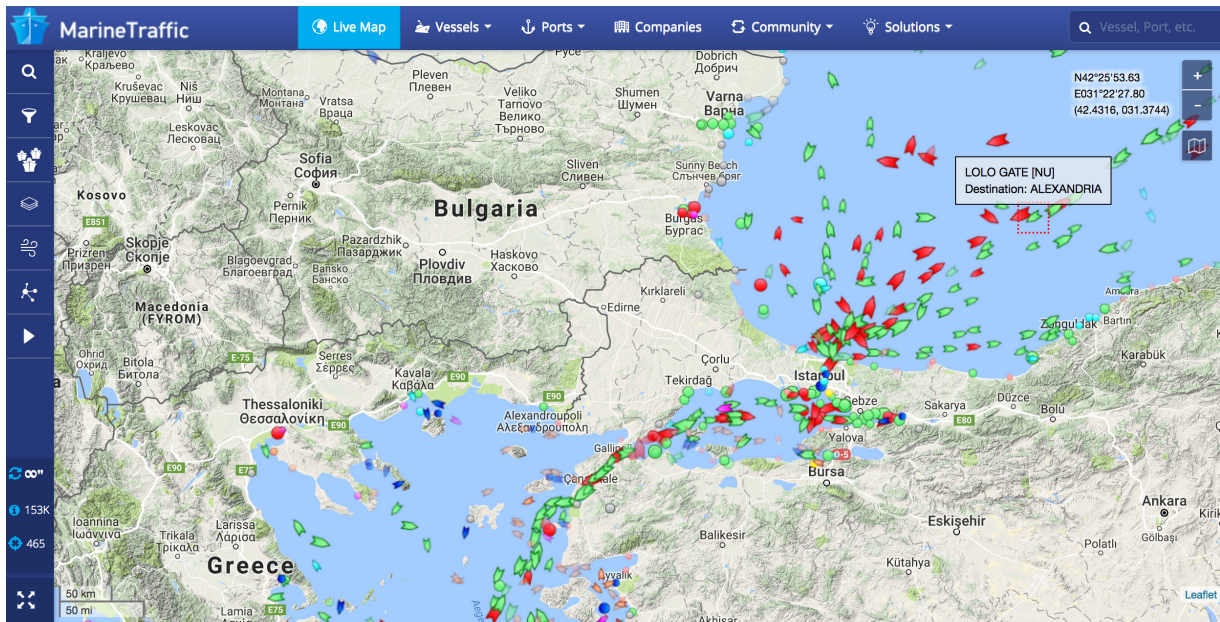
Grain chain: From seed to mouth, every step.
(Source: Author)



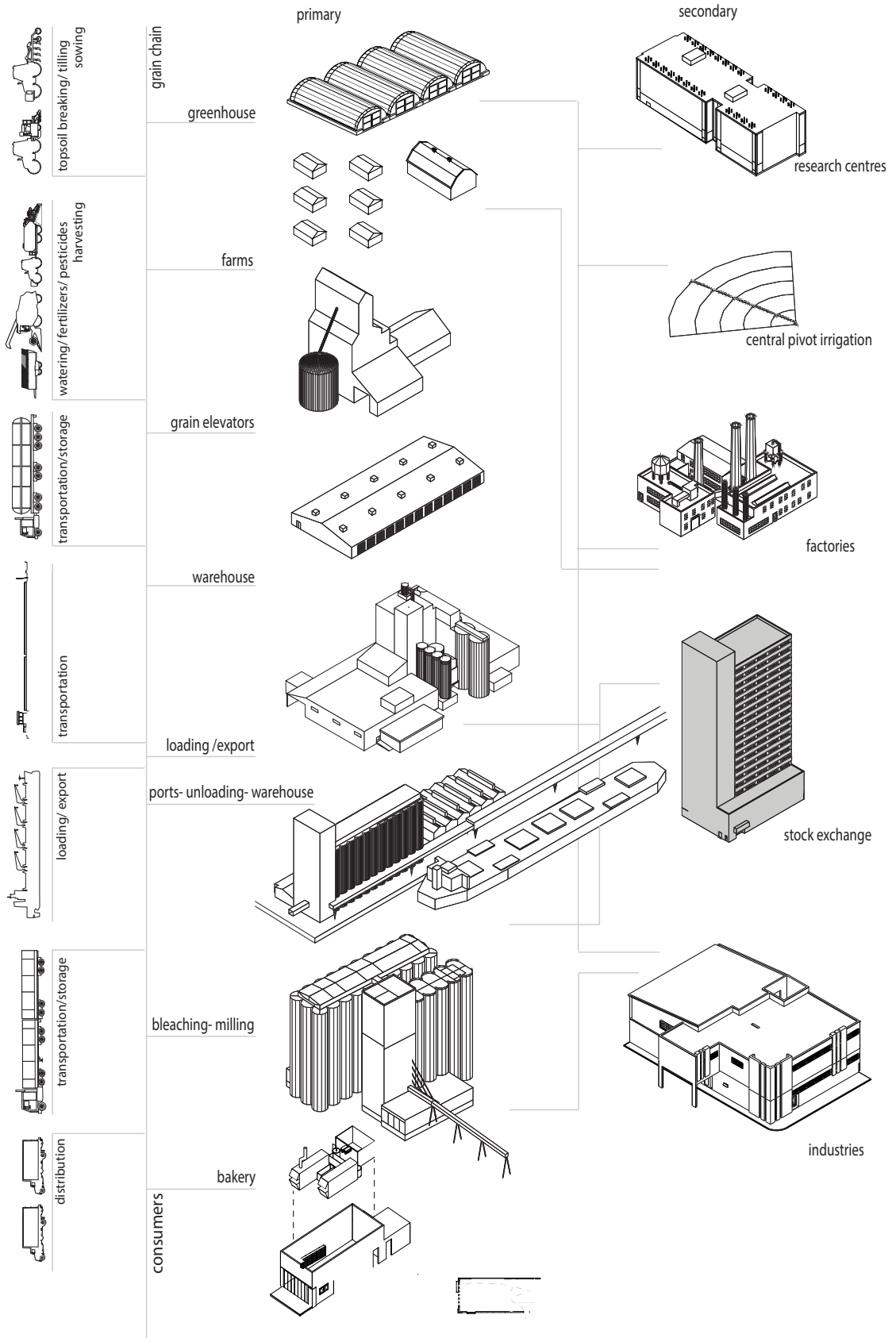
Flows of grain (Author sketch)



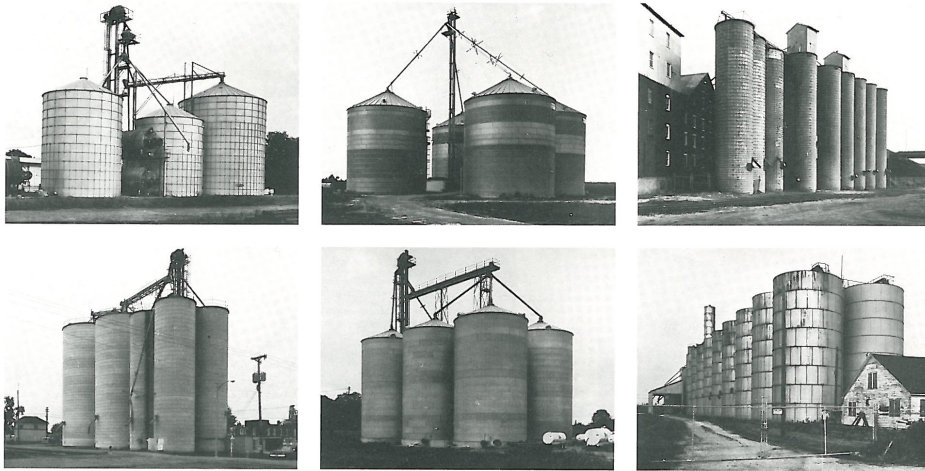
Grain chain: From seed to mouth, every agent involved. (Source: Author)



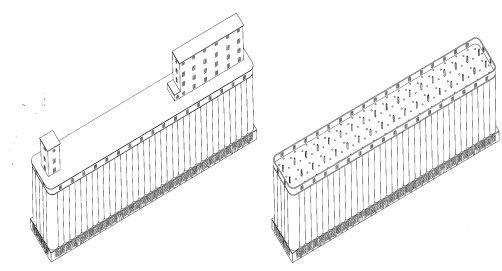
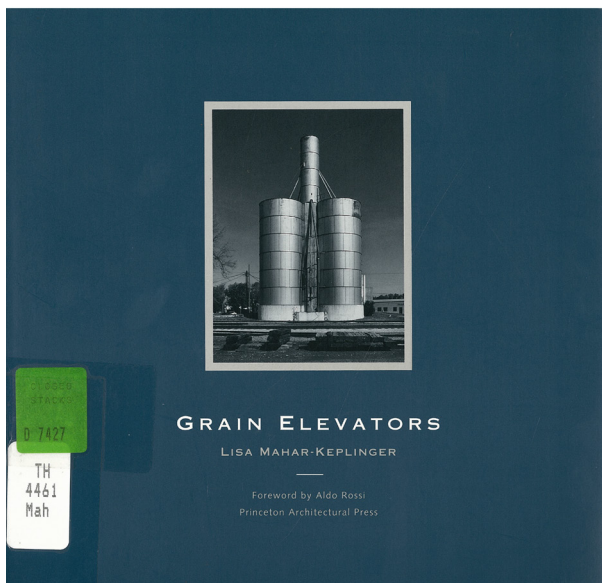
“Live Ships Maps,” ed. Marine Traffic (Nicosia, Cyprus: Maltenoz Limited).



Grain chain: Territorial impacts (Source: Author)



USA Fotos 1977



The Concrete Urban Elevator

The function of the urban elevator is to store the grain it has received from smaller rural elevators until it can be sold to processors. A typical urban elevator is made of concrete and has four distinct levels which are easily identified from the exterior: the work floor, located at ground level; the storage bins, defining the bulk of the building; the distributing floor, directly above the bins; and the headhouse, the isolated structure on top of the building. The concrete elevator illustrated in the four drawings above is in Brooklyn, New York and was built in 1922.

It is 408 feet long, 70 feet wide, and 110 feet high. It has 54 circular bins, 38 star-shaped bins, and 38 suter bins. The structure was poured as a monolith over a period of fourteen days by over 300 workers.

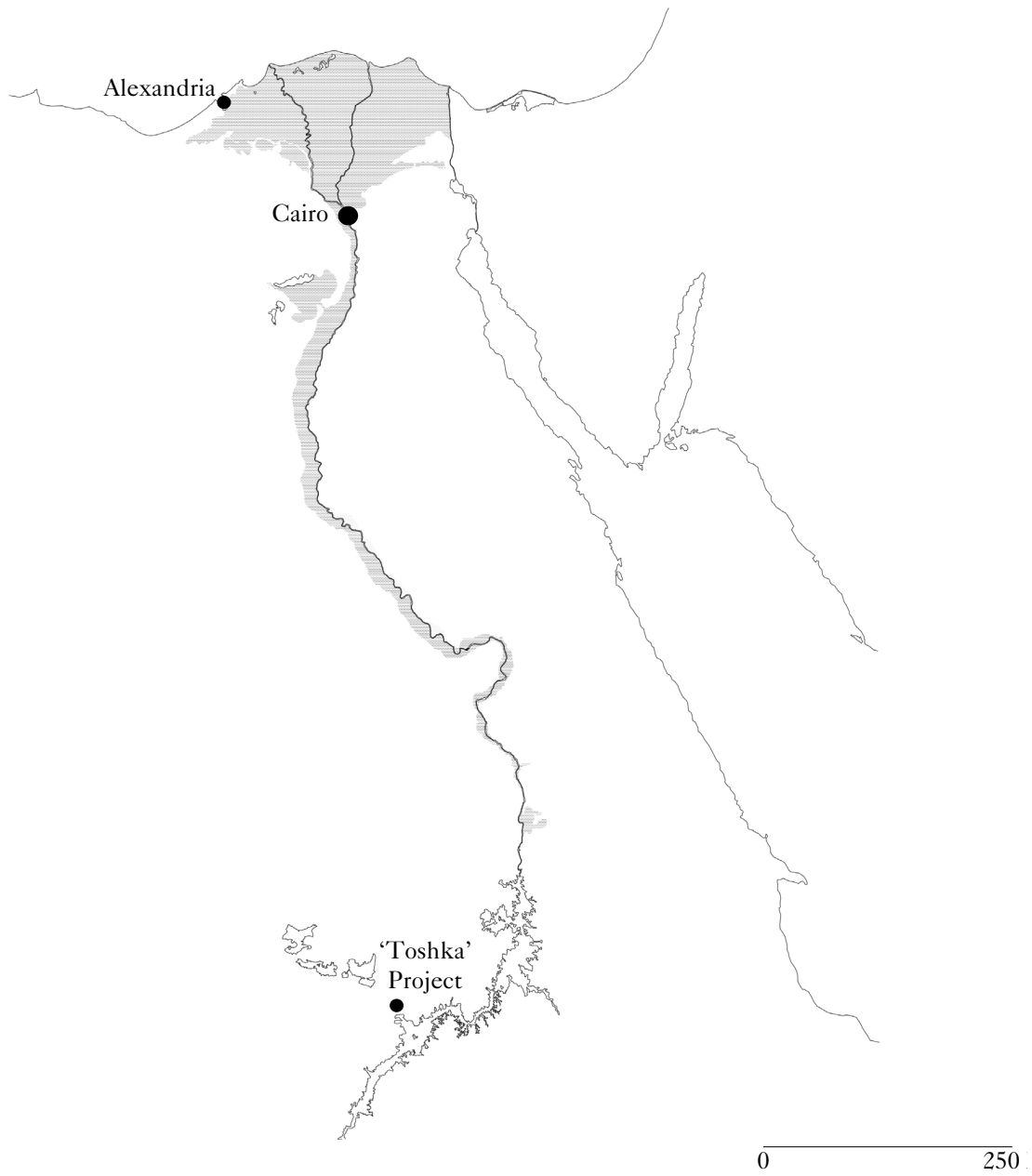
Distributing Floor

Located just above the main bin structure, the distributing floor is easily identified from the exterior by the large windows which span across its length. These windows provide ventilation to an area prone to grain-dust explosions. After the grain has been weighed and sorted in the headhouse it is organized and distributed into the bins here. The grain is carried along the length of the floor by conveyor belts until it reaches the appropriate bin. It is then directed down into a small hole in the floor by a rotating spout. Bin contents are recorded on a chalkboard (see opposite page, bottom left) that lists specific information about the grain: the type and amount, the company to which it belongs, the date it was stored, and the bin number.

It is 408 feet long, 70 feet wide, and 110 feet high. It has 54 circular bins, 38 star-shaped bins, and 38 suter bins. The structure was poured as a monolith over a period of fourteen days by over 300 workers.

Grain elevators (Bernd & Ina Becher, 1977)

Grain Elevators (Lisa Mahar-Keplinger, Princeton Press, 2008)



Map of Egypt with the location of the 3 case studies.
(Source: Author)



The current food regime finds its origins in the US New Deal commodity programs, when chronic food surpluses were re-routed in the form of exports into the world economy. The specific mechanisms of these distributions were designed for the first time in the Marshall plan for foreign aid to Europe.

For a New Deal

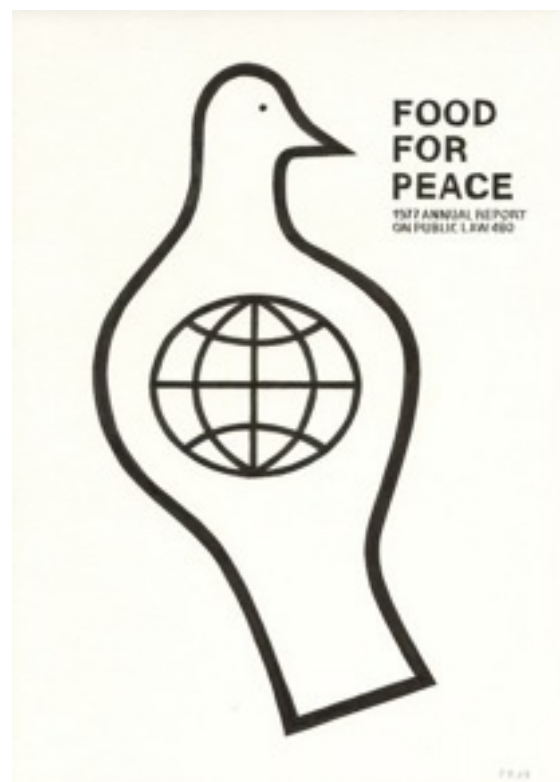
United States Agency for International Development.



American grain surpluses were poured into the reconstruction of destroyed France, Germany etc- An example of the long-term plan of the surplus regime is the promotion of meat diets and livestock wheat consumption, which guaranteed a constant demand for further cereal imports- a market.

For European Recovery, supplied by the United States of America

Food for Peace (PL 480)



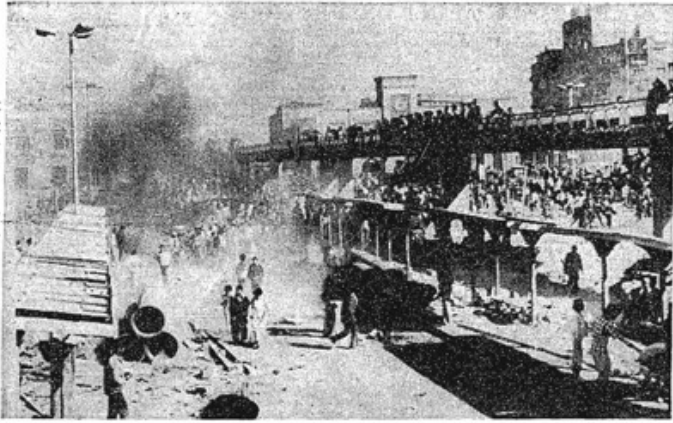
CASE 1: FOOD SUBSIDIES
AND URBAN SPACE,
ALEXANDRIA



Consolidating food subsidies

Gamal Nasser, Anouar Sadat, Ali Sabri and Hussein Shafei (Source: Gamal Abdel Nasser Foundation, 1968)

Anouar Sadat and Hosni Mubarak at Camp David (Source: Getty Images, 1979)



Smoke hanging over Ramses Square in Cairo as rioters clashed with police and army forces on Wednesday.

Egypt's Cities Seem Calm After 2 Days of Price Riots

CAIRO, Jan. 20—Calm seemed to have returned today to Egyptian cities after two days of rioting over increased food and other prices. Basic consumer items were again selling at previous levels.

No major incidents were reported in Cairo and Alexandria. Many shops and cafes were open, but others remain shuttered. Soon after dusk, the streets that normally are noisy and crowded fell eerily silent as army checkpoints enforced a curfew for the second night.

Forty-three people were killed in the clashes Tuesday and yesterday between rioters and police and army forces, according to the official Middle East News Agency. Hundreds more were reported wounded, many students and some journalists among them, and 600, many students and some journalists among them, were said to have been arrested in Cairo and Alexandria.

Riots Began in Alexandria
The riots started Tuesday in Alexandria, which has a reputation for left-wing militance, when thousands took to the streets to protest a Government announcement increasing the price of many staple foods and other basic consumer goods by 50 to 100 percent while giving an across-the-board wage increase of 23 percent.

The riots spread to Cairo and its suburbs including Helwan, the site of a large iron and steel plant enlarged with Soviet help. Rioting was reported also in Suez City and other provincial towns. As far away as Arwa, in southern Egypt, triumphal arches for a visit by President Tito

of Yugoslavia, now canceled, were burned.

The rioters' wrath was clearly directed at least in part against President Anwar el-Sadat and his closest associates. A mob surged up to his villa in Giza, a residential quarter of Cairo, and threw rocks. The home of Vice President Husni Mubarak in Alexandria was sacked, according to reports from that city.

The social aspect of the explosion was also clear. Big American and German cars—symbols of wealth in Egypt—were the favorite targets of rock throwers and arsonists. Several nightclubs along the boulevard leading to the pyramids were sacked and burned. At the nightclub Auberge des Pyramides hundreds of empty whiskey bottles stood neatly lined up along a wall while workers cleared the burned, broken and trampled furnishings. Lying on a pile of broken glass was a picture of President Sadat, its frame and cover smashed and with crossed lines slashed across it.

The Anger Was Disipated
The curious gathered at the gates, but the anger of the past two days was gone. The nightclubs are symbols of foreign influence and excesses. Wealthy Saudi Arabians, in particular, go there for pleasures not available at home.

Elsewhere in the city there were long lines waiting to buy the bottled gas that nearly everyone who can afford it uses to cook and heat. On Monday the cost

went from \$1.60 to \$2.40; today it was back to \$1.60.

In downtown Cairo workers swept the streets of bricks and glass, and what remained was hard to distinguish from the ordinary rubble of this worn city. Soldiers armed with machine guns were stationed at strategic spots, with orders to shoot to kill rioters.

An armored personnel carrier was waiting with troops in Zamalek near the spot where Gamal Abdel Nasser made his headquarters for the revolution of 1952, when the monarchy was overturned. Student demonstrators carried Mr. Nasser's picture and chanted his name and shouted derisive slogans against Mr. Sadat.

A few blocks away an old man who sells string watched children playing in the burned wreckage of a bus. Referring to the rioters, he said: "They do not do this because they are hungry. How do they eat from this? This was work of troublemakers."

On the same street a man was selling hand-made tools from a cart. While the rioters attacked government shops, police and fire stations, they left his little open cart and others beside it alone, he said.

Lifting of Curfew Forecast
CAIRO, Friday, Jan. 21 (Agence France-Presse)—The semi-official newspaper Al-Ahram said today that Egyptian authorities planned to lift the curfew within the next 24 hours after two days of riots.

Cairo Reaps a Wind

Sadat Weathers His Worst Social Upheaval, But Economic Problems Don't End With Riots

By HENRY TANNER

CAIRO, Jan. 20—President Anwar el-Sadat, with the help of regular soldiers of the Egyptian Army, has succeeded in putting down the worst social unrest he has had to face since he took office in 1970. While the rioting Tuesday and yesterday over increased prices of food and other basic consumer goods has apparently ended, the question of its effect on Mr. Sadat's program for economic and political liberalization remained unresolved.

Diplomats pointed out that the policies that led to the riots had been supported, and to a degree, inspired by the United States. Mr. Sadat's most powerful backer.

They noted, however, that there appeared to be a tentative first indication that President Sadat does not now intend to rescind his policies on political liberalization, which led to new freedom for the press and the formation of a line of political parties that were abolished 25 years ago.

This occasion was drawn from the unusually unsparring coverage of the rioting by the state television network and the Egyptian newspapers. Today the newspapers carried large pictures of the rioting on their front pages. In a news program last night, the TV network showed films of the Cairo nightclubs, a downtown Cairo landmark, ablaze—the work of rioters.

'Open-Door' Policy in Doubt
Bowing to the pressure of the violence yesterday, Mr. Sadat revoked the price increases that touched off the trouble after subsidies for key consumer items were summarily cut off by the Government on Monday. The developments of the last two days, however, left in question whether he would be able to continue his "open-door" economic policy, which ties him to the West and particularly to the United States.

The price increases had been urged upon President Sadat by the International Monetary Fund, the United States Government, American private banks that are his creditors and the governments of Saudi Arabia and Kuwait, on which he depends financially.

Many Egyptians and foreigners here today said that these recommendations had now proved inapplicable because they destroyed Egypt's internal stability. Sweet tea, bread, cigarettes and conversation are among the main daily pleasures of the poor urban Egyptian, and butane gas for cooking is among the most dire necessities. The announced price increases put all of these things except conversation out of reach for many thousands of already hard-pressed families.

A Promise to Monetary Fund
Last spring, I.M.F. negotiators obtained from Cairo a promise that it would scale down its huge annual subsidies for basic food and would start adjusting the unrealistically high rate of the Egyptian pound in exchange for a loan from the fund. And that, in turn, would have signaled to Western investors that Egypt could now be trusted.

But even then, there were signs of public unrest as low-income Egyptians, whose minimum wage is about \$40 a month at the official rate, realized that the proposed reforms would hit them hardest.

The Government then decided not to follow through on the I.M.F. recommendation. Egypt's basic financial problem—namely, that it generates nowhere nearly enough income to cover its needs—thus remained unscathed.

This winter, again, negotiators from the fund came to Cairo with pleas for belt-tightening. Similar pressures from the United States were reported.

Ten days ago, Foreign Minister Imrabi Fahmy sharply walked out of a conference with Saudi and Kuwaiti officials whom they made financial support for Egypt dependent on reforms along the line suggested by the fund.

Today, the Financial Commission of the Egyptian People's Assembly took the two-day riots as an occasion for an appeal to all of Egypt's financial backers, including the United States, to increase their aid.

In the view of some diplomats here, the specter of a leftist ascendancy in Egypt, the linchpin of the Arab world, may well frighten the conservative Saudis and Kuwaitis into deciding to give a few hundred million dollars more to Mr. Sadat.

Similarly, diplomats here fear, the riots placed a new burden on the United States. So far the American connection has just not brought any visible results as far as the average Egyptian is concerned.

Two annual aid programs of nearly \$1 billion have had no visible impact on Egyptian living standards, though last year American food shipments made up for large reductions in the Cairo Government subsidies for food.

Final Fact Reassessed
In foreign affairs, American support has brought back to Egypt a narrow strip of Israeli-occupied territory in the Sinai peninsula, and many Egyptian officials now wonder whether that was worth the year-long feud with Syria, which felt that it had been abandoned by Egypt in the diplomatic maneuvering against Israel.

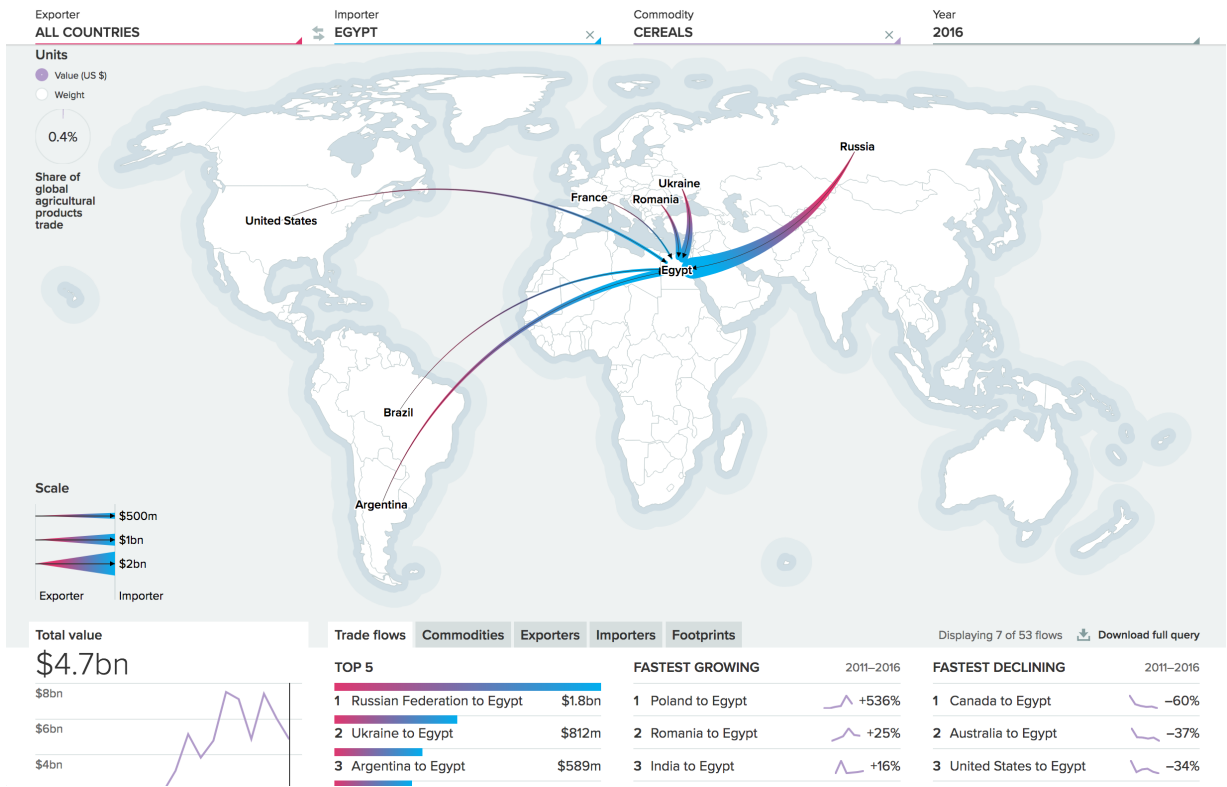
The subtle diplomacy of Secretary of State Henry A. Kissinger, who negotiated the Egyptian-Israeli disengagement agreement, had raised far greater expectations here.

As far as can be ascertained, there were no shouts, during rioting Tuesday and yesterday, of "Down with the United States!" But, Western diplomats say, inasmuch as some rioters shouted "Down with Sadat!" and "Long live Nasser!" they passed judgment on Mr. Sadat's American ties.

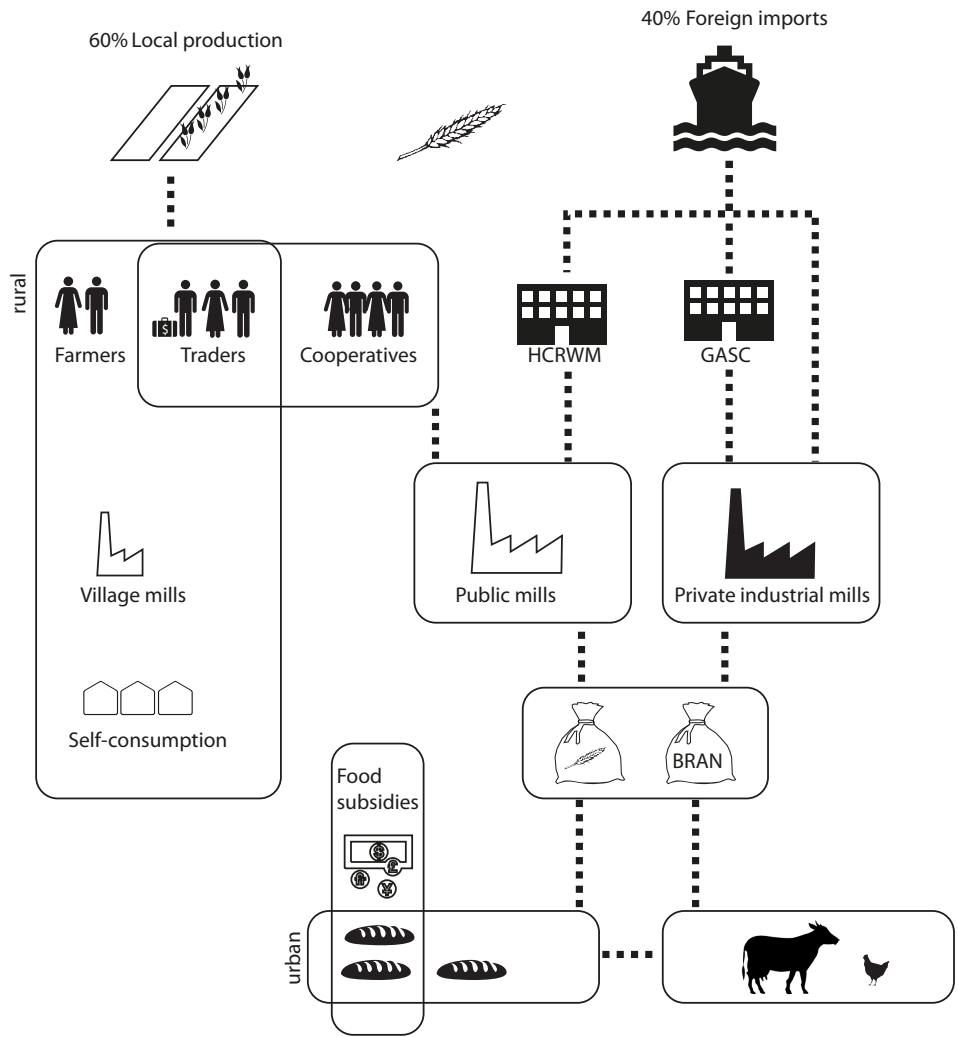
The army was brought in on the second day. According to all accounts, it acted effectively and in complete loyalty to the Government. The army is thus disclosed as one of President Sadat's main sources of power.



Egypt's Cities Seem Calm After 2 Days of Price Riots
The New York Times, January 1977
Mahallah riots, 2008 (Nasser Nour)



Map of volumes of global wheat exports, origin and percentage of Egypt's imports (Source: World Bank, 2017)



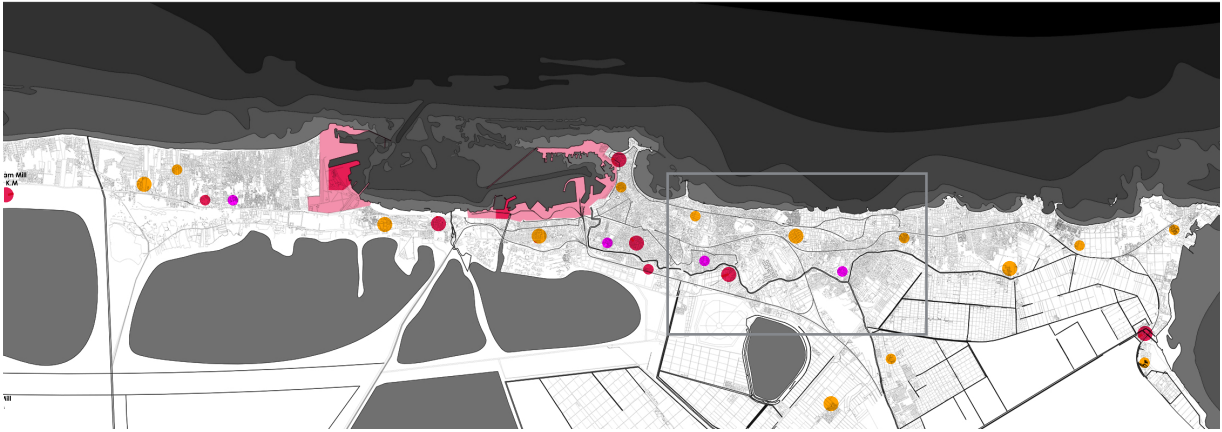
Structure of the Egyptian wheat industry (Source: Studio Basel & Author, 2009-2013)



Port of Alexandria, 2009
(Source: Port of Alexandria Website)

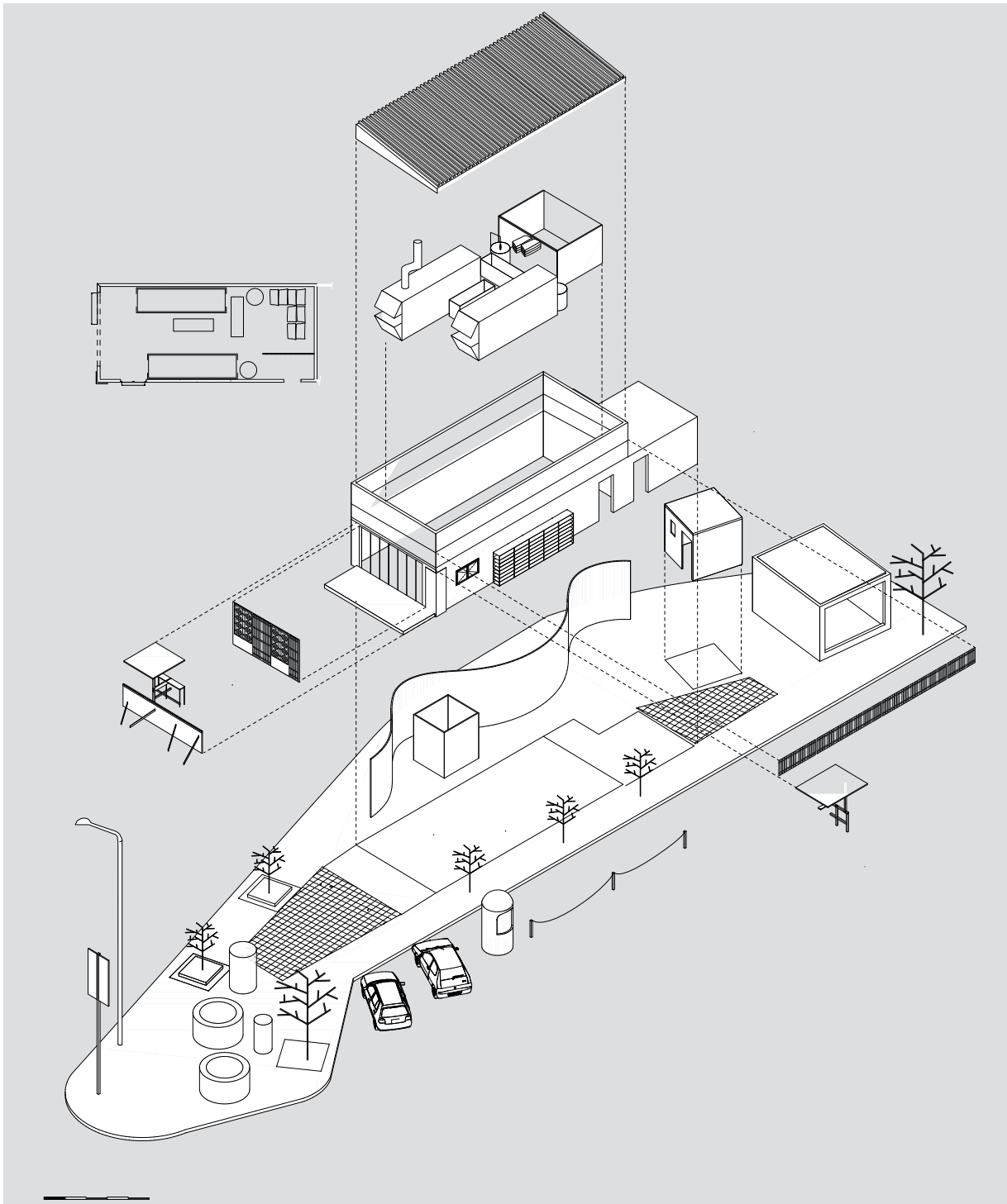


Main silo, Port of Alexandria, 2013
(Source: Author)



Map of Alexandria Milling Facilities, 2013
(Source: Mohammed Ossama & Bassant Morsy,
Author)

Alexandria Mills (Source: Mohammed Ossama &
Bassant Morsy)



Gleem bakery, Alexandria (Source: Author)



Gleem bakery, Alexandria

Mandatory panel outside Gleem bakery, Alexandria
(Source: Author)

محافظة الإسكندرية
مديرية التموين والتجارة الداخلية
ادارة شؤون التموين

بيان المخابز البلدية النصف الية التابعة لمشروع المحافظة

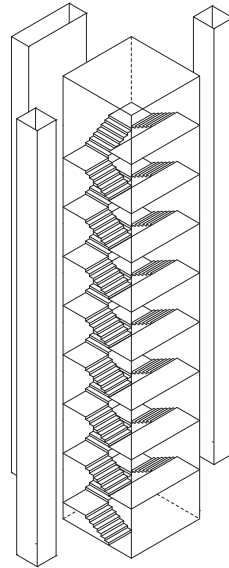
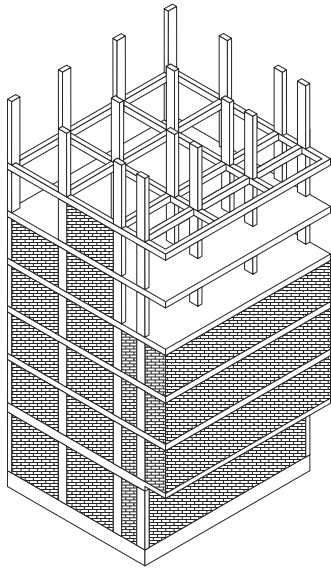
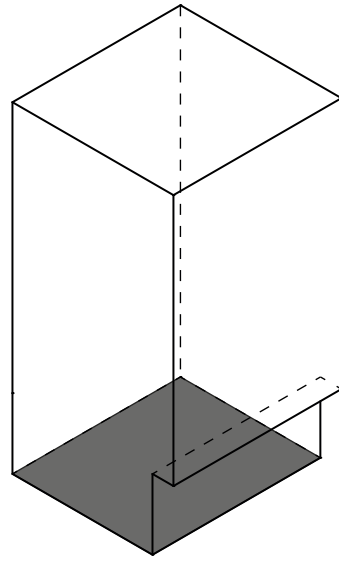
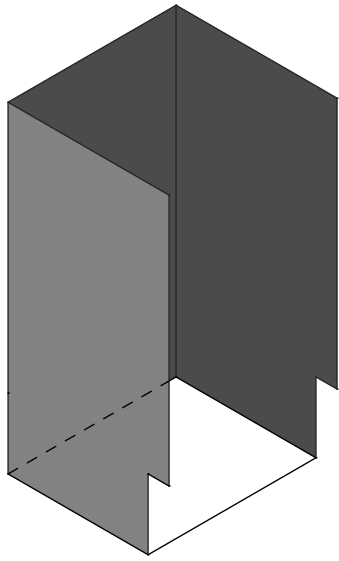
م	اسم المخبز	العنوان	الحي	عدد الخطوط	تاريخ التشغيل	ملاحظات
١	السهاجرين	عزبة السهاجرين	المتنزه	١	٢٠٠٨/٨/١٠م	
٢	طلعت مصطفى	ساكن طلعت مصطفى	المتنزه	١	٢٠٠٨/٨/١٠م	
٣	الحرسين	ساكن الحرسين	المتنزه	١	٢٠٠٨/٨/١٠م	
٤	الجزيرة الحضراء (١)	ارض الملعب	المتنزه	١	٢٠٠٨/٨/١٧م	
٥	سحيز ايكا	ساكن ايكا	شرق	١	٢٠٠٨/٨/٨م	
٦	مخبز كوبري الناموس	الكوبري امام الصرف الصحي	شرق	١	٢٠٠٨/٨/٨م	
٧	القلعة	القلعة حجر انثوائية	شرق	٢	٢٠٠٨/٨/٨م	
٨	عزب الجمهورية	ساكن عزب الجمهورية	وسط	٢٠	٢٠٠٨/٨/٢م	
٩	مخبز طوسون (١)	ساكن طوسون	وسط	١	٢٠٠٨/٨/٩م	
١٠	امبروز (بن خاسع)	شارع الجمال	وسط	١	٢٠٠٨/٨/٩م	
١١	مخبز طوسون (ب)	ساكن طوسون	وسط	١	٢٠٠٨/٨/٩م	
١٢	مدينة العرائس	مدينة العرائس	غرب	١	٢٠٠٨/٨/٩م	
١٣	مخبز الكيلو ٢٦	ساكن الكيلو ٢٦	العامة	١	٢٠٠٨/٨/٩م	
١٤	الناصرية	اليوتاجاز	العامة	١	٢٠٠٨/٨/٩م	
١٥	زاوية عبد القادر	زاوية عبد القادر	العامة	١	٢٠٠٨/٨/٩م	
١٦	النورين	امام مترسة النورين - التحطة الجينز	العجمي	١٠	٢٠٠٨/٨/٢٥م	
١٧	برج العرب القديم	برج العرب القديم	برج العرب	٢	٢٠٠٨/٨/١٠م	
١٨	لميح	برج العرب	لميح	٢	٢٠٠٨/٨/١٠م ٢٠٠٩/٢/٣م	
١٩	درباله	شارع من سلامة- درباله	المتنزه	١	٢٠٠٨/٨/١٠م	
٢٠	الجزيرة الخضراء	ارض الملعب	المتنزه	١	٢٠٠٩/٢/٣م	
٢١	امين سهلان	امين سهلان - الوردان	غرب	٢	٢٠٠٩/٢/٣م	



Mapped bakeries, East district, City of Alexandria
(Source: Mohammed Ossama & Bassant Morsy, 2013)

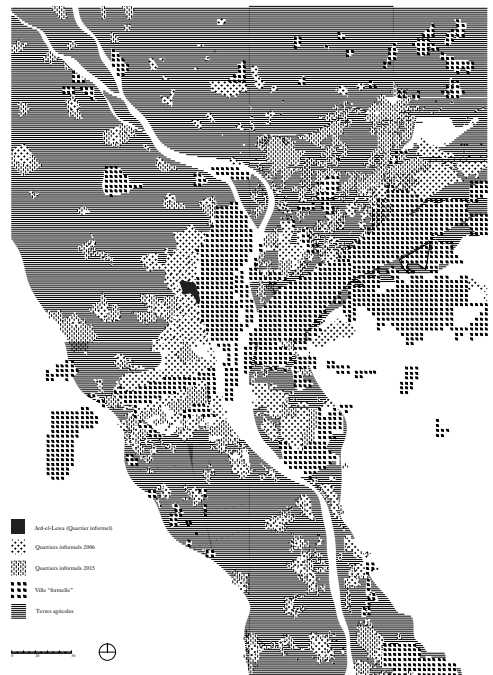
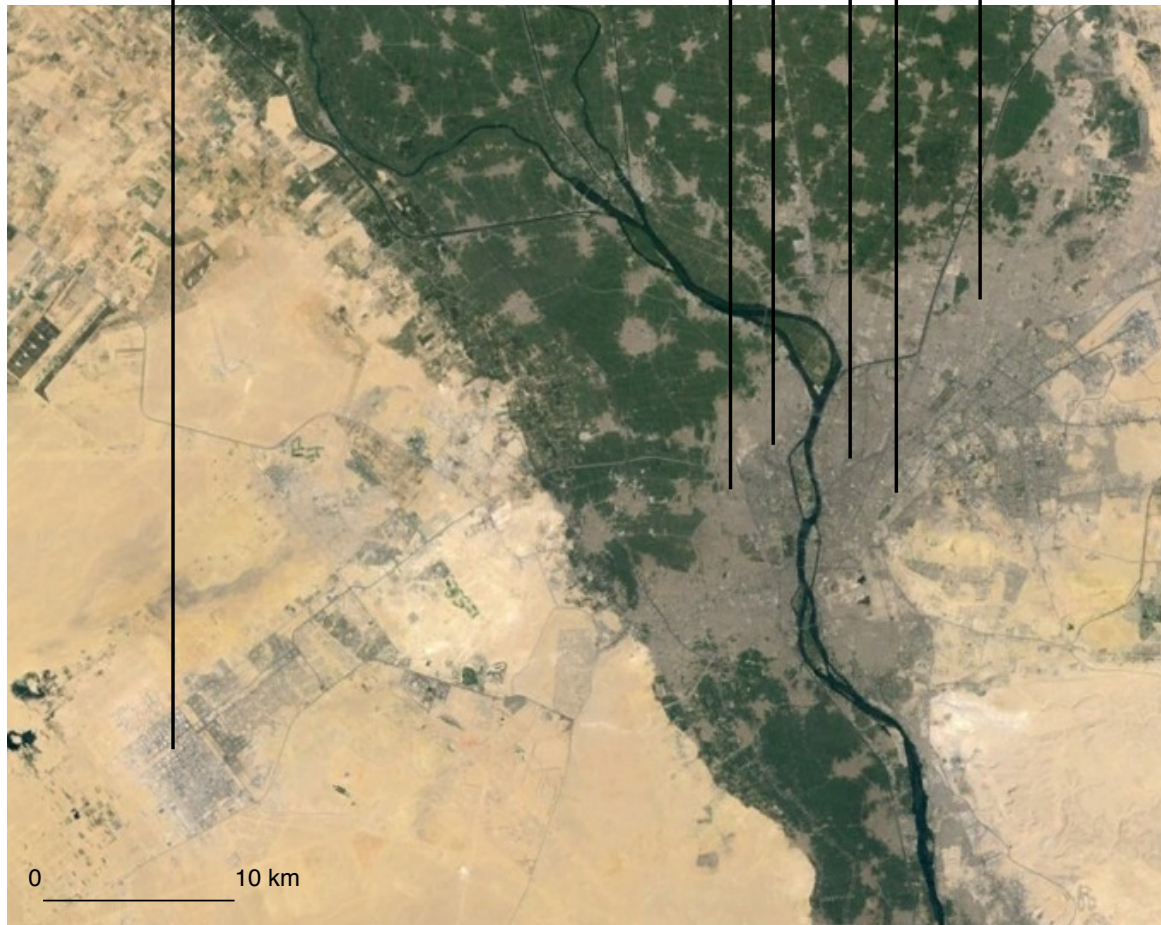
Bread lines outside public bakeries in Cairo

CASE 2:
FOOD PRODUCTION AND
URBANIZATION, CAIRO



Urbanization process (Source: Housing Cairo, Ruby Press, 2016)

6th of October City Mohandesseen Downtown Heliopolis
Ard el-Lewa Islamic Cairo



Greater Cairo, Google Earth, 2014.

Map of informal growth, 2006-2015
(Source: Housing Cairo, Ruby Press, 2016)



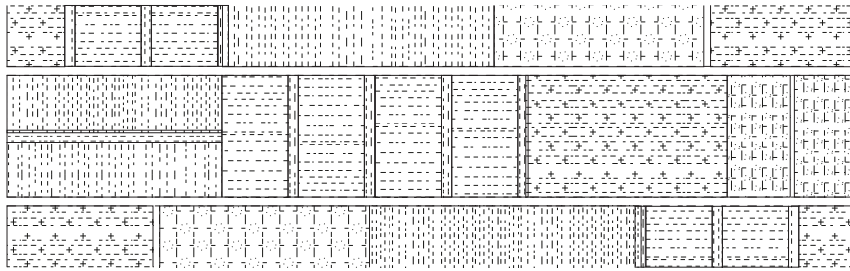
Cadastral map, showing the subdivision of agrarian land in feddans, and canals. Ard-el-Lewa, pre-1941



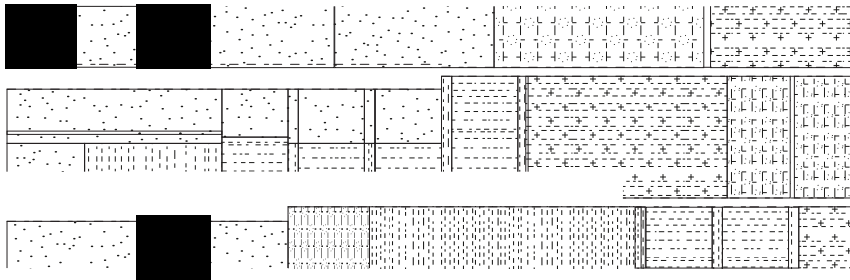
Cadastral map, Ard-el-Lewa, 1970
(Source: Housing Cairo, Ruby Press, 2016)



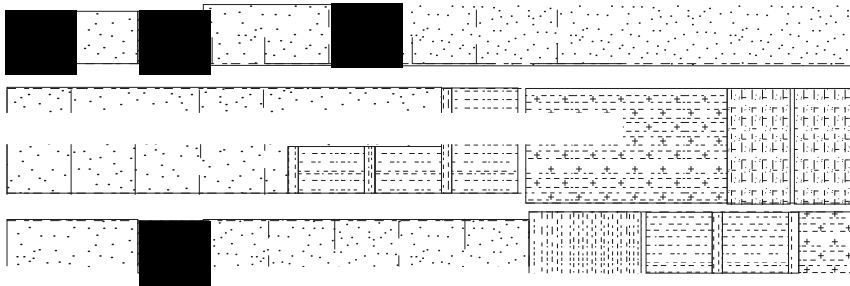
Urbanization map, Ard-el-Lewa, 2015
(Source: Housing Cairo, Ruby Press, 2016)



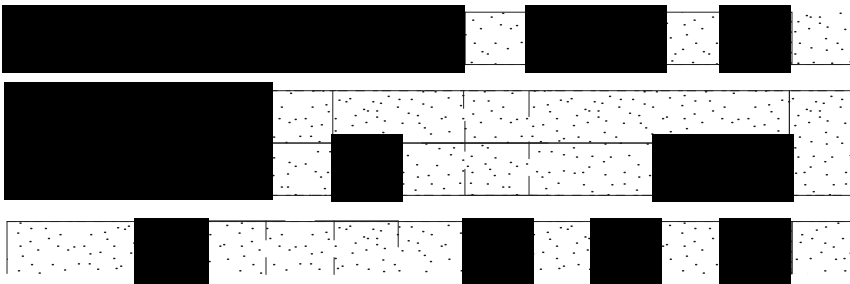
Agrarian land



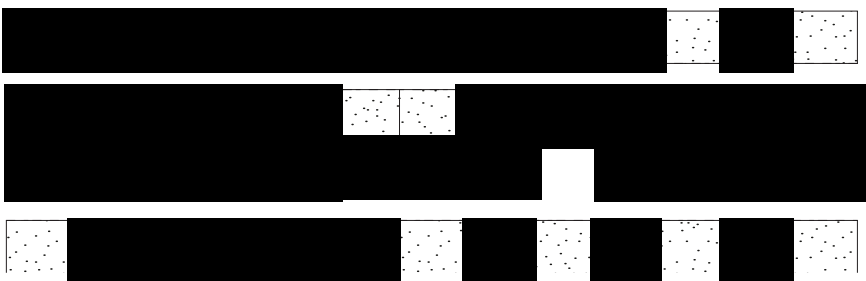
Land undergoes both farming and residential activities



Rise in construction as farming becomes less manageable and profitable

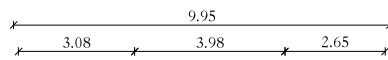
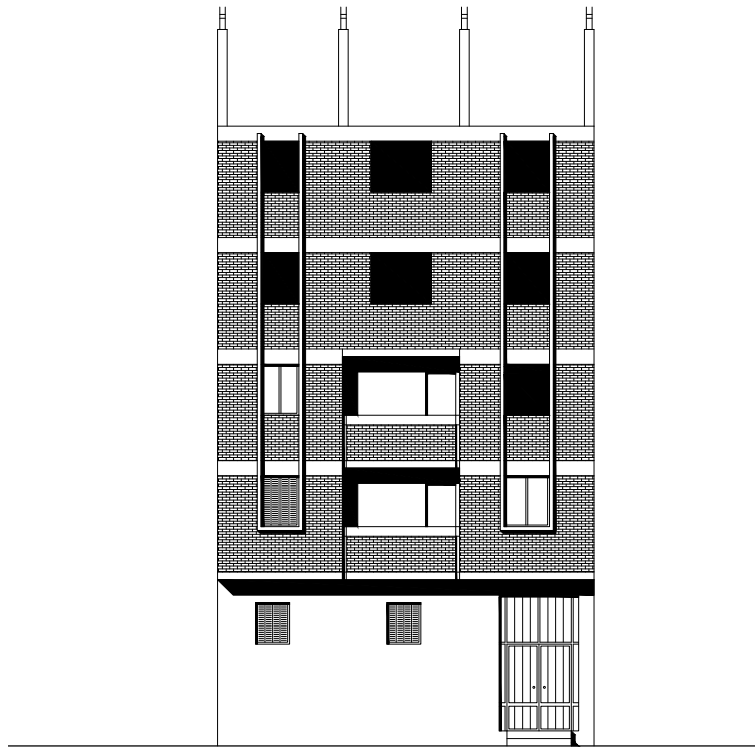


Isolated nodes are connected into an urban texture

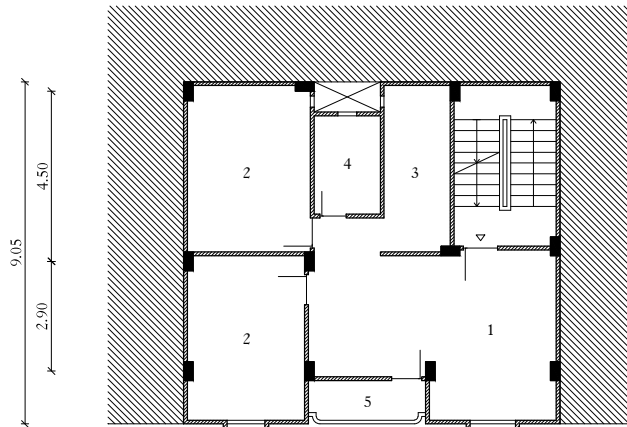


Consolidated urbanized area

Land subdivisions and processes of informal urbanization of agrarian fields (Source: Housing Cairo, Ruby Press, 2016).



1



J

- 1. Living-room
- 2. Bedroom
- 3. Kitchen
- 4. WC
- 5. Balcony

Informal architecture: typology emerging over agrarian land (Source: Housing Cairo, Ruby Press, 2016).



View over informal area of Ard-el-Lewa, 2015
(Source: Lorenz Bürgi).



Urbanization of Ard-el-Lewa, 2006-2016 (Source: Google Earth).



Residual agrarian practice and field, Ard-el-Lewa, 2015 (Source: Lorenz Bürgi).



Urbanization of Mariutiya, 2003-2016 (Source: Google Earth).



Agrarian practice and field against urbanization, Mar-
tutiyā 2015 (Source: Lorenz Bürgi).

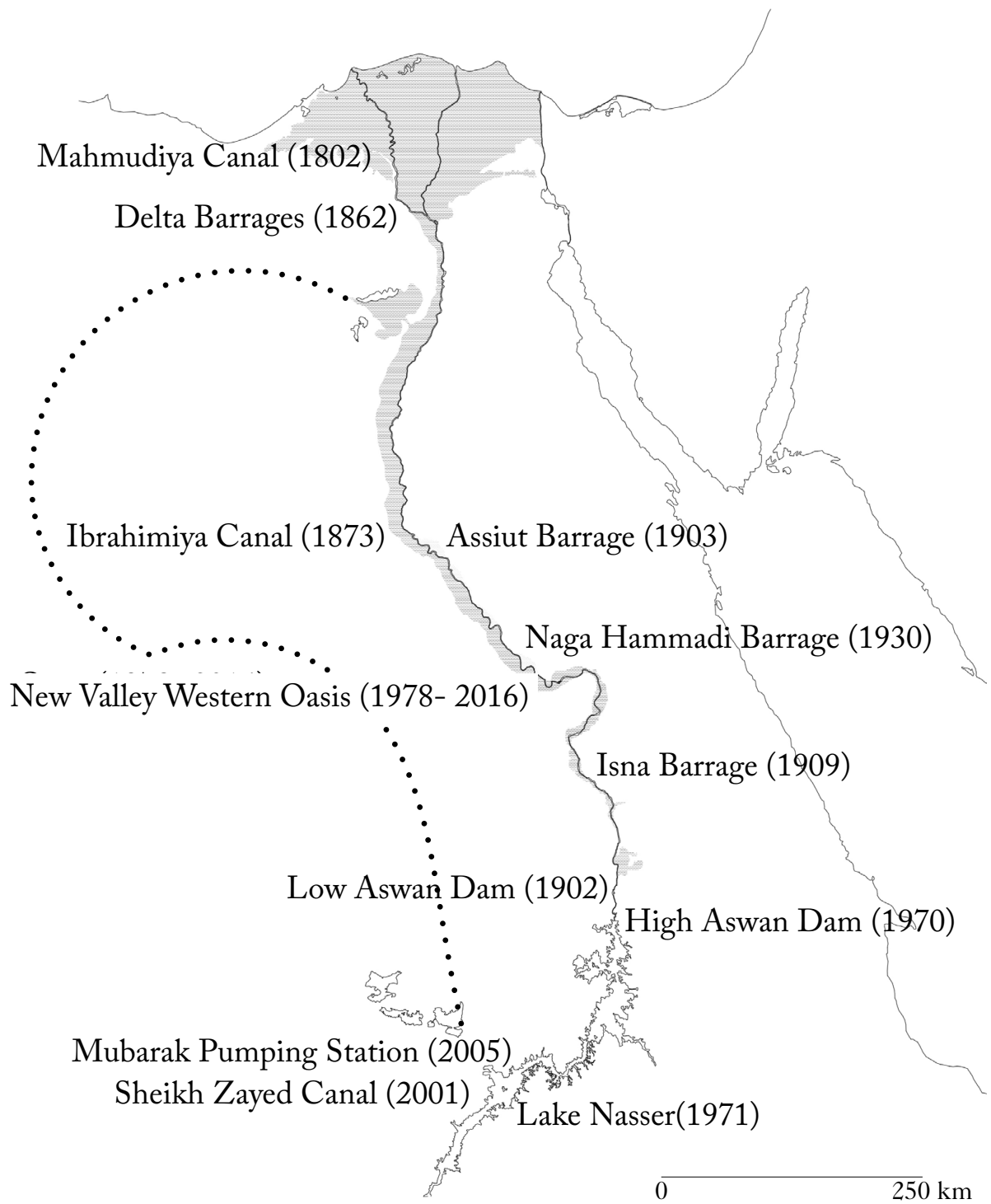


Urbanization of Mariutiya, 2003-2016 (Source: Google Earth).

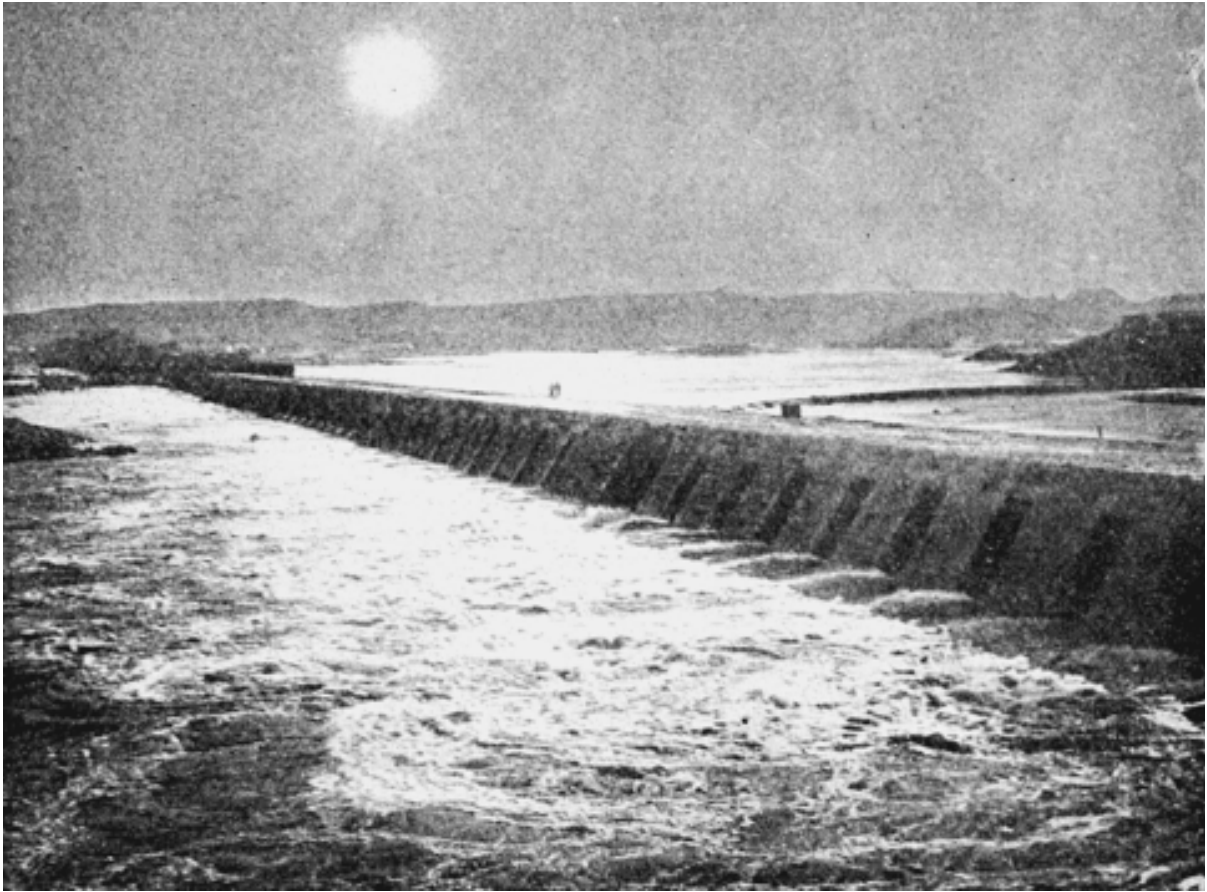


Agrarian practice, polluted irrigation channel,
Mariutiya 2015 (Source: Lorenz Bürgi).

CASE 3: FOOD SECURITY AND INFRASTRUCTURE, TOSHKAN



Chronological Infrastructure of the Nile, 1802-2005
 (Source: Author).



The Low Aswan Dam, 1900 (Getty Images)



The Assiut Barrage, 1902 (Getty Images)

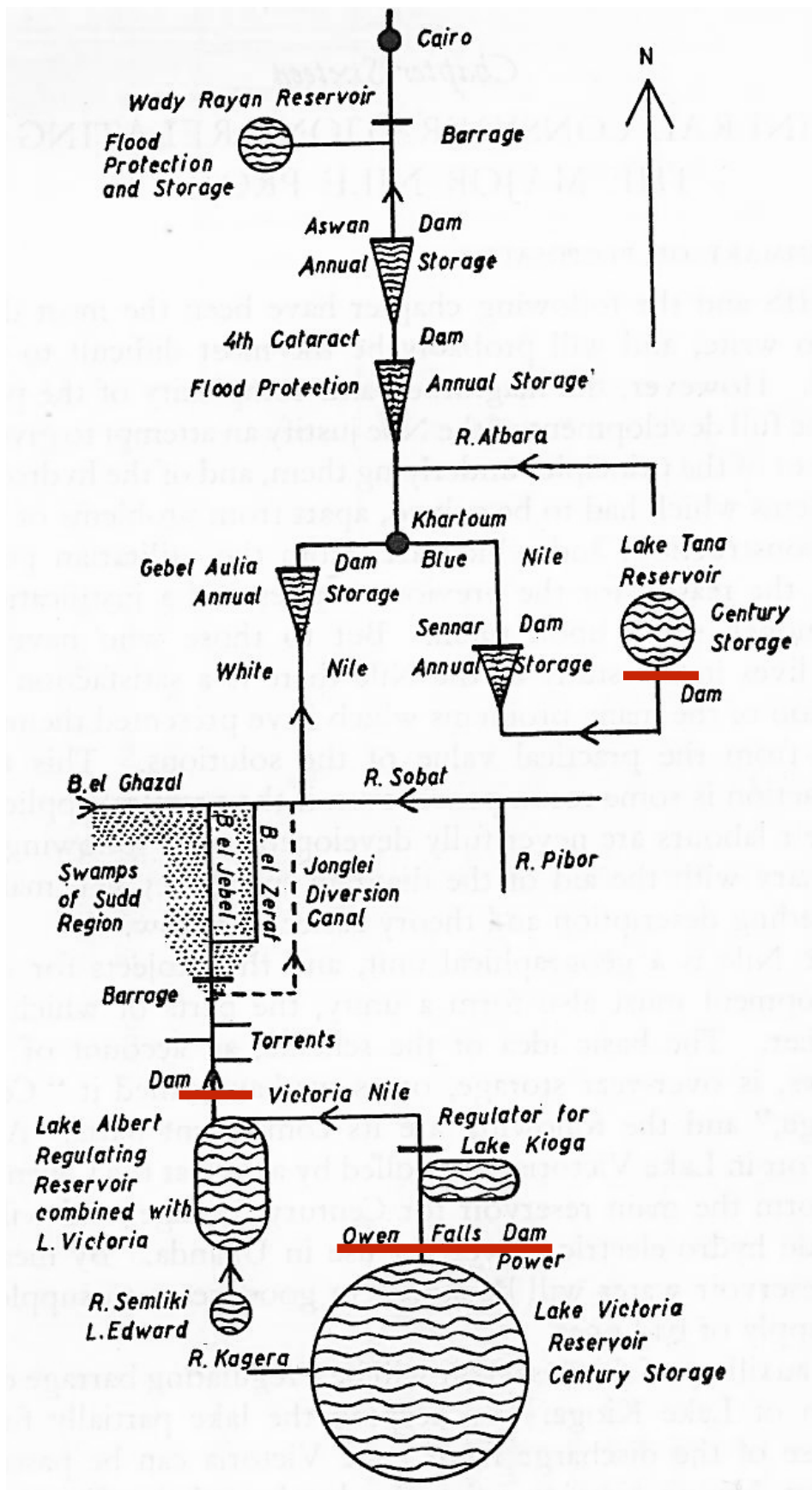
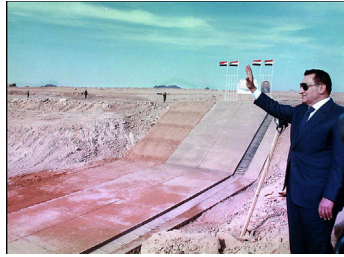


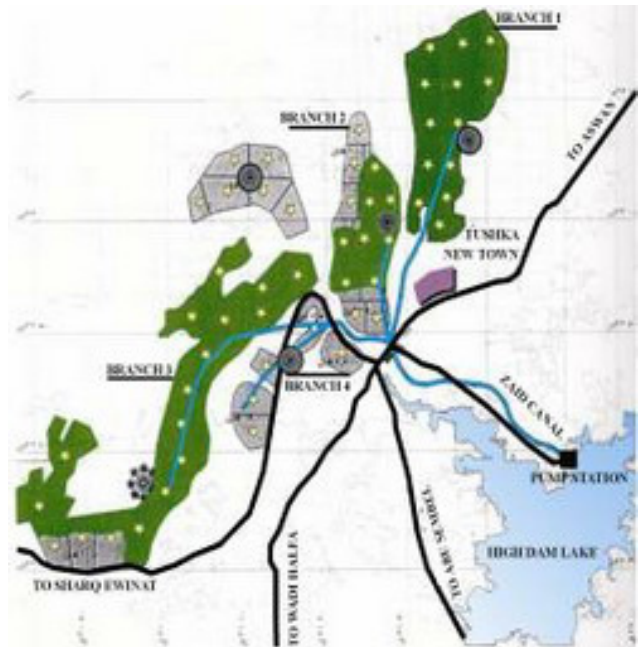
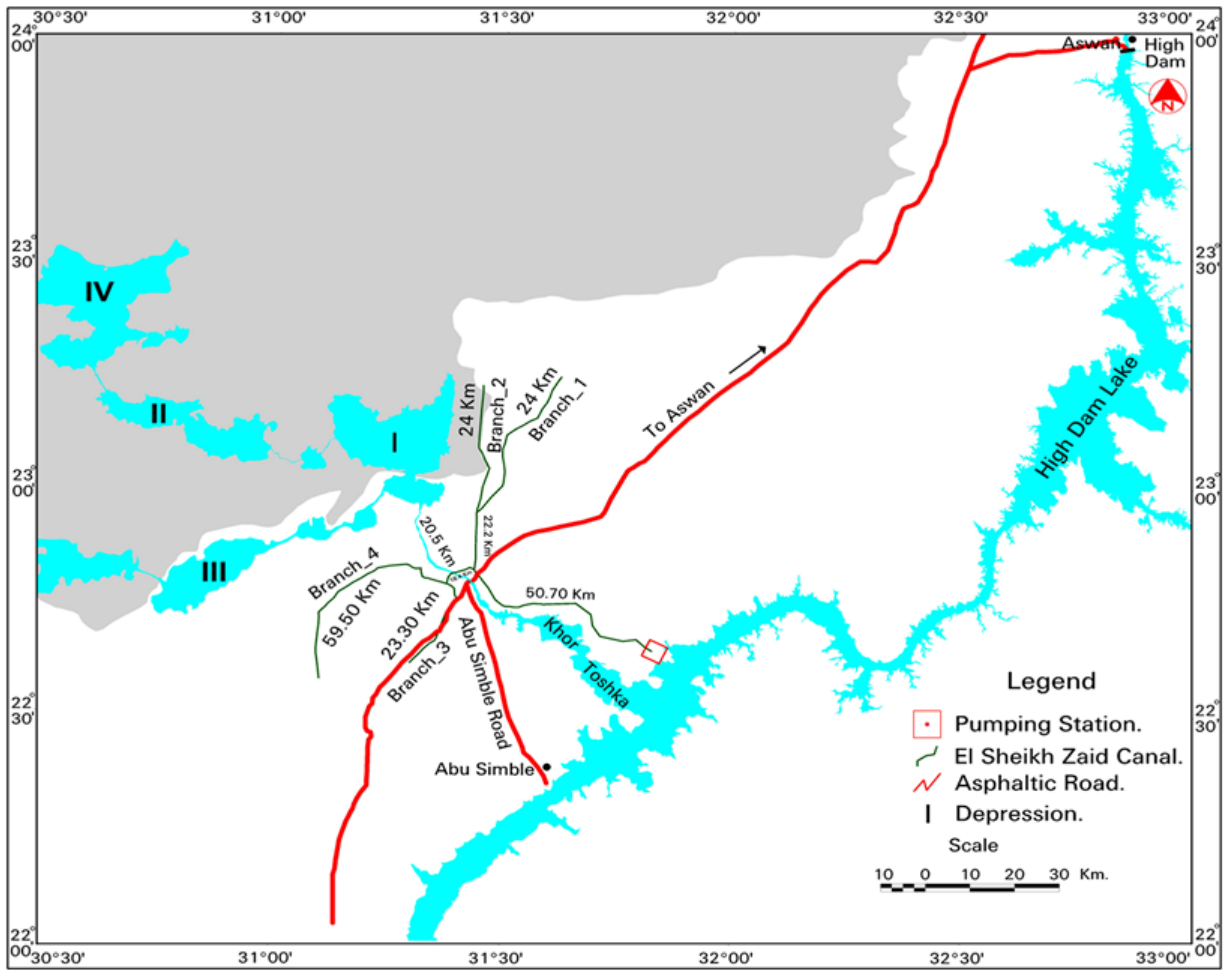
Diagram of major Nile Projects (Source: H.E. Hurst, The Nile, 1952)



The High Aswan Dam, 1971 (Getty Images)



Visits to the Toshka Project of President Hosni Mubarak, 1995-2009 (Various media)



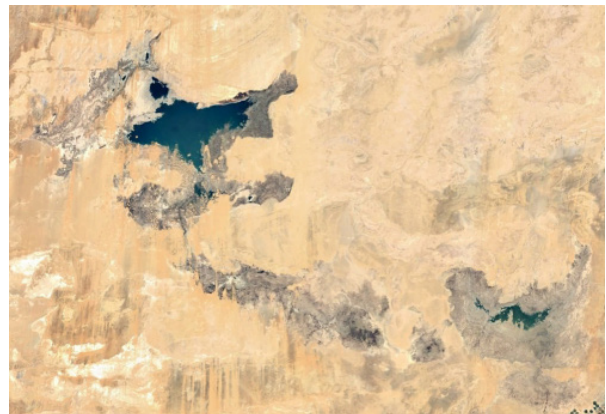
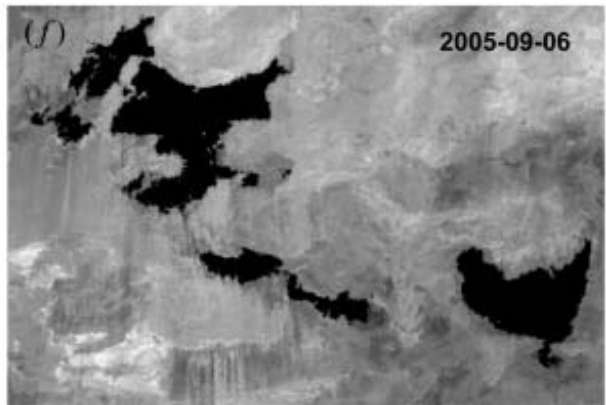
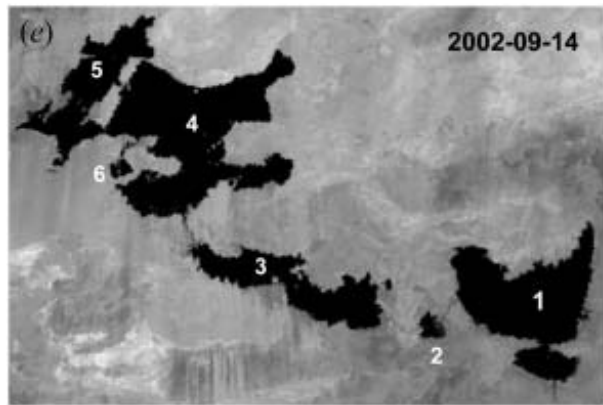
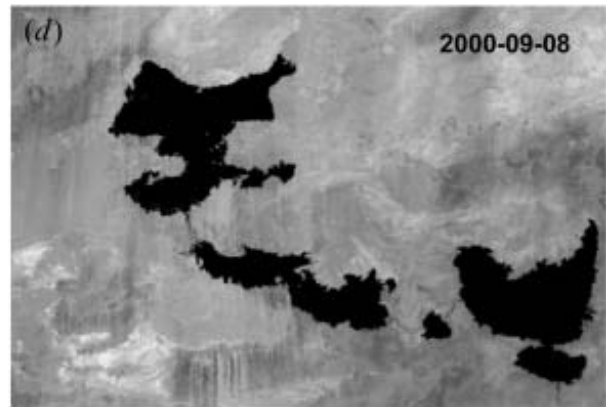
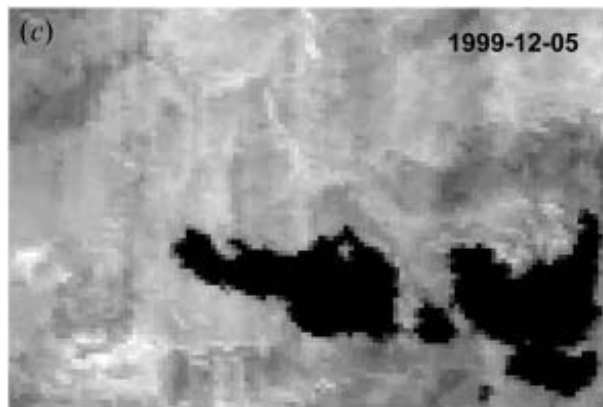
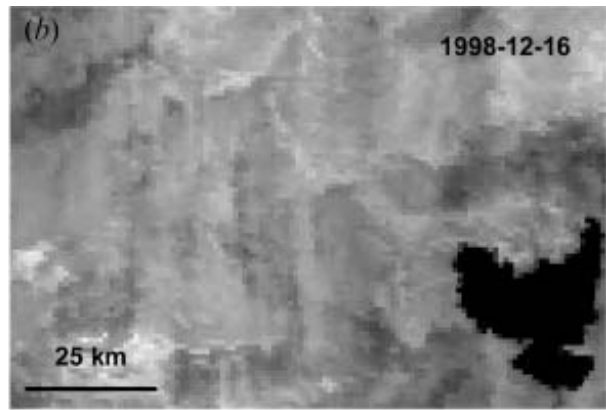
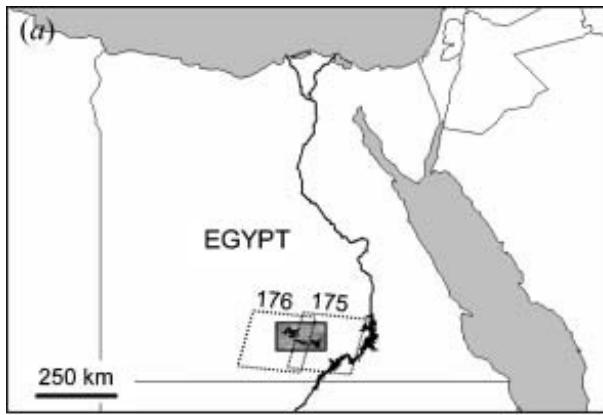
The Toshka Project including the Mubarak Pumping station, the Sheikh Zayed Canal (Branch 1-4) and the land reclamation areas. (Source: Ministry of Agriculture and Land Reclamation).



Construction of the Toshka Spillway, the first infrastructure of the project, originally dug as a siphon for Lake Nasser, 1984 (Wikipedia Commons).

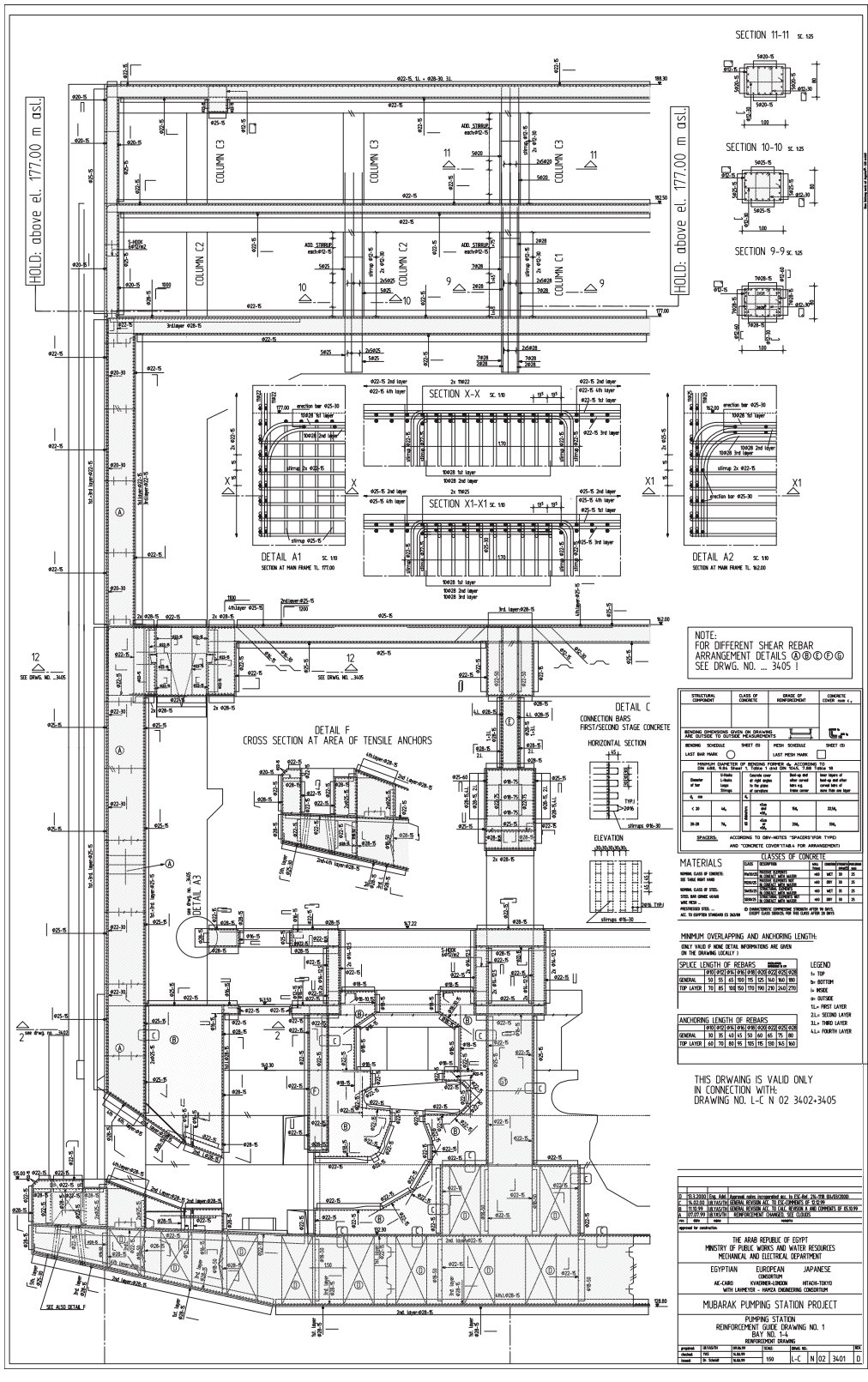


Construction and satellite view of the Toshka Spillway, 1984. The Spillway led to the formation of the Toshka lakes. (Wikipedia Commons, Google Earth).



NASA images documenting the formation of the Toshka Lakes, generated by several seasons of floods from 1991 to 1995.

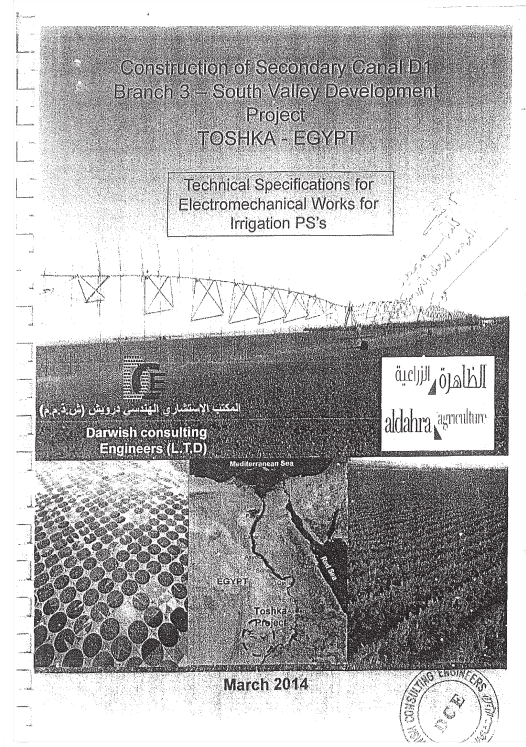
Google image, 2018. The Lakes have now practically disappeared.



NOTE:
FOR DIFFERENT SHEAR REBAR
ARRANGEMENT DETAILS @ @ @ @ @
SEE DRWG. NO. 3405 I

STRUCTURAL COMPONENT	CLASS OF CONCRETE	GRADE OF REINFORCEMENT	CONCRETE COVER (mm) ±1
Column	C30	R235	40
Beam	C30	R235	40
Slab	C30	R235	40
Foundation	C30	R235	40

MINIMUM OVERLAPPING AND ANCHORING LENGTH:	
SPLICE LENGTH OF REBARS	MINIMUM
GENERAL	35, 45, 55, 65, 75, 85, 95, 105, 115, 125, 135, 145, 155, 165, 175, 185, 195, 205, 215, 225, 235, 245, 255, 265, 275, 285, 295, 305, 315, 325, 335, 345, 355, 365, 375, 385, 395, 405, 415, 425, 435, 445, 455, 465, 475, 485, 495, 505, 515, 525, 535, 545, 555, 565, 575, 585, 595, 605, 615, 625, 635, 645, 655, 665, 675, 685, 695, 705, 715, 725, 735, 745, 755, 765, 775, 785, 795, 805, 815, 825, 835, 845, 855, 865, 875, 885, 895, 905, 915, 925, 935, 945, 955, 965, 975, 985, 995, 1005, 1015, 1025, 1035, 1045, 1055, 1065, 1075, 1085, 1095, 1105, 1115, 1125, 1135, 1145, 1155, 1165, 1175, 1185, 1195, 1205, 1215, 1225, 1235, 1245, 1255, 1265, 1275, 1285, 1295, 1305, 1315, 1325, 1335, 1345, 1355, 1365, 1375, 1385, 1395, 1405, 1415, 1425, 1435, 1445, 1455, 1465, 1475, 1485, 1495, 1505, 1515, 1525, 1535, 1545, 1555, 1565, 1575, 1585, 1595, 1605, 1615, 1625, 1635, 1645, 1655, 1665, 1675, 1685, 1695, 1705, 1715, 1725, 1735, 1745, 1755, 1765, 1775, 1785, 1795, 1805, 1815, 1825, 1835, 1845, 1855, 1865, 1875, 1885, 1895, 1905, 1915, 1925, 1935, 1945, 1955, 1965, 1975, 1985, 1995, 2005, 2015, 2025, 2035, 2045, 2055, 2065, 2075, 2085, 2095, 2105, 2115, 2125, 2135, 2145, 2155, 2165, 2175, 2185, 2195, 2205, 2215, 2225, 2235, 2245, 2255, 2265, 2275, 2285, 2295, 2305, 2315, 2325, 2335, 2345, 2355, 2365, 2375, 2385, 2395, 2405, 2415, 2425, 2435, 2445, 2455, 2465, 2475, 2485, 2495, 2505, 2515, 2525, 2535, 2545, 2555, 2565, 2575, 2585, 2595, 2605, 2615, 2625, 2635, 2645, 2655, 2665, 2675, 2685, 2695, 2705, 2715, 2725, 2735, 2745, 2755, 2765, 2775, 2785, 2795, 2805, 2815, 2825, 2835, 2845, 2855, 2865, 2875, 2885, 2895, 2905, 2915, 2925, 2935, 2945, 2955, 2965, 2975, 2985, 2995, 3005, 3015, 3025, 3035, 3045, 3055, 3065, 3075, 3085, 3095, 3105, 3115, 3125, 3135, 3145, 3155, 3165, 3175, 3185, 3195, 3205, 3215, 3225, 3235, 3245, 3255, 3265, 3275, 3285, 3295, 3305, 3315, 3325, 3335, 3345, 3355, 3365, 3375, 3385, 3395, 3405, 3415, 3425, 3435, 3445, 3455, 3465, 3475, 3485, 3495, 3505, 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12995, 13005, 13015, 13025, 13035, 13045, 13055, 13065, 13075, 13085, 13095, 13105, 13115, 13125, 13135, 13145, 13155, 13165, 13175, 13185, 13195, 13205, 13215, 13225, 13235, 13245, 13255, 13265, 13275, 13285, 13295, 13305, 13315, 13325, 13335, 13345, 13355, 13365, 13375, 13385, 13395, 13405, 13415, 13425, 13435, 13445, 13455, 13465, 13475, 13485, 13495, 13505, 13515, 13525, 13535, 13545, 13555, 13565, 13575, 13585, 13595, 13605, 13615, 13625, 13635, 13645, 13655, 13665, 13675, 13685, 13695, 13705, 13715, 13725, 13735, 13745, 13755, 13765, 13775, 13785, 13795, 13805, 13815, 13825, 13835, 13845, 13855, 13865, 13875, 13885, 13895, 13905, 13915, 13925, 13935, 13945, 13955, 13965, 13975, 13985, 13995, 14005, 14015, 14025, 14035, 14045, 14055, 14065, 14075, 14085, 14095, 14105, 14115, 14125, 14135, 14145, 14155, 14165, 14175, 14185, 14195, 14205, 14215, 14225, 14235, 14245, 14255, 14265, 14275, 14285, 14295, 14305, 14315, 14325, 14335, 14345, 14355, 14365, 14375, 14385, 14395, 14405, 14415, 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Project Report
Mubarak Pumping Station – the World's largest
Egypt

The Egyptian government requires water to be pumped from Lake Nasser for irrigation purposes. The water will be transferred to the new irrigation area via the Sheikh Zayed Canal System. The central feature of the project is the Mubarak Pumping Station in Toshka.

The electrical supply to the plant is secured via a 220/11kV substation in Toshka and an 11kV busduct, which were also supplied by ABB in a separate contract under the Toshka Project.

ABB was the subcontractor responsible for the complete main electrical works.

Enduser: Ministry of Public and Water Resources, Egypt.
 The project was completed in December 2003.

The pumping station, which is located at the intake basin, will accommodate (in the final stage) 24 variable speed pumps with a total capacity of 288MW (24 x 12MW) and a total discharge of 400m³/s (24 x 16.7m³/s). The static suction head is 56m.

The pumping station dimensions are 145 x 60 x 45m (l x h x w).

Power and productivity for a better world™ **ABB**



UNITED NATIONS DEVELOPMENT PROGRAMME
GOVERNMENT OF EGYPT

Award ID: 12557 REVISION: 01 30 October 2005
 Project ID: 00012357-00040844-00040845-00045036-00045037

Project Title: Implementation Mechanism of the Strategic Development Plan of Southern Egypt

Start Year: 2002
 End Year: 2007
 Executing Agent: NEA-General Organization for Physical Planning
 Implementing Agent: NEA-General Organization for Physical Planning (GMAK2)
 Revision Type: Substantive Revision: 1

	Budget Financing (in US\$)		
	UNDP	GOVERNMENT	CO-FINANCING
UNDP	75,000	75,000	75,000
GOVERNMENT	629,630	629,630	629,630
TOTAL INPUTS	704,630	704,630	704,630
Country Admin. Costs: GMS	19,190	19,190	19,190
TOTAL	723,820	723,820	723,820

Brief Description:

Within the framework of the new orientation of the government towards decentralization and participatory local development, the Ministry of Housing is committed to support citizen and stakeholder participation in planning and upgrading processes for urban development which include the management of the rural human settlements. The purpose of this budget revision is to:

- Align the project with this new orientation and the expected outputs are a) Participatory Strategic Planning for Village Development
- Participatory Urban Upgrading. The justification for this budget revision is attached hereto.
- Rephrase the unspent balance of 2004.

Approved by:	Signature:	Date:	Name/Title:
Government:	<i>[Signature]</i>	20.11.2005	H.E. Ansh-Abolhasan Mohamed Soliman, Director, Department of Int'l. National Co-operation for Development, Ministry of Foreign Affairs
Executing Agency:	<i>[Signature]</i>	20.11.2005	Dr. Hazem El Kawady, Director, GOPP
UNDP:	<i>[Signature]</i>	20.11.2005	Mr. Antonio Vigilante, Resident Representative

Toshka Secondary Canal Tender Technical Specifications.

Mubarak Pumping Station – the World's largest Egypt, Project report (Source: ABB Archives, ABB, UNDP, 1999, 2005)



MUBARAK PUMPING STATION
Bringing Life to the Desert



Mubarak Pumping Station, construction (Getty)

Mubarak Pumping Station Hitachi Brochure: 'Bringing Life to the Desert', 1995 (ABB Archives)

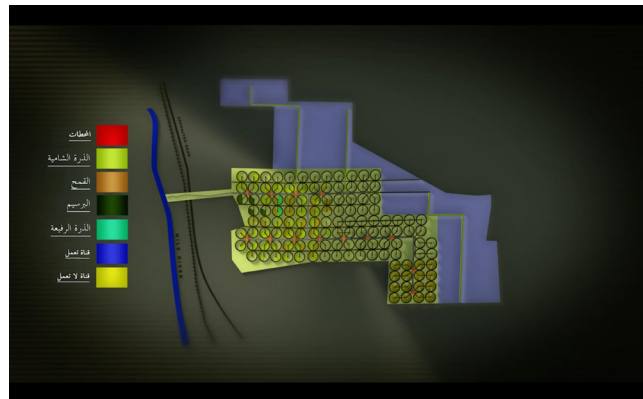
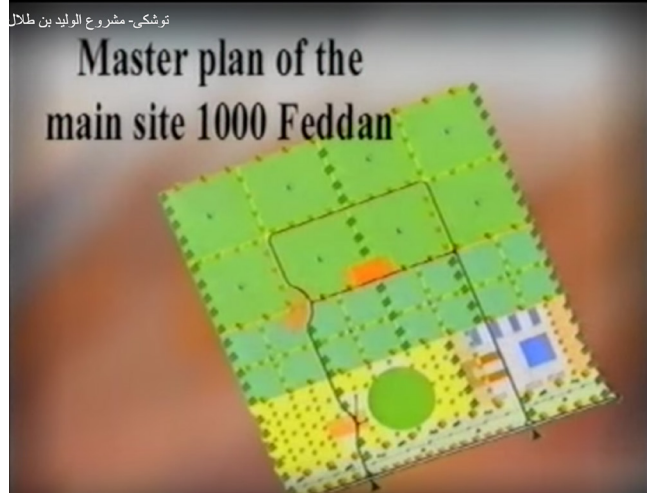
Sheikh Zayed Canal (Getty)



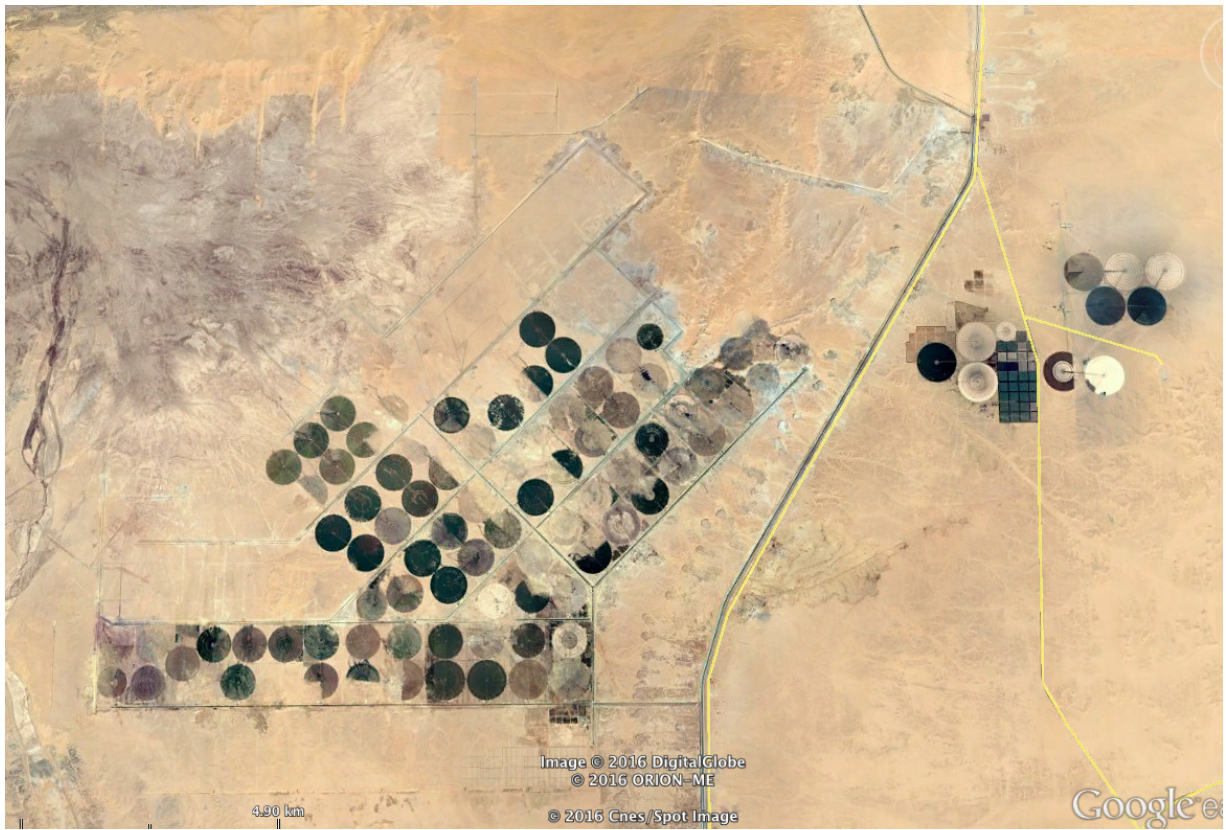


Mubarak Pumping Station completed (AFP)

Land reclamation area along Sheikh Zayed Canal
(Source: Terje Tvedt)



Snaps from commercial video promoting further land reclamation phase involving KADCO, Prince Al Waleed Bin Talal Bin Abdulaziz Al Saoud, and Sun World, a Californian agrobusiness (Youtube).



Google Earth imagery, current state of Toshka, Branches 1 & 2 and central pivot irrigation fields.

Appendix A, B, C

Appendix A

Appendix A, "GASC's awarded tenders from February 15 to August 21, 2017."

Shipping period	year	tender winner	amount	price/FOB	other tendering firms	Source
July 13-20	2015					
August 21-30	2015	Cerealecom Doll	60,000 tonnes of Romanian wheat	\$166.90	ADM, Venus, Union, Olam, Casillo, Noble, LDC, Midgulf, Daewoo, Aston, Ameropa,	http://af.reuters.com/article/investingNews/idAFKCNZMNSF
Feb. 15-25	2017	Grainbow	60,000 Russian	\$187.5	Glencore, Adm, Olam, Louis Dreyfus, Cerealecom, AOS	http://af.reuters.com/article/investingNews/idATKRN1XN06
March 25-April 4	2017	Carigill	60,000 MT of Russian wheat	at 208.75 \$/mt c&f (198.5 \$/mt FOB+11.25 \$/mt freight);		http://www.agrodart.com/en/news/6143/egypis-gasc-buys-360-000-t-russian-ukrainian-wheat.html
		Olam	60,000 MT of Russian wheat	at 208.26 \$/mt c&f (197.5 \$/mt FOB+11.25 \$/mt freight);		
		Louis Dreyfus	60,000 MT of Russian wheat	at 208.20 \$/mt c&f (196.95 \$/mt FOB+11.5 \$/mt freight);		
		Louis Dreyfus	60,000 MT of Ukrainian wheat	at 208.45 \$/mt c&f (198.2 \$/mt FOB+12.5 \$/mt freight);		
		Midgulf	60,000 MT of Russian wheat	at 209.10 \$/mt c&f (198.2 \$/mt FOB+10.8 \$/mt freight);		
		ADM	60,000 MT of Russian wheat	at 210.15 \$/mt c&f (199.3 \$/mt FOB+10.35 \$/mt freight)		
April 1-10	2017	AOS	60,000 MT of Romanian wheat	208.65 \$/mt c&f		http://www.agrodart.com/en/news/6149/egypis-gasc-buys-535-000-t-romanian-russian-french-ukrainian-wheat.html
		Cerealecom	60,000 MT of Romanian wheat	209.29 \$/mt c&f		
		Daewoo	60,000 MT of Russian wheat	210.09 \$/mt c&f		
		Ameropa	60,000 MT of Russian wheat	210.34 \$/mt c&f		
		Carigill	60,000 MT of French wheat	211.12 \$/mt c&f		
		Glencore	55,000 MT of Russian wheat	211.65 \$/mt c&f		
		Carigill	60,000 MT of Romanian wheat	211.75 \$/mt c&f		
		Daewoo	60,000 MT of Ukrainian wheat	212.50 \$/mt c&f		
		Leucetur	60,000 MT of French wheat	213.12 \$/mt c&f		
		Louis Dreyfus	60,000 MT of Ukrainian wheat	207.74 \$/mt c&f		
		Olam	60,000 MT of Russian wheat	208.29 \$/mt c&f		
		Louis Dreyfus	60,000 MT of Russian wheat	209.39 \$/mt c&f		
		AOS	60,000 MT of Russian wheat	210.15 \$/mt c&f		
		Aston	60,000 MT of Russian wheat	210.15 \$/mt c&f		
		Daewoo	60,000 MT of French wheat	210.15 \$/mt c&f		
June 15-24	2017	Cerealecom	60,000 MT of Romanian wheat	207.18 \$/mt c&f	Casillo, Aston, Glencore, AOS, Union	http://www.agrodart.com/en/news/6151/egypis-gasc-buys-295-000-t-romanian-ukrainian-russian-and-the-us-wheat.html
		Ameropa	60,000 MT of US HRW wheat	207.25 \$/mt c&f		
		Louis Dreyfus	60,000 MT of US HRW wheat	207.9 \$/mt c&f		
		Midgulf	60,000 MT of Russian wheat	208.49 \$/mt c&f		
		Louis Dreyfus	60,000 MT of Ukrainian wheat	208.74 \$/mt c&f		
July 1-10	2017	ADM	60,000 MT of Ukrainian wheat	201.56 (c&f)	Louis Dreyfus, Ameropa	http://af.reuters.com/article/egypNews/idA18N1X1XHU
		Midgulf	120,000 MT of Russian wheat	\$203.14 (c&f)		
		Carico	60,000 MT of Russian wheat	204.02 \$/mt c&f		
		Cerealecom	60,000 MT of Romanian wheat	204.80 \$/mt c&f		
		Friends	60,000 MT of Romanian wheat	204.99 \$/mt c&f		
		AOS	60,000 MT of Russian wheat	206.40 \$/mt c&f		
		Aston	60,000 MT of Russian wheat	206.45 \$/mt c&f		
		Friends	60,000 MT of Russian wheat	205.47 \$/mt c&f	Ameropa, Cerealecom, Casillo, GTCs	http://www.agrodart.com/en/news/6102/egypis-gasc-buys-300-000-t-romanian-ukrainian-wheat.html
		ADM	60,000 MT of Romanian wheat	205.57 \$/mt c&f		
		Louis Dreyfus	60,000 MT of Ukrainian wheat	206.59 \$/mt c&f		
		Daewoo	60,000 MT of Russian wheat	206.88 \$/mt c&f		
July 25-August 5	2017	Cerealecom	60,000 MT of Romanian wheat	207.09 \$/mt c&f	AOS, Glencore, Casillo, Daewoo, GTCs, ADM, Friends, Aston	http://www.agrodart.com/en/news/6110/egypis-gasc-buys-175-000-t-romanian-ukrainian-wheat.html
		Aston	60,000 MT of Romanian wheat	208.15 \$/mt c&f		
		Carico	60,000 MT of Romanian wheat	209.08 \$/mt c&f		
		Venus	55,000 MT of Ukrainian wheat	211 \$/mt c&f (199+13 freight);		
August 5-15	2017	Glencore	60,000 MT of Russian wheat	1.212.75 \$/mt c&f		http://www.agrodart.com/en/news/6117/egypis-gasc-buys-410-000-t-romanian-russian-wheat.html
		AOS	60,000 MT of Russian wheat	214.19 \$/mt c&f		
		Daewoo	60,000 MT of Russian wheat	214.8 \$/mt c&f		
		Aston	60,000 MT of Russian wheat	215.29 \$/mt c&f		
		GTCs	60,000 MT of Russian wheat	215.39 \$/mt c&f		
		Louis Dreyfus	60,000 MT of Russian wheat	215.45 \$/mt c&f		
Aug 10-20	2017	Friends	55,000 MT of Russian wheat	219.5 \$/mt c&f	Daewoo, Louis Dreyfus, GTCs	http://www.agrodart.com/en/news/6121/egypis-gasc-buys-115-000-t-russian-wheat.html
		Ameropa	60,000 MT of Russian wheat	219.92 \$/mt c&f		
Aug 21-31	2017	Aston	60,000 tonnes of Romanian wheat	\$202.45	Solaris, ADM, Olam, GTCs, Glencore, Ameropa, Casillo,	http://www.agrodart.com/en/news/6121/egypis-gasc-buys-115-000-t-russian-wheat.html
		Ameropa	60,000 MT of Romanian wheat	219.7 \$/mt c&f		
		Solaris	60,000 MT of Russian wheat	219.7 \$/mt c&f		
		Casillo	60,000 MT of French wheat	220.85 \$/mt c&f		http://www.agrodart.com/en/news/6150/egypis-gasc-buys-300-000-t-romanian-russian-french-wheat.html

Appendix B

Statistics, Bakeries of the Eastern District, Alexandria, 2013.

Alexandria Governorate
 Directorate of Supply and Internal Trade
 Administration of Supply Affairs

Statement of Automatic Municipal Bakeries following the Governorate Project

No.	Bakery Name	Address	District	No. of Production Lines	Opening date	Remarks
1	El-Mohagereen	Ezbet El-Mohagereen ,Khorshid road.	ElMontaza	1	10/8/2008	
2	Talaat mostafa	Masaken Talaat , 30 st., Asafra kebly	ElMontaza	1	10/8/2008	
3	Elharameen	Masaken Elharamen(elharamen Homes)	ElMontaza	1	10/8/2008	
4	Elgezeera elkhadraa(A)	Ard elmalaab	ElMontaza	1	17/8/2008	
5	Eika Bakery	Masaken Eika(Eika Homes)	East	1	8/8/2008	
6	Kobri El-Namoos Bakery	The bridge infront of the sewege system	East	1	8/8/2008	
7	El-Kalaah	Elkalaah(the citadel) hagar elnawateya	East	2	8/8/2008	
8	Ezab elGomhoria	Ezab elgomhoria homes	Middle District	2	3/8/2008	
9	Tosson (A) Bakery	Tosson homes	Middle District	1	9/8/2008	
10	Ambrooz (Ben Game3)	Elgamal st.	Middle District	1	9/8/2008	
11	Tosson (B) Bakery	Tosson st.	Middle District	1	9/8/2008	
12	Madinat elaraaes	Elaraaes city(madinat elaraaes)	West	1	9/9/2008	
13	Kilo 26 Bakery	Kilo 26 homes	ElAmreya	1	3/9/2008	
14	El-Nasereya	Al-Butagas	ElAmreya	1	9/9/2008	
15	Zawyet Abd Elkader	Zawyet Abd Elkader	ElAmreya	1	18/9/2008	
16	El-Noras	Infront of ElNoras school,ElDekhila Eljabal	ElAgami	1	24/9/2008	
17	Borj Elarab elkadeem	Old Borj Elarab	Borj ElArab	2	7/10/2008	
18	Baheeg	Borj Elarab	Baheeg	2	16/10/2008 3/2/2009	
19	Derbala	Ebn Salama St.,Derbala	ElMontaza	1	16/10/2008	
20	Elgezeera elkhadraa(B)	Ard elmalaab	ElMontaza	1	3/2/2009	
21	Ebn Sahlan	Ebn Sahlan ,Elwardian	West	2	3/2/2009	
22	El-karantina	ElKabbary	West	1	3/2/2009	

Alexandria Governorate
 Directorate of Supply and Internal Trade
 Administration of Supply Affairs

23	Mahkamet El-Dekheila	Beside Eldekhila Court	ElAmreya	1	3/2/2009	
24	ElMasaken ElSeeneya	ElMasaken ElSeeneya Compound	ElAmreya	2	3/2/2009	One Production Line
25	Gleem Bakery	Mazloun Station	East	2	7/4/2010	1st production line , 10 bags/day , 2nd production line , 3 Tons/day
26	ElArady Bakery	Masaken ElArady	Middle District	3	17/6/2010	150 bag per day
	total			35		

[26] Bakeries belongs to the governorate with [35] production lines ,Each line has a share of 30 flour bags/each single day .

S.No	Code	Bakery name	In-Charge Manager	Address	Type	Share(jawal)	Working hours	OPEN /CLOSED	ownership	production lines	Notes
1	E1-1	Zaki Abd ElMoly Terhona	Zaki Abd ElMoly Terhona	34 pilot Ahmed Soeud st.	half-matic	15	7.30 3.00	OPEN	private	1	
2	E1-2	Ahmed Elzahed Ahmed	Ahmed Elzahed Ahmed	18 El-Taey st.	half-matic	16	7.30 2.55	OPEN	private	1	
3	E1-3	Mohamed Elsaid Ahmed Abd elghaffar	Mohamed Elsaid Ahmed Abd elghaffar	19 El-Kasaey st.	half-matic	10	8.00 12.35	OPEN	private	1	
4	E1-4	Mohamed Mahmoud Farghaly	Ahmed Mohamed Mahmoud Farghaly	38 El-Kasaey st.	half-matic	13	7.30 1.00	OPEN	private	1	
5	E1-5	Zeinab Mohamed Mahmoud El-Omda	Gamal Ali Abd-El-Basset	28 El-Kamel st.	half-matic	15	8.30 2.45	OPEN	private	1	
6	E1-6	Mostafa Youssef	Rashad Mohamed Ahmed	30 El-Hamam st.	half-matic	6	9.00 11.30	OPEN	private	1	
7	E1-7	Nasser Rashad El-Eryan	Nasser Rashad El-Eryan	12 Dr./Mohamed Abd Elmonem Maher st	half-matic	26	7.00 2.30	OPEN	private	1	
8	E1-8	Mohamed Attia /Gad El-Kareem Gaid	Kamel Gaid Gad Elkareem	17 Dr./Mohamed Abd Elmonem Maher st	half-matic	19	7.00 2.50	OPEN	private	1	
9	E1-9	Emad Abd El-Hakeem Ali Hussein	Emad Abd El-Hakeem Ali	56 Dr./Mohamed Abd Elmonem Maher st	half-matic	18	7.00 3.00	OPEN	private	1	
10	E1-10	Ali Mohamed Mohamed Hassan	Ali Mohamed Mohamed Hassan	52 Mostafa Kamel st.	half-matic	22	6.30 3.40	OPEN	private	1	
11	E1-11	Mohsen Mahmoud Mohamed	Mohsen Mahmoud Mohamed	El-Mogahedeem St 37	half-matic	18	7.30 3.00	OPEN	private	1	
12	E2-1	Ahmed Darwish El-Said	Ahmed Darwish El-Said	10 El-obour st.	half-matic	16	7.30 2.10	OPEN	private	1	
13	E2-2	Gleem Government Bakery	Mahmoud Abd El-Raouf Mohamed	580 El-Horia st	Automatic	30	7.00 2.00	OPEN	government	2	2 production lines
14	E2-3	Mohamed Salama Ismail	Mohamed Salama Ismail	Abu shabana Market	half-matic	21	6.30 3.15	OPEN	private	1	
15	E2-4	Mohamed Abd-Allah Mohamed	Mostafa Fouad Teama	135 Mostafa Kamel st.	half-matic	15	7.30 1.45	OPEN	private	1	
16	E2-5	Rezk Ibrahim Abu Ahmed	Abd El-Moly Ali Abd El-Moly	107 Mostafa Kamel st.	Automatic	21	6.30 3.15	OPEN	private	1	
17	E2-6	Ramadan Hassan Ahmed	Safia Mohamed Abd El-Nabi	11 Zaki Munarak st.	half-matic	14	8.00 1.50	OPEN	private	1	
18	E2-7	Saad Tadres Gad El-Kareem	Gaid Gad El-Kareem	37Khamaraweya st	half-matic	15	7.30 1.45	OPEN	private	1	
19	E2-8	Abd El-Gawad El-Said Eissa	El-Said Abd El-Gawad El-Said	31 El-Anbary st.	half-matic	22	7.00 4.10	OPEN	private	1	
20	E2-9	Mahmoud Ali Nagaa	Ossama Saber Mahmoud Ali Nagaa	34 Ebn Kasset st.	half-matic	9	8.30 12.15	OPEN	private	1	
21	E2-10	Gaid Gooda Ibrahim	Closed	219 Saree El-Ghawany st.	half-matic			CLOSED	private	1	
22	E2-11	Mahmoud Ali Nagaa	Closed	23 Ebn Moanes st.	half-matic			CLOSED	private	1	
23	E2-12	Ali maarouf diab	Closed	Elsakaleya st. 30	half-matic			CLOSED	private	1	
24	E3-1	Ahmed Ibrahim Mohamed	Ahmed Ibrahim Mohamed	243 Masjid King Faisal St	half-matic	22	7.00 4.10	OPEN	private	1	
25	E3-2	Abd El-Kader Abd El-Ghany	Abd-El-Ghany Abd El-Kader Abd El-Ghany	255 Mostafa Kamel st	half-matic	22	7.00 4.10	OPEN	private	1	
26	E3-3	Moahmoud Hussein Keis	Ahmed Ali Moahmed	8 Ghebrial st	half-matic	12	12.30	OPEN	private	1	
27	E3-4	El-Safy Abd -El-Aal	Ragab El-Safy Abd -El-Aal	12 Ghebrial st	half-matic	19	7.30 2.25	OPEN	private	1	
28	E3-5	Mohamed Abd-Allah Abd -El-Moly	Mohamed Ahmed Abd-Allah	43 Rasem Bek st.	half-matic	16	6.30 1.40	OPEN	private	1	
29	E3-6	Ahmed Abu-Zaid Mohamed	Ibrahim Abu-Zaid Mohamed	4 El-Matary st	half-matic	13	7.00 12.25	OPEN	private	1	
30	E3-7	Hussein Mohamed Ahmed ,Abu -El-Hamd Said Omar	Serag Mohamed	El-Montaza Canal st.	half-matic	16	7.00 1.40	OPEN	private	1	
31	E3-8	Abd-Allah Mohamed Ali,Ahmed Mohamed Ali	Mohamed Abd-El-Fattah	beginning of Dana main St	half-matic	16	7.00 1.40	OPEN	private	1	
32	E3-9	Zaki Mohamed Ali	Zaki Mohamed Ali	282 Mostafa Kamel st.	half-matic	16	7.30 2.10	OPEN	private	1	
33	E3-10	Gaber Ahmed Abd-El-Megeed	Nasser Saber El-Said	Masjid El-sawm from the canal st.	half-matic	6	9.00 11.30	OPEN	private	1	
34	E4-1	Mekhemar Abd-El-Aal Mekhemar	Nasser Mekhemar Abd-El-Aal	155 Mohamed Farid st.	half-matic	14	7.00 12.50	OPEN	private	1	
35	E4-2	Kamel Abd-El-Aal Mekhemar	Mostafa Kamel Abd-El-Aal	63 Hagar El-Nawateya st	half-matic	15	6.00 12.15	OPEN	private	1	
36	E4-3	Ismail Ali Ismail, Harbi El-Said Abd El-Rahman	Abd-El-Rahman Mohamed Mahdy	25 Ebn-Hazm st.	half-matic	18	7.30 3.00	OPEN	private	1	
37	E4-4	Attia Mohamed Abd--El Samee,Mohamed Abd El-Hafeez Abd-El-Samee	Mohamed Abd El-Hafeez Abd-El-Samee	Ebn-Hazm st.	half-matic	20	7.00 3.20	OPEN	private	1	
38	E4-5	Osman Ismail Mohamed	Osman Ismail Mohamed	Masjid El-Foly st.	half-matic	12	8.00 1.00	OPEN	private	1	
39	E4-6	Roushdy Ahmed Omar	Mohamed Khalaf Desouky	24 Ebn-Wassel st.	half-matic	12	8.00 1.00	OPEN	private	1	
40	E4-7	Mohamed Naguib Abd	Mostafa mohamed Bekheet	151 Hagar Elnawateya st.	half-matic	11	7.30 12.05	OPEN	private	1	
41	E4-8	Ibrahim Ali Mohamed Abd El-Aal	Ali Ibrahim Ali Mohamed	16 El-Hawary st.	half-matic	12	7.30 12.30	OPEN	private	1	
42	E4-9	Ahmed Fathy Ahmed Abd El-Moly	Ahmed Fathy Ahmed Abd El-Moly	Eeshreen st.	half-matic	7	9.00 11.55	OPEN	private	1	
43	E4-10	Asmaa Soliman Mohamed	Saiid El-Araby	From Canal Elmahmoudeya	half-matic	5	10.00 12.55	OPEN	private	1	
44	E5-1	Serag Mohamed Ahmed	Khaled Serag Mohamed Ahmed	98 El-Hegaz st.	half-matic	6	8.30 11.00	OPEN	private	1	
45	E5-2	Said Mahmoud Said Osman	Said Mahmoud Said Osman	Behind 84 Eshreen st	half-matic	7	9.00 11.55	OPEN	private	1	
46	E5-3	El-Said Hussein Bakry	Mohamed El-Said Mohamed	El-Farouk Omar st	half-matic	7	8.30 11.25	OPEN	private	1	
47	E5-4	Soad Mohamed El-Said	Gamal Eissa El-Said	Abd-El-Rahman Maarouf St	half-matic	12	9.00 2.00	OPEN	private	1	
48	E5-5	Ismail Kabeesy Ahmed Morad	Ismail Kabeesy Ahmed Morad	5 El-Bostan st /Ard	half-matic	15	8.00 2.15	OPEN	private	1	
49	E5-6	Atta Adawy Mahmoud	Ahmed Atta Adawy Mahmoud	155 The market station st	half-matic	18	7.00 2.30	OPEN	private	1	

S.No	Code	Bakery name	In-Charge Manager	Address	Type	Share(jawal)	Working hours	OPEN /CLOSED	ownership	production lines	Notes
50	E5-7	Riad Abdo Abd-El-Shaheed	Khalil Fathy Hakeem	124 The market station st	half-matic	22	6.30 3.40	OPEN	private	1	
51	E5-8	Ezzat Anwar Attiat-Allah	Ezzat Anwar Attiat-Allah	108 The market station st	half-matic	10	8.30 12.40	OPEN	private	1	
52	E5-9	Ika (Government Bakery)	the Governorate	behind The market station st	Automatic	30	7.00 1.30	OPEN	government	1	1 production lines
53	E6-1	Mohamed Hussein Khalil El-Far	Ahmed Ali Sedeek	13 Sarhank st.	half-matic	22	7.00 4.10	OPEN	private	1	
54	E6-2	Mohamed Ahmed ismail	Raesa Ahmed Mohamed ismail	8 Abd-El-Monam El-Dalil st.	half-matic	14	7.30 1.20	OPEN	private	1	
55	E6-3	Shokry Gad El-Kareem	Nazmy Shokry Gad El-Kareem	75 Shods Station st	half-matic	13	7.00 12.25	OPEN	private	1	
56	E6-4	Ahmed Khalil Ahmed Hegazy	Hesham Khalil Ahmed Hegazy	18 El-Kaseey st	half-matic	13	7.30 12.55	OPEN	private	1	
57	E6-5	El-Said Kabeesy Khalil	Hassan Rodwan Ali	6 El-Kaseey st	half-matic	6	10.00 12.30	OPEN	private	1	
58	E6-6	Mamlouk Masoud Ket	Mamlouk Masoud Ket	20 Marwan st.	half-matic	7	9.00 11.55	OPEN	private	1	
59	E6-7	El-Badry Shehata Metwaly	Gomaa El-Badry /Mahmoud Abd	64 Nazlet Abd-Allah st.	half-matic	11	8.30 1.05	OPEN	private	1	
60	E6-8	Shaaban Hassan Mohamed	Alaa Shaaban Hassan Mohamed	384 Mostafa Kamel st.	half-matic	12	7.00 12.00	OPEN	private	1	
61	E6-9	Hamad Taliba Masrawy	Ragab Hamad Taliba Masrawy	13 Ebn-Kalawoon st.	half-matic	17	7.00 2.55	OPEN	private	1	
62	E6-10	Nesim Ibrahim Shnoda	Ibrahim Nesim Ibrahim Shnoda	20 Ebn-okeel st.	half-matic	18	6.45 2.15	OPEN	private	1	
63	E6-11	Radwan Ali Radwan	Ali Radwan Ali Radwan	63 Ebn-Monkez st.	half-matic	18	7.00 2.30	OPEN	private	1	
64	E6-12	Amer Khafaga Hussein	Abd -El-Hamid Abd-El-Samie	75 El-Kashef st	half-matic	11	8.00 1.35	OPEN	private	1	
65	E6-13	Mohamed Abd Elhaleem Abd	Mohamed Abd Elhaleem Abd	37 El-Mohamadeya st.	half-matic	11	8.00 1.35	OPEN	private	1	
66	E7-1	Omar Mohamed Abu-Kassem	Omar Mohamed Abu-Kassem	Ramsis St ,old Mahrousa	half-matic	15	7.30 1.45	OPEN	private	1	
67	E7-2	Omar Mohamed Abu-Kassem	Ali Mohamed Abu-Kassem	Salah El-Din st.,Faisal ,El-Mahrousa	half-matic	22	7.30 4.40	OPEN	private	1	
68	E7-3	Fathy Ahmed Abd El-Moly	Mohamed Fathy Ahmed Abd El-Moly	Dana Main st.	half-matic	19	6.30 2.25	OPEN	private	1	
69	E7-4	Fathy Ahmed Abd El-Moly	Mahmoud Fathy Ahmed Abd El-Moly	El-Katakeet Laboratory st.	half-matic	19	7.00 2.55	OPEN	private	1	
70	E7-5	Gamal Helmy Abd El-Rady	Gamal Helmy Abd El-Rady	El-Fath st. from Dana main st.	half-matic	6	9.30 12.00	OPEN	private	1	
71	E7-6	Salah El-Din Mohamed Mahmoud	Salah El-Din Mohamed Mahmoud	10 st from El-Fath st.	half-matic	15	6.30 12.45	OPEN	private	1	
72	E7-7	Abd-El-Hamid Moahmed El-Sharaky	Abd-El-Hamid Moahmed El-Sharaky	Ezbet Hassan Mansour	half-matic	6	9.30 12.00	OPEN	private	1	
73	E7-8	Hosni Hamed Abd El-Megeed	El-Husseiny Hosni Hamed	El-Ekhlis st. from El-Katakeet Laboratory st.	half-matic	6	9.30 12.00	OPEN	private	1	
74	E7-9	Abd-El-Hafeez Abd-El-Halim	Fathy Abd-El-Hafeez Abd-El-Halim	El-Katakeet Laboratory st.	half-matic	6	8.30 11.00	OPEN	private	1	
75	E8-1	Mohamed Mostafa Moussa	Hassar iwinar ned Mostafa Moussa	18 Mohamed Eissa st.	half-matic	12	7.30 12.30	OPEN	private	1	
76	E8-2	Mohamed Abd-El-Monaem Shaaban	Mohamed Abd-El-Monaem Shaaban	20 st,The market station	half-matic	8	9.00 12.20	OPEN	private	1	
77	E8-3	Sobhy Eshak Soliman	Sobhy Eshak Soliman	Khaled Ebn-El-Waleed st., Ezbet El-Nesha	half-matic	11	8.30 1.05	OPEN	private	1	
78	E8-4	Omar Ali Ibrahim	Nafisa Ahmed Mansour	El-Haj Salama st.	half-matic	14	7.00 12.50	OPEN	private	1	
79	E8-5	Abd-El-Hady Taha Soliman	Mohamed Abd-El-Hady Taha Soliman	El-Montaza Canal st.	half-matic	17	6.30 1.35	OPEN	private	1	
80	E8-6	Eiset Om Mohamed Mohamed Bakr	Ahmed Gad El-Moly	El-Montaza Canal st.	half-matic	17	6.30 1.35	OPEN	private	1	
81	E8-7	Hussein Hashem Hussein Mohamed	Abd-El-Mohsen Hussein Hashem	Ezbet Salam	half-matic	8.5	8.30 12.00	OPEN	private	1	
82	E8-8	Ahmed Mohamed Moussa	El-Said Ahmed Mohamed Moussa	Street 3	half-matic	12	7.30 12.30	OPEN	private	1	
83	E8-9	Ali Abd-El-Reheem Youssef	Mohamed Abd-El-Rahman	46 Mansheyet El-Zahraa st.	half-matic	7	9.30 12.25	OPEN	private	1	
84	E9-1	Fatma Mohamed Abd-El-Hamid	Mahmoud Ahmed Farag	Ahmed Abu Soliman st.	half-matic	17	6.30 1.35	OPEN	private	1	
85	E9-2	Mahmoud Ameen Hanafy	Nasser Mohamed Abd El-Latif	st.14 ,El-Moftee El-Gedeeda Land	half-matic	8	9.00 12.20	OPEN	private	1	
86	E9-3	Ali Said Abdo Wahman	Ahmed Hassan Abd El-Awad	1 Elmahrousa School st.	half-matic	12	7.00 12.35	OPEN	private	1	
87	E9-4	Mohamed Rashad Abd-El-Aal ,Abd El-Hamid Hassanin Shafei	Odd:El-Said Mohamed Rashad, Even:Hesham Abd El-Hamid	52 Arabic Company st.	half-matic	15	9.00 3.15	OPEN	private	1	
88	E9-5	Rezk Hamed Abd El-Megeed	Ashraf Rezk Hamed Abd El-Megeed	Arabic Company st.	half-matic	21	7.15 4.00	OPEN	private	1	
89	E9-6	Ahmed Mohamed Hassan	Ahmed Mohamed Hassan	St. 3 Saleh Eid Land	half-matic	12	9.00 2.00	OPEN	private	1	
90	E9-7	Fathy Alaam Mohamed	Mohamed Alaam Mohamed	7 Gaber Harb land	half-matic	6	9.00 11.30	OPEN	private	1	
91	E9-8	Mahmoud Ahmed Farag	Mahmoud El-Said Bekheet Farag	Behind 116 Yakout El-Hamawy st.	half-matic	6	8.30 11.00	OPEN	private	1	
92	E9-9	Hassan Hashem Mohamed,Abd El-Reheem Hashem Mohamed	Mohamed Hassan Hashem Mohamed	28 st.8 El-Moftee El-Gedeeda Land	half-matic	11	7.30 12.05	OPEN	private	1	
93	E9-10	Ibrahim Masoud	Al-Seoud Nagaty	st.5 El-Moftee El-Gedeeda Land	half-matic	13	7.3 15.55	OPEN	private	1	
94	E9-11	Abd El-Hafeez Abd El-halim	Abd El-Rahman Abd El-Aziz	st.9 El-Moftee El-Gedeeda Land	half-matic	12	7.00 1.40	OPEN	private	1	
95	E10-1	Attia Mohamed Omar	Abd El-Kader Attia Mohamed ,Mostafa Ahmed Mohamed Omar	18 Dr Mostafa Latif st.	half-matic	9	8.30 12.15	OPEN	private	1	

S.No	Code	Bakery name	In-Charge Manager	Address	Type	Share(jawal)	Working hours	OPEN /CLOSED	ownership	production lines	Notes
96	E10-2	Hassan Mohamed Abd El-Latif	Salah Gedoh Abd El-Latif	ST. 10 Keriako Land	half-matic	13	7.30 12.55	OPEN	private	1	
97	E10-3	Mohamed Fathy Abd El-Moly,Ragab Gaber Ahmed Kamal	Ragab Gaber Kamal El-Din	25 Zaki Atta-Allah st.	half-matic	22	6.30 3.40	OPEN	private	1	
98	E10-4	Selim IbrahimSelim	Mahmoud Selim IbrahimSelim	Salah El-Din Ibrahim st.	half-matic	18	6.30 2.00	OPEN	private	1	
99	E10-5	Khodary Mohamed Ahmed	Ragab Khodary Mohamed Ahmed	122 El-Shahid st.	half-matic	17	7.00 2.05	OPEN	private	1	
100	E10-6	Mohamed Abd El-Aziz Othman	Kheir Othman Abd El-Aziz	derived from Elshahid st.	half-matic	15	8.00 2.15	OPEN	private	1	
101	E10-7	Ramadan Ahmed Abd-Allah	Ramadan Ahmed Abd-Allah	10 Tiba st. ,Yasser Ebn-Amer School	half-matic	11	8.30 1.05	OPEN	private	1	
102	E10-8	Ahmed Fahmy Hussein Mohamed	Salah Fahmy Hussein Mohamed	39 Yasser Ebn-Amer st.	half-matic	22	7.00 4.10	OPEN	private	1	
103	E10-9	Gaber Zaki Hussein Salem	Hassan Zaki Hussein Salem	14 dr/Ahmed Riyad Tork st.	half-matic	9.5	7.30 11.30	OPEN	private	1	
104	E10-10	Gorgious Al-Kams Louka	Closed	155 ahmed abu st.	half-matic			CLOSED	private	1	
105	E10-11	Awatef Mohamed Ali Mostafa	Closed	Salah El-din El-ayouby st.	half-matic			CLOSED	private	1	
106	E11-1	Abd El-Hamid mohamed	Abd El-Hamid mohamed	35 Roushdy Market st.	half-matic	13	7.00 12.25	OPEN	private	1	
107	E11-2	Abd Rab El-Naby Abd El-Azim	Abd Rab El-Naby Abd El-Azim	12 El-Sheikh Ali st.	half-matic	16	7.00 1.40	OPEN	private	1	
108	E11-3	Rezk Allah Yakoub Allah	Mohamed Abd El-Aal Darwish	3 El-Abrash st.	half-matic	9	7.30 11.15	OPEN	private	1	
109	E11-4	Ahmed Abd El-Wahed	Abd El-Naeem Sabak	6 Taouk st.	half-matic	11	8.00 12.35	OPEN	private	1	
110	E11-5	Tadres Khalil Yakoub	Wageeh Hazeen Baskharoon	83 Aziz Fahmy st.	half-matic	14	8.00 1.50	OPEN	private	1	
111	E11-6	Hashem Hussein Mohamed	Gamal Haroon Hussein	48 Aziz Fahmy st.	automatic	21	6.30 3.15	OPEN	private	1	
112	E11-7	Araby Ahmed Ali	Araby Ahmed Ali	48 Aziz Fahmy st.	half-matic	14	8.00 1.50	OPEN	private	1	
113	E11-8	Mohamed Mahmoud Abd Allah	Ali Mohamed Mahmoud Abd Allah	18 Ebn Arab Shah st.	automatic	21	6.30 3.15	OPEN	private	1	
114	E11-9	El-Said Ahmed Abd El-Rehim	Ahmed Mohamed Ahmed	Ebn Arab Shah st.	half-matic	10	8.30 12.40	OPEN	private	1	
115	E11-10	Abd El-Maseeh Yakoub Rezkallah	Hakeem Floupas Hakeem	288 Port-Said st.	half-matic	19	7 2.55	OPEN	private	1	
116	E11-11	Mohamed Abd Allah Abd El-Moly	Kamek Ahmed Abd Allah	4 Yopastus st.	half-matic	17	6.30 1.35	OPEN	private	1	
117	E11-12	Ahmed Othman Rodwan	Hazem Mohamed Ahmed Othman	1 El-Said Morsy st.	half-matic	18	6.00 1.30	OPEN	private	1	
118	E11-13	Said Ahmed Ali	Said Ahmed Ali	10 Armant st.	half-matic	15	6.30 12.45	OPEN	private	1	
119	E11-14	Mahmoud Mohamed Hassan	Nasser Gaber Ibrahim	13 Luxor St	half-matic	20.5	5.00 1.30	OPEN	private	1	
120	E11-15	Mohamed Abd El-Reheem	Raies Mohamed Abd El-reheem	Abd El-Kareem Khataby st.	half-matic	10	8.30 12.40	OPEN	private	1	
121	E11-16	Abd El-Satar Abd El-Naeem	Faizah Abd El-Rahman El-Said	Helmy Bahgat st.	half-matic	14	8.00 1.50	OPEN	private	1	
122	E11-17	Mohamed Ramadan Mohamed	Closed	8 Ebn Wasseef Shah st.	half-matic			CLOSED	private	1	
123	E11-18	Abu Deif Ahmed Gomaa	Closed	41 Aziz Fahmy st.	half-matic			CLOSED	private	1	
124	E11-19	El-Said Abd El-aal Keis	Closed	Bany -Nofal st. 76	half-matic			CLOSED	private	1	
125	E12-1	Mohamed Bahaa El-din Abd El-Hak	Waleed Khamis Mohamed Saleh	Commercial Market Smouha	half-matic	16	6.30 1.10	OPEN	private	1	
126	E12-2	Abdo Maglaa Sedhom	Hasanein Attia Khalaf Allah	% Alfons st.	half-matic	13	8.00 12.35	OPEN	private	1	
127	E12-3	Shokry Masoud Said	Emad Shokry Masoud Said	3 Ebn-Rashid st.	half-matic	14	7.00 12.50	OPEN	private	1	
128	E12-4	University Dormitories /Smouha	Hamdy Ibrahim Abd El-Mawgood	Albert the 1st st.	half-matic	30	3.00 3.20	OPEN	private	1	
129	E12-5	Mohamed Ahmed Abd El-Reheem	Faizah Mohamed Ahmed Abd El-Reheem	43 El-Gawaher st.	half-matic	13		closed	private	1	
130	E12-6	Ahmed Zanaty Ibrahim	Said Ahmed Zanaty	33 El-Gawaher st.	half-matic	22	7.00 4.10	OPEN	private	1	
131	E12-7	Dahy Ramadan Khalaf Allah	Hani Ramadan Khalaf Allah	4 Masjid El-Saleheen st.	half-matic	6	10.00 12.30	OPEN	private	1	
132	E12-8	Sabry Hussein Mohamed Ahmed, Tharwat Shokry Baskalas	Ali Hussein Mohamed Ahmed, Hatem Shokry Baskalas	6 Masjid El-Sanhoory st.	half-matic	6	8.00 10.30	OPEN	private	1	
133	E12-9	El-Said Hashem El-Said	El-Said Hashem El-Said	Masjid Fajr El-Islam st.	half-matic	9	9.00 12.30	OPEN	private	1	
134	E12-10	Noura Tawfik	Mohamed Harby El-Said Abd El-Reheem	Ezbet El-Rahma	half-matic	5	8.30 11.50	OPEN	private	1	
135	E13-1	Raafat Abd El-Hakeem Fathy Hussein	Romany Khedr Hassan Ibrahim	st.5 Ezbet Abd El-moneem Riyad	half-matic	14	7.00 12.00	OPEN	private	1	
136	E13-2	Hussein Mohamed Ali	Hussein Mohamed Ali	st.4 Ezbet Abd El-moneem Riyad	half-matic	9	8.00 12.10	OPEN	private	1	
137	E13-3	Ahmed Mohamed Farid Masoud	Ali Makboul Omar	st.3 Ezbet Abd El-moneem Riyad	half-matic	12	8.00 1.00	OPEN	private	1	
138	E13-4	Wael Mohamed Ahmed	Wael Mohamed Ahmed	st.3 Ezbet Abd El-moneem Riyad	half-matic	6	8.00 10.30	OPEN	private	1	
139	E13-5	Harby Said Sedeek	Refaat Abd El-Rahman Abd El-Ghafar	st.1 Ezbet Abd El-moneem Riyad	half-matic	8	9.00 12.20	OPEN	private	1	
140	E13-6	Mohamed Shaaban Emara	Mohamed Shaaban Emara	st.1 from st.3 Ezbet Abd El-moneem Riyad	half-matic	5	8.30 10.35	OPEN	private	1	
141	E13-7	Mohamed El-Amroussy El-Said	Nabil Dardir Abd El-Sabour	st. 10 behind Moharram Printing Shops	half-matic	9	9.00 12.45	OPEN	private	1	
142	E13-8	Mohamed Salehin Mohamed Othman	Ashour Ramadan Khalaf Allah	st. 30 behind Moharram Printing Shops	half-matic	6	8.30 11.00	OPEN	private	1	
143	E13-9	Ahmed Mohamed Elewa	Hani El-Said Emam	Ezbet Fathy	half-matic	6	9.00 11.30	OPEN	private	1	
144	E13-10	Adel Shehata Ali Abd El-Hakim	Saber El-Said Ashry	Ezbet Mansi	half-matic	6	9.00 11.30	OPEN	private	1	

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145	E13-11	Ezzat Abd El-Naeem Ahmed Ali	Ezzat Abd El-Naeem Ahmed Ali	st.4 Ezbet Abd El-moneem Riyad	half-matic	7.5	8.00 11.15	OPEN	private	1	
146	E13-12	Mahmoud El-Said Farag	Mahmoud El-Said Farag	Ezbet fata El-Bar El-Kebly ,Smouha	Manual	4	10.00 4.00	OPEN	private	1	
147	E14-1	Heddeya Hamed Mohamed	Tharwat Mahmoud Mohamed	Ezbet Refaatkom	half-matic	5	10.00 12.05	OPEN	private	1	
148	E14-2	Mohamed El-Said Farghaly	Mohamed El-Said Farghaly	El-Esraa Wel-Merag ,jinioty	half-matic	5	10.00 12.05	OPEN	private	1	
149	E14-3	Nasser Ali Mohamed Tayeb	Nasser Ali Mohamed Tayeb	Nazlet Ahmed Abu Saada,El-Bakatoushy	half-matic	10	8.00 12.10	OPEN	private	1	
150	E14-4	Farrag Mahmoud Farrag	Raafat Hassan Mohamed Hassan	Nasr El-Islam ,El-Bakatoushy	half-matic	6	9.00 11.30	OPEN	private	1	
151	E14-5	Tharwat Abd El-Badei Mohamed	Tharwat Abd El-Badei Mohamed	El-Emam El-hussein st. ,Jinioty	half-matic	6	9.00 11.30	OPEN	private	1	
152	E14-6	Abu El-Hamd Said Omar	Mohamed Abu El-Hamd Said Omar	Hoda El-Islam ,Jinioty	half-matic	15.5	7.00 1.30	OPEN	private	1	
153	E14-7	Mahmoud Gaber Mohamed Khalil	Hamed Gaber Mohamed Khalil	Hoda El-Islam ,Jinioty	half-matic	13	8.00 1.25	OPEN	private	1	
154	E14-8	Abd El-Naeem Gad Allah	Abd El-Naeem Gad Allah	Pipes st. ,Jinioty	half-matic	8	9.30 12.50	OPEN	private	1	
155	E14-9	Abu El-Nasr Abd El-Fattah	Mohamed Abd El-Aal Mohamed	Arafat st. ,Jinioty	half-matic	6	8.30 11.00	OPEN	private	1	
156	E14-10	Abd El-Rasul Abd El-Salam Ali	Abd El-Rasul Abd El-Salam Ali	17 El-Mohagereen st. ,Jinioty	half-matic	8	7.50 10.50	OPEN	private	1	
157	E14-11	Awatef Ahmed Said	Mohamed Mahmoud Ahmed	2 Ezbet Nasr El-Din st. ,Jinioty	half-matic	7	9.50 12.25	OPEN	private	1	
158	E14-12	Said Soliman Ahmed		Jinioty	half-matic	5	10.00 12.05	OPEN	private	1	
159	E14-13	Mortada Mohamed El-Gales	Manual Tabakky	El-Ashraf st. , Jinioty	Manual	6	10.00 7.00	OPEN	private	1	
160	E14-14	Kamal Abd Elkereem Bayoumy	Manual Tabakky	El-Sahaba st. ,Jinioty	Manual	6	10.00 7.00	OPEN	private	1	
161	E14-15	Mohamed Ahmed Gabaly	Manual Tabakky	El-Kholafaa El-Rashedeen st.	Manual	6	8.00 5.00	OPEN	private	1	
162	E14-16	Moahmed Abd Elshakour	Manual Tabakky	Pipes st. ,Jinioty	Manual	6	8.00 5.00	OPEN	private	1	
163	E14-17	Gaber Abd El-reheem Ismail	Manual Tabakky	Egyptian Flag st	Manual	6	9.00 6.00	OPEN	private	1	
164	E15-1	Sami Ramadan Ali	Sami Ramadan Ali	Beside Hagar El-Nawateyya Homes	half-matic	6	8.00 11.20	OPEN	private	1	
165	E15-2	Safaa Abd El-Aziz El-Said	Safaa Abd El-Aziz El-Said	El-Ashry st.	half-matic	6	7.30 11.15	OPEN	private	1	
166	E15-3	Abd El-Baset Ali Mohamed	Abd El-Baset Ali Mohamed	Omar Ebn El-Khattab st.	half-matic	6	8.30 11.00	OPEN	private	1	
167	E15-4	Mostafa Abd El-Hai Mostafa	Mostafa Abd El-Hai Mostafa	Anwar El-Sadat st.	half-matic	6	8.30 11.25	OPEN	private	1	
168	E15-5	Fatheyra Farouk El-Said	Nasr Eldin Abd El-Shakour	Masjid El-Aziz El-Badeei st.	half-matic	5	9.30 11.35	OPEN	private	1	
169	E15-6	Ibrahim El-Said Kamel	Mosaad Mohamed Nasr Mohamed	Masjid El-Rahman st, El-Kalaah	half-matic	8	9.00 11.05	OPEN	private	1	
170	E15-7	El-Kalaah (government Bakery)	Mohamed Hussein Mohamed	The Governorate Home ,El-Kalaah	Automatic	60	7.00 1.30	OPEN	government	2	2 production lines
171	E15-8	Mosquitos Bridge (kobry El-Namoos) (government Bakery)	Hanan Mahmoud Abd El-Megred	Mosquitos Bridge Homes	Automatic	30	7.00 1.30	OPEN	government	1	1 production lines
172	E15-9	Ahmed Ali Abd El-Rahman	El-Korashy Abd El-Aal	Batal El-Salam st.	half-matic	6	9.00 11.30	OPEN	private	1	
173	E15-10	Ashraf Abd -Elfattah Khater	Ashraf Abd -Elfattah Khater	El-Emam El-Shafei st.	half-matic	7.5	10.00 1.10	OPEN	private	1	
174	E15-11	Othman Kamel Hussein	Montasser Othman Kamel Hussein	El-Rahma st.	half-matic	6	9.00 11.30	OPEN	private	1	
175	E15-12	Ibrahim Mahrous Dahy Abd Allah	Ibrahim Mahrous Dahy Abd Allah	El-Hoda St.	Manual	6	9.00 6.00	OPEN	private	1	
176	E15-13	Yasser Mahmoud	Manual Tabakky	Abd Allah st. From Omar st.	Manual	6	10.00 7.00	OPEN	private	1	
177	E15-14	Abd eEl-Aal Darwish & Co.	Darwish Abd eEl-Aal Darwish	in the beginning of Pipes st. ,Behind Mosahmet El-Beheira	Manual	5	10.00 12.05	OPEN	private	1	
178	E16-1	Refaat Gaber Abu El-Magd	Refaat Gaber Abu El-Magd	st. 23 ,Ezbet Sekina	half-matic	9.5	7.00 11.00	OPEN	private	1	
179	E16-2	Youssef Kamal Roffaiel	Youssef Kamal Roffaiel	st. 6 ,Ezbet Sekina	half-matic	9.5	6.30 10.30	OPEN	private	1	
180	E16-3	Gamal Bekheet Manaa	Gamal Bekheet Manaa	st. 14 ,Ezbet Sekina	half-matic	9.5	7.30 11.30	OPEN	private	1	
181	E16-4	El-Said El-Rashidy Abd El-Rehim	Mohamed Farghaly Mohamed	st. 4 ,Ezbet Sekina	half-matic	12	8.00 1.00	OPEN	private	1	
182	E16-5	Amin Saad Ali	Amin Saad Ali	st. 1 ,Ezbet Sekina	half-matic	6	9.00 11.30	OPEN	private	1	
183	E16-6	Romany Aziz Awad	Romany Aziz Awad	st. 5 ,Ezbet Sekina	half-matic	5	9.00 11.05	OPEN	private	1	
184	E16-7	Makram Abdo Ali El-Sakka	Sahar Abdo Ali El-Sakka	st. 6 ,Ezbet Sekina	half-matic	5	9.30 11.35	OPEN	private	1	
185	E16-8	Tarek Youssef Abd El-Mawgood	Tarek Youssef Abd El-Mawgood	st. 3 ,Ezbet Sekina	half-matic	5	10.00 12.05	OPEN	private	1	
186	E16-9	Sami Wahba Abd El-Wahab	Manual Tabakky	Ezbet Sekina	Manual			CLOSED	private	1	
187	E16-10	Mostafa Morsy Badr	Reda Hussein Mohamed	Ezbet El-Nemr	half-matic	6	8.30 11.00	OPEN	private	1	
188	E16-11	Ragab Hassan Hashem	Ragab Hassan Hashem	Abees Bridge	half-matic	7	9.00 11.55	OPEN	private	1	
189	E16-12	Sahar Abd El-Kadeer Abd El-Fattah	Sahar Abd El-Kadeer Abd El-Fattah	Ezbet El-Mowazafeen	half-matic	7	8.30 11.25	OPEN	private	1	
190	E16-13	Akram Abd Allah Mohamed	Akram Abd Allah Mohamed	Ezbet El-Mowazafeen	half-matic	6	9.00 11.30	OPEN	private	1	
191	E16-14	Mohamed Abd El-Rahman Youssef	Mohamed Abd El-Rahman Youssef	1st Abees ,El-Nasreya	half-matic	16	6.00 12.40	OPEN	private	1	
192	E16-15	Abd El-Rahman Abd El-Latif	Faizah Abd El-Fattah Hassan	2nd Abees ,El-Nasreya	half-matic	7	9.00 11.55	OPEN	private	1	
193	E16-16	Abdo Thabet Dahy	Abdo Thabet Dahy	3rd Abees ,El-Nasreya	half-matic	6	10.00 12.30	OPEN	private	1	
194	E16-17	Besheer Beshry Morgan	Besheer Beshry Morgan	4th Abees ,El-Nasreya	Manual	5	8.00 6.00	OPEN	private	1	
195	E17-1	Amira Abu El-Yazeed	Amr Abu El-Yazeed Abd El-Salam	Abees 2	half-matic	8.5	8.30 12.05	OPEN	private	1	
196	E17-2	Gaber Hussein Abd El-Hamid	Ahmed Gaber Hussein Abd El-Hamid	3 El-Sahaba st. ,Abees 2	half-matic	9.5	7.30 11.30	OPEN	private	1	
197	E17-3	Ramadan Fahmy Abd El-Aaty	Ramadan Fahmy Abd El-Aaty	Abees 2	half-matic	8	8.30 11.50	OPEN	private	1	

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198	E17-4	Abd Allah Abd El-Hady Ali	Safaa Abd Allah Mahmoud Hassan	Abees 2	half-matic	6	9.00 11.30	OPEN	private	1	
199	E17-5	Abd El-Monem Mohamed El-Habashy	Abd El-Monem Mohamed El-Habashy	The New Exhibition st.	half-matic	5	10.00 12.05	OPEN	private	1	
200	E17-6	Hamido Mahmoud Allam	Hamido Mahmoud Allam	Abu El-Dahab,Abees 2	half-matic	5	10.00 12.05	OPEN	private	1	
201	E17-7	Karima Mohamed Shehata	Karima Mohamed Shehata	beside The Fire Station ,Abees 2	half-matic	5	10.00 12.05	OPEN	private	1	
202	E17-8	Hayam Mohamed Kotb	Abd El-Aaty Abd El-Alim	Abees 1	half-matic	6	7.00 9.30	OPEN	private	1	
203	E17-9	Ezzat Farg Abd El-Naby	Ezzat Farg Abd El-Naby	Abees 1	half-matic	9	7.30 11.15	OPEN	private	1	
204	E17-10	Othman El-Said el-Fishawy	Othman El-Said el-Fishawy	Nasser Project ,Abees	half-matic	6	8.30 11.00	OPEN	private	1	
205	E17-11	Alaa Abd Allah Abd El-Fattah	Alaa Abd Allah Abd El-Fattah	Nasser Project ,Abees	half-matic	5	8.00 10.05	OPEN	private	1	
206	E17-12	Khairy Bekheet El-Said	Khairy Bekheet El-Said	St. 6 ,Ezbet El-Zohour	half-matic	7	9.30 12.25	OPEN	private	1	
207	E17-13	Aida Mohamed El-Said	El-Said Mohamed Abu El-Kassem	the New Exhibition st.	half-matic	6	8.30 11.00	OPEN	private	1	
208	E17-14	Magdy Hassan Abd El-Wahab	Magdy Hassan Abd El-Wahab	Lower Khorshid	half-matic	10	7.00 11.10	OPEN	private	1	
209	E17-15	Baker Fouad Gad El-Hakk	Baker Fouad Gad El-Hakk	Lower Khorshid	half-matic	5	10.00 12.05	OPEN	private	1	
210	E17-16	Ragab Khalil hassan	Rashwan Omar Mohamed	Lower Khorshid	half-matic	5	9.00 11.05	OPEN	private	1	
211	E17-17	Magdy Mohamed Mohamed Baz	Naema El-Said Mohamed El-Said	50 El-Mahmoudeyya Canal st.	half-matic	5	9.00 11.05	OPEN	private	1	
212	E17-18	Maheer Ibrahim Mohamed	Maheer Ibrahim Mohamed	El-Mahmoudeyya Canal st. ,Ezbet El-Sheikh	half-matic	8	7.00 10.20	OPEN	private	1	
213	E17-19	Nouh Ahmed El-said Nouh	Nouh Ahmed El-said Nouh	Ezbet El-Awkaf ,lower Khorshid	half-matic	5	10.00 12.05	OPEN	private	1	
214	E17-20	Rashad Gomaa Abd El-Kadder	Rashad Gomaa Abd El-Kadder	El-Mahmoudeyya Canal st.	half-matic	5	10.00 12.05	OPEN	private	1	
215	E17-21	Abd El-Raouf Mohamed Abd El-Tawab	Abd El-Raouf Mohamed Abd El-Tawab	1st Abees Village	half-matic	4	10.00	OPEN	private	1	
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