Sustainable Urbanization in the Egyptian Desert, the case study Heliopolis

Investigating the Town Growth between 1905 and 1961 in Comparison to the New Urban Communities' Development within GCR

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Thesis submitted in a partial fulfillment for the requirement of
the degree of Master of Science in urban development

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Statement of Authenticity of Material

This thesis contains no material which has been accepted for the award of any other degree or diploma in any institution and to the best of my knowledge and belief, the research contains no material previously published or written by another person, except where due reference has been made in the text of the thesis.

Cairo, 12-May-2015

Signature

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Abstract

Egypt is urbanizing in an astonishing rate. Its cities are becoming large complex urban agglomerations with many social, economic and environmental challenges. After the 25th of January revolution in 2011, grassroots oriented change to the policies behind local planning and urban development is yet to be seen. The forty years old, new urban communities' development within the Egyptian desert, is ongoing with a limited success in meeting its three preset goals, to attract population growth away from the Nile valley into the desert, shrink informal growth and limit encroachment on agricultural land. The author of this thesis argues that the project has had its negative reflexes and side effects back on the already built mother cities. Today, the metropolitan Cairo region suffers a high-level of deterioration and dysfunction, there is a substantial loss to fertile land, and more than ever increase in informal sprawl. However, there is no doubt that desert urbanization is still the right solution to tackle the housing problems within the Nile Valley. The questions are how to configure the right model of development, and how to adopt the right policy for sustainable growth?

Owing to its special location, Egypt has been a place for various geopolitical transformations through its modern history. An interesting field of study is to trace back those changes through its corresponding impacts on the local planning and development mechanism. When different ideologies and policies came together to shape the urban setting and configure housing polices.

This thesis is a study with the aim to change the current Egyptian planning and development policy of desert urbanization. Instead of mainly putting "Theory into practice", this thesis is comparing "practice by practice" through addressing two models of urbanization in the Egyptian desert. The model of the city Heliopolis (the era between1905 until 1961) and the new urban communities' development within the Greater Cairo Region (GCR). The main thesis questions: is could the satellite garden town Heliopolis between 1905 and 1961, be considered as the best urban practice towards sustainable urban growth, in comparison to the new urban communities' development within GCR? The author has reached the conclusion that the answer is yes. It could be considered based on analyzing the environmental, economic and socio-demographic dimensions of sustainable urban growth.

Keywords: sustainable development, Heliopolis, new urban communities' development, desert urbanization, Greater Cairo Region.

Contents

Abbreviations

AUC	American University in Cairo
CAPMAS	Central Agency for Public Mobilization and Statistics – Egypt
ERA	Egyptian Railways
ESC	The Egypt Study Circle
GCR	Greater Cairo Region
GOPP	Egyptian General Organization of Physical Planning
HHD	Heliopolis Housing and Development company (Nationalized HOC)
HOC	Cairo Electric Railways and Heliopolis Oases Company
IFE	Institut Français d'Egypte
IUCN	International Union for the Conservation of Nature
LILP	Lincoln Institute of Land Policy
NOUH	National Organization for Urban Harmony
NUCA	New Urban Communities Authority - Egypt
SDASM	San Diego Air & Space Museum
SIS	Egyptian State Information Service
TCPA	Town and Country Planning Association – United Kingdom
UIOWA	The University of Iowa
USSR	The Union of Soviet Socialist Republics
WCED	World Commission on Environment and Development

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1. Introduction

1.1. Topic

Western and Oriental ideologies of development shared a common perspective in the city Heliopolis initiated in the early 20th century. The city, built by Cairo Electric Railways & Heliopolis Oases Company (HOC), introduced the first model of garden city suburbanization in the desert near the historical city of Cairo. Heliopolis was initiated just few years after Ebenezer Howard published his book Garden Cities of Tomorrow in 1898. The city was built parallel to the construction of many Garden cities in Europe [1].

Egypt has a key transitional location between the north and the south. By late 19th century. The development of railway networks and electricity placed Egypt on the industrialization path. Same path in parallel to many European countries at that time. Industrialization opened the gate to provide new means of transportation that helped to override the time-space relationship. Thus, to evade from the old deteriorated cities and to build up new towns and suburbs. Heliopolis is a key city that shaped the metropolitan development of Cairo. The city, which originally developed as an Oasis, represents the first model of suburbanization outside the Nile Valley. It adopts a controversial model that gathers between the prospects and characteristics of a Garden city, a satellite city and a Green city [2].

Baron Impain has built the town Heliopolis, as a global city. The main target group, “Europeans” were invited to settle down and live in the new built desert city near Cairo. A new trend of life has been created, a life that is affected by several natural and man-made contextual parameters. A life that is enriched by a clear identity and also by new means of communication, creating a new time-space relationship , developed by its own structure and its own rhythm. The new city has managed to gather many vulnerable social classes in one urban platform. Careful planning and development succeeded to break the boundaries between different ethnics and cultures [3].

In the context of the Nile valley, where environmental aspects of development have to be maintained parallel to accommodating the population growth in a sustainable way. There is an urgent need today to revisit Heliopolis and to understand it from a sustainable perspective. In the age of globalization, Heliopolis represents a unique model where urbanization become a tool for social and cultural integration. It is also a city where the uprising Industrial driven urbanization had to conquer the desert using a western mindset of development. Heliopolis managed to create a catalyst of cultural

[1] Alhowaily, 2014.
[2] Ibid.
[3] Ibid.

diversity while maintaining the national Egyptian identity as a base. Several European nationalities, mainly, were emigrating from Europe to settle down in Heliopolis, the opposite to today's case [1].

Several planning and development strategies have taken place within the Egyptian context during the modern era of the Egyptian state [2]. "Urban Egypt" today demonstrates the involvement of several, global and local inputs to the field of urban planning. Due its Geo-political location, several political and social aspects contributed to the formation of today's built up cities. After decades of colonialism, the Egyptian practice in the field of regional and urban planning is still underperforming and unable to effectively achieve the goals set during the last century. Heliopolis today is a district surrounded by Metropolitan Cairo. A district, which played a very vital role in the modern Egyptian history.

Academic research has to document and evaluate the original statues of the suburb and its evolution to provide guidance to today's new urban communities in Egypt. Close monitoring and assessment of urban communities is part of sustainable planning approach. The Urban development strategies has to maintain a solid base of knowledge on the evolution and the development of the past urban communities in order to effectively plan for future settlements [3].

Why there is a pressing necessity to revisit the city Heliopolis today? The answer to this question will be based on screening the status of today's new urban communities in Egypt, AbdelKader & Ettouney in 2005 and 2013 provided a study on the Egyptian new urban communities initiative that took place in the beginning of the 1970's with clear goals [4] such as:

- To reduce the encroachment on the agricultural land in the Nile valley.
- To overcome the lack of urban land for development and housing shortage.
- To evade from the deteriorating urban fabric, weak infrastructure, facilities and low quality living.

Today, the new urban communities are clearly lagging behind its planned goals [5]. Making it even harder to imagine their success in facing future challenges without assessing and altering their current performance. The vulnerability to global warming, the near future scarcity of fossil fuels and the escalating population growth, those are three pressing challenges that will shift not only Egypt, but many countries in the MENA region to build and develop sustainable cities. As a hyper arid climate [6], The MENA-Region is particularly vulnerable to global warming due to its tense environmental conditions. The resulting raising temperature will continue to push the region from the state of water stress to water scarcity, and will continue to build up high tendencies to rely on heavy mechanical acclimatization and heavy energy consumption. Parallel to the undergoing challenges of global

[1] Alhowaily, 2014.
[2] The Modern Egyptian state starts in the early 19th century since the emergence of Muhammad Ali's rule. Ali's modernization project involved suggesting a new map for Egypt and building a new army (SIS, 2013).
[3] Ibid.
[4] AbdelKader & Ettouney, 2009, p.1.
[5] Ibid, pp.11-12.
[6] Nasr, 1999, p.15.

warming, population growth in the MENA region will increase the residential housing stock by 24 million new housing units by 2030 [(1)].

1.2. Research Objectives

This Thesis is focusing on the suburbs Heliopolis in the era between 1905 and 1961. The era starts by the development of the city and ends by the nationalization of the company and all of its assets in 1961. The research hypothesis assumes that the city Heliopolis is considered to be the best practice toward "sustainable urban growth" within GCR in comparison to the new urban communities. This thesis intends to obtain the learned lessons of such an urbanization model beside proving or concealing the hypothesis. In addition, this thesis tends to investigate the garden city model application in the arid desert, the city is characterized by several environmental measures that were applied on the on the urban and architectural level. To summarize, the research objectives are:

- Evaluation of the city Heliopolis in the period between (1905- 1961) based on the dimensions of sustainable urban growth. (Discussed in details in the second chapter).
- Compare the city to the new urban communities' development within GCR in the last 40 years.

1.3. Research Question

The thesis question is, could the satellite garden town Heliopolis between 1905 and 1961, be considered as the best urban practice towards sustainable urban growth, in comparison to the new urban communities' development within GCR?

1.4. Research Methodology

The research method applied in this dissertation is a mixture between deskwork research and analysis of a primary data collected mainly from different academic and field recourses. For the first phase of research (the second chapter), the Author revisits the concept of sustainable development and provide the theoretical knowledge required for proceeding to the qualitative analyses of this research. The terms Sustainability, sustainable development, sustainable urban development and growth are investigated through key academic articles to understand notion of the trend "sustainability" through its dimensions and characteristics. The author relates the concept of sustainability to suburbanization to link between the concept and urban growth and to elaborate a clear analytical structure for the thesis.

[1] MED-ENEC, 2012, p.3.

The Analysis of data during the next chapter will adopt a qualitative approach to identify the patterns of development, extract themes and make observations.

Within the third chapter, the author proceed to investigating the new urban communities' development in the Egyptian desert. The investigation will be based on the dimensions of sustainable growth elaborated in the previous chapter (theoretical background), environmental, economic and socio-demographic. The chapter will focus in particular on the developments within the Greater Cairo metropolitan region (GCR). The reason behind, is that GCR hosts the case study of this thesis Heliopolis, and focusing within a single geographical area will help to relate the development both eras to each other. The author depends mainly on the literature discussing the new urban communities, its evolution, growth and operation.

Within the fourth chapter, the author, revisits and investigates the case study Heliopolis and adopts a historical approach to find and recover data about the old city. Up to five visits have been conducted to HHD headquarters in Heliopolis (Figure 1). Fortunately, the author has managed to gain access to HHD's archive. Several Drawings that dates back to early 20th century has been recovered and analyzed. In addition, the researcher gained access to the company's construction license and regulations archives. The granted access unveiled part of HOC's planning and building regulations.

The research will take in consideration the geo-political circumstances as well as the socio economic situation that helped to shape both Heliopolis and the new urban communities.

Within the last phase of research (chapter 5), a summery to the main findings and the learned lessons of both proposals will be included in the conclusion.

Figure 1: Left picture the HHD headquarters in Heliopolis. Middle picture: the spacious atrium where HOC used to serve its customers, Right picture and bottom left: inside the company's archive. Bottom middle: building 33 in Heliopolis and bottom right. Building 57 in Heliopolis.

Sources: Left: (Dobrowolska, 2006), middle and right and bottom pictures: HOC archives.

1.4.1. Literature Review

The master thesis topic acquired the investigation of several academic and non-academic resources. In general, literature review was concerned with three main divisions regarding sustainable urban development, the new urban communities and the case study Heliopolis.

For the first part, sustainable urban development, the author approached the broad field of sustainability through reading several key articles (selected according to their relevance to the topic) such as the article of Alberti in 1997 *Measuring Urban Sustainability,Providing Signals for Monitoring Urban Performance and Defining Urban Ecological Space Developing Urban Sustainability Indicators.* One year before, W. Maclaren in 1996 introduced in her work the characteristics of sustainability. Her work helped the author to extend his knowledge on the interrelated aspects of sustainability. Portnov & Pearlmutter in 1999 introdced their work *Development Peculiarities of Peripheral Desert Settlements,* where the concept of sustainable growth in the desert is investigated.

Later within the same chapter, the auther found the essasy's of LeGates & Stout and Fishman in the *City Reader book* (2000) to best illustrate the American expeience in subrbanization as a mode of urban growth.

In the third chapter, different literature investigated the new urban community's development in Egypt. Key articles are those of 2009 and 2013 by Abdel-Kader & Ettouney. The articles represent a comprehensive investigation of the development. They provide a critical reexamination and assessment to their progress in comparison to their early development goals.

The city Heliopolis is well known at the international and national level. It do constitutes a major attraction for many writers and academic researchers. Therefore, several books have been published to narrate and document the evolution of the city. Many of these books discuss the city from a historical point of view as well as from architectural, urban and socio-cultural perspectives.

However, books as a *"Journalistic resource"* are not a sufficient base for an academic research [(1)]. In the case of this paper, the author can argue for two main reasons, the first is generally academic. Books are not "peer-reviewed" as other authors do not review the published information. Secondly, in the case of Heliopolis, books do not provide information from the standpoint of a Real estate or urban development venture. Thus, it is hard to imagine integrating the knowledge provided into practice. Moreover, the information are not always provided in scientific approach. Due to lake of academic recourses, the author integrated specific books, that were published by universities or research centers as they represent a good academic resource [(2)].

For writing this Thesis, The author reviewed several resources at libraries of different Egyptian and German universities in order to unveil all the possible academic primary resources that mentioned Heliopolis. Such as Cairo University, Ain Shams University, Ain Shams University Faculty of Education, Masr Elgedida library and finally, the TU-Berlin Central Library in Germany. Unfortunately, as most of the archived data and company resources were took back to Belgium after the nationalization of the company [(3), (4)]. The local research input to the documentation of the city is still of few quantities. The most comprehensive academic research that has been conducted is the work of the French historian Ilbert Robert in His Ph.D based book "Heliopolis, Le Caire 1905-1922, Genese Du'ne Ville" published in 1981. The Book Unveiled many valuable information that documents the city growth until 1922. The evolution of the suburbs as a real estate venture has been most covered in Ilbert's Ph.D. based book. Unfortunately, the Ph.D. dissertation is written in French. The language somehow constituted a barrier that kept a low profile to his work until today in Egypt. However, several number

[1] UIOWA, 2014.
[2] Ibid.
[3] Salem, 2014.
[4] Almaghrabi, 2014.

of local academic research were conducted on Heliopolis with more focus on the current status of the city.

This thesis is focusing on the original planning and development of the city that took place until the nationalization of the company. The first task conducted by the author in the process of literature review was to read, translate and summarize Ilbert's book. The Author overcame the problem of the language by getting assistance from French language speaker as well as different automatic translation websites.

During Literature review, the author defined a number of key resources for the purpose of research. Ilbert's studies on Heliopolis still the most comprehensive and practical ones to investigate the early growth of the city. His Ph.D. based book published on 1981 "Heliopolis, Le Caire 1905-1922, Genese Du'ne Ville" discusses the early growth of the city mainly in two main sections the corporate structure/operation and the realization of the city. His work is based on diverse data resources including interviews to the company's' officials, reviewing the archives of the company in Cairo, Paris and Brussels as well as his fieldwork. Another brief article by Ilbert published by the Aga Khan "*Heliopolis Colonial enterprise and Town Planning Success?* ", contributed to the documentation of the city as well as the enterprise HOC, The article is published in English and it is nearly a summery to his Ph.D work.

Between the 1981 and 2005 several local academic research has been conducted on the city. For example, in 1985, Elkougah [(1)] presented a study entitled "The suburbs of Heliopolis, a study to the urban growth" the study tackles a geographical dimension of urban growth, the architecture, population density and public services between year 1954 to 1977.

From the beginning of 2005 and parallel to the celebration of 100 years on the evolution of Heliopolis, several publications came to investigate the city. In 2005, the Economic and Business History Research center in the AUC published the article "A Brave new city, Heliopolis: Place, Business and People" by Hussein & Attalah. The article represents an intensive research that depended mainly on both the review of Ilbert work and on the bilateral research with the old residents of Heliopolis. The article adopted local interviews with the old residents as an approach to research business history within the settlement [(2)].

The same year, 2005, witnessed the publication of "*Mèmories Hèliopolitaines* [(3)]. The book is a product of an academic research and it is published by the IFE celebrating 100 years of the city Heliopolis [(4)]. In this book, the city is documented through the resident's eyes who witnessed the early growth of the city. Meanwhile, the book unveiled many information on the social daily life of the city as well as the early growth of Heliopolis.

[1] Elkhougah, 1985.
[2] Hussein & Attalah , 2005, p 39.
[3] The memories of Heliopolis.
[4] IFE, 2005.

In 2006, Mahrous has created a land use study to the District of *Maṣr el-Gedīda*, the study presents an overview of the development of land use within the district until 2006 [(1)]. Mahrous based his studies on extensive field survey. A brief overview on the evolution of the district is presented in the first chapter. Mahrous study is a documentation to the status of the district. His research unveiled the dramatic change in the public land use, especially the military land use that occupied the second rank after roads and street networks [(2)].

In 2006 Agnieszka & Jaroslaw Dobrowolska[(3)], presented their book "*Heliopolis, Rebirth of the City of the Sun*". The book starts with a comprehensive study to the ancient Egyptian era of the city Heliopolis. Then, the book analyzes the evlution of the 20th centry city until its modern days as a district in Cairo.

In 2014, Mahy Mourad, presented her master thesis dissertation *Urban Space and Politics of Transition in Contemporary Cairo*. Mourad adopted the city Heliopolis to trace the nowadays seemingly disordered developments to the roots of their origin at the outset of the 20th century, in four processes of making, coping, consuming and reclaiming[(4)]. Mourad master thesis dissertation has not been published yet.

After carring intensive literature review, the author came up to the result that until the moment of writing this dissertation, no research has been conducted to evaluate Heliopolis In relation to today's urban communities' development in Egypt. Heliopolis as a real estate venture or an urban development is yet to be investigated in comparison to the new urban communities in the desert fringes of metropolitan Cairo.

1.4.2. Fieldwork, Site Visits and Interviews

Site visits helped to capture many of the urban and architectural characteristics of the city. Fieldwork also enabled the researcher to determine the buildings to look for in the company's archives. The selection was based on the environmental characteristics of the buildings and the completeness of the drawing sets. Interviews were conducted at HELI's company main quarter to several key officials to discuss several aspects regarding the growth of the city.

1.5. Research Terms and Definitions

[1] Mahrous, 2006.
[2] The city Heliopolis was the nucleus of *Maṣr el-Gedīda* district. The district is the eastern gate to metropolitan Cairo.
[3] Dobrowolska, 2006.
[4] M. Mourad, 2014.p 5.

Within the first chapter of this thesis, the author attempts to deliver a precise definition to the term "sustainable urbanization" in terms of dimensions, components, and characteristics. In order to reach a clear understanding, other terms are investigated such as sustainable development, urban sustainability and sustainable growth. However, in these terms, sustainable urbanization implies growth and harmonic development with the environment where services and habitat conditions can provide the inhabitants with optimum living conditions, and where pollution and destruction of water, soil, air, flora and fauna are minimal [(1)].

The Egyptian Desert is divided over four main sections, the Nile Valley, the Eastern Desert, the Western Desert and Sinai Peninsula. In the third chapter, further description to each section is elaborated in order to understand the challenges of desert urbanization. The Nile Valley is a fertile corridor that extended from south to the north of the country and in most cases contain no desert areas. However, according to the topography on the Nile valley fringes, desert lands occasionally represents its adjacent boundaries. The new urban communities' development were all built on desert lands including desert lands existing within the Nile Valley section.

[1] Afify, n.d., p. 1.

2. Sustainable Urban Development, Theoritical Background

In the this chapter the author will review the concept of sustainability and its interrelation with the urban context in order to reach a clear understanding to the notions of sustainability. The understanding will help to build a solid base before proceeding to the next chapters and answering the research questions. The chapter provides theoretical background on sustainability, its corresponding characteristics, sustainable urban development, sustainable urban growth, and relating sustainability to the era of suburbanization.

The chapter is a preparation to start investigating sustainable urbanization within the Egyptian desert along the Egyptian New Urban Communities development, paying special attention to the Greater Cairo Region (GCR). Afterwards, an ex-post analysis to the growth of the city Heliopolis within GCR will be initiated.

2.1. Reviewing Sustainability, Definition

"Sustainability" has become the word and theme of our time. The term is widely interpreted in different definitions within different research fields. One of sustainability definitions has been cited by Portnov & Pearlmutter, in 1999 after Goodland and Ledec in 1986, "*a pattern of development which optimizes the economic and other societal benefits in the present without jeopardizing the likely potential for similar benefits in the future*" [1]. The word *sustainability* means *that a subject is able to be maintained at a certain rate or level* [2].Another lateral definition to the word refers to *the endurance of systems and processes*. The term Sustainability, was first used in forestry and fisheries to refer to management strategies that keep harvest rate below replacement rate [3].

The built environment, the urban form along with individual consumption choices are the largest contributors to consumption and waste production. Those are the locations where people live, work, learn and shop and travel between those locations. Cities has become the dominant place where sustainability are tackled. Today, urban areas are the primary habitat for the human being. In 2007, humanity has crossed the 50% mark, the percentage represent the transfer of the human population of this world for the first time from agrarian species to mostly urban species [4] [5]. In Egypt, urban

[1] Portnov & Pearlmutter, 1999. p.280.
[2] Oxford Dictionaries, c2015.
[3] Alberti, 1997, p. 382.
[4] Wu, 2010, p 1.
[5] Jianguo Wu in 2010 also referred to the gradual global increase of urban population, 2% in year 1800, 14% in 1900 and 30 % in 1950.

population reached around 37 million inhabitants with a level of urbanization that reached 43.3%. In 2010 in an expected projection of 50% within 2030 (1).

The term *sustainable development* came into prominence in 1980. When it was first introduced by IUCN in the framework of the world conservation strategy. The strategy came with the overall aim of achieving sustainable development through conserving living resources (2).

In order to relate sustainability to the urban level, and in particular, the city scale the following question arises, what makes a city sustainable?

After conducting research and intensive literature review. The author would argue that there is no easy - or single - answer to the question as sustainability depends on numerous interrelated components on the long and short term.

Today, no city could sustain itself without depending on the carrying capacity of their hinterland or region. Even further, the boundaries of the area of sources and sinks have expanded beyond hinterland or region. Therefore, a sustainable city is considered a self-reliant city; On the other hand, a city that tends to be self-reliant is a city that depletes its resources base and becomes less resilient and more vulnerable to external stress (3).

In theory, three conditions shall be met in order to consider a city sustainable. First, the city shall adopt the best available technology in order to minimize its impact on natural resources. Second, supposing that cities has surpassed the carrying capacity of its hinterland and thus, importing carrying capacity from other regions, it must be based on an ecological surplus in these regions. Third, this same city should compensate the exporting regions for the value of ecological productive capacity it has subtracted. This means that cities shall recognize both issues, the finite nature of the natural resources base upon which all urban activities depend and The needs of all the people, not only the population living within the city boundaries, but the future generations as well as the present one (4).

1 UN-Habitat, 2013. p. 169.
2 Portnov & Pearlmutter, 1999. p.276.
3 Alberti, 1997.p. 383.
4 Ibid.p. 384.

2.2. Characteristics of Sustainability

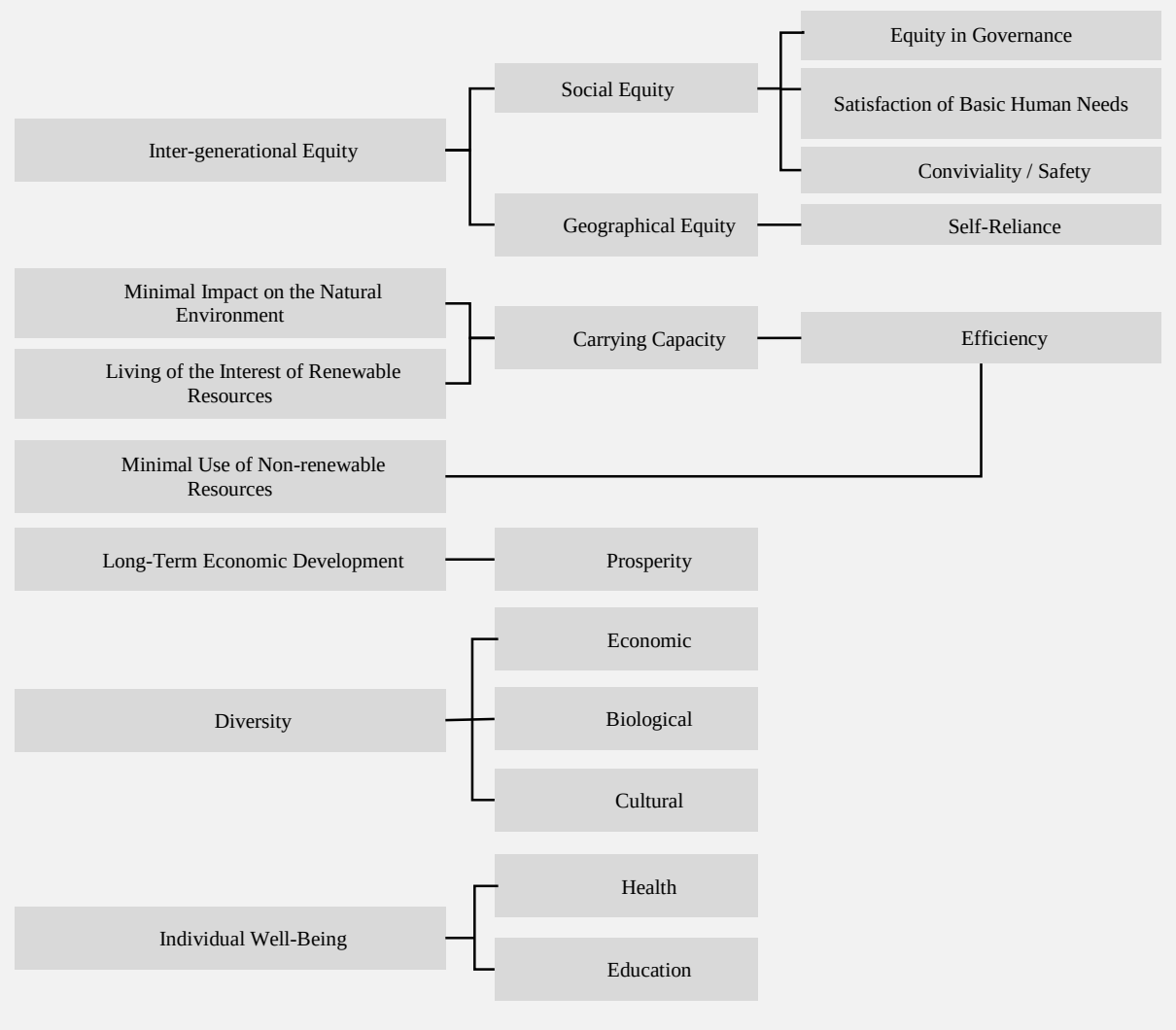


Figure 2: Characteristics of sustainability.

Source: (W.Maclaren, 1996: 3)

Sustainability has three main dimensions, environmental, social and economic. Sustainability has different characteristics as well. W. Maclaren in 1996 has introduced the characteristics of sustainability (Figure 2).

The characteristics starts with intra-generational equity, which means the needs of the future generations, are as important as the needs of the current generations. In this form of intergenerational equity, there are two components, social and geographical equity. Social equity means the fair distribution of the costs and benefits of the natural resources use and environmental protection, taking into account basic human needs such as, food, shelter, employment, public facilities and services. Within the context of sustainability, Social equity refers to the improvement of equity in a broader

sense, for example, more equitable distribution of income and the elimination of discrimination. Two other aspects of social equity are governance and conviviality. Equity in governance contains concepts such as self-determination and a more participatory approach to governance through community based decision-making. Conviviality means that people live together in harmony and without fear to their personal safety [1].

The second component of intergenerational equity is "geographical equity". The concept underlines the under desirability of achieving the economic growth, or the higher quality of life, in one community at the expense of environmental degradation at the another [2].This type of development is inequitable unless some form of reparation or compensation takes place between the two communities. Geographical equity also implies that sustainable communities support global sustainability by minimizing their contribution to geographical inequities by increasing its capacity for self-reliance. This would involve both, minimizing its consumption of resource inputs from outside the community, and its production of waste outputs. In practice, a goal of total self-reliance may be neither feasible nor realistic. Another characteristic of sustainability is producing minimal impacts on the natural environment. In which the assimilative capacity of the natural environment is able to absorb, render and to compose all the all types of waste discharges. The next characteristic is living of the interest of natural resources, where the depletion rates for renewable resources does not exceed the regenerative capacity of their producing natural system. In this case, both, living of the interest of renewable resources and the minimal use of non-renewable resources are defined as the carrying capacity in which efficiency would lead to the minimum use of natural resources. Urban wise, the increased efficiency in utilizing land and other resources could be minimized through two levels: Reducing urban sprawl and building compact urban form, in which economic efficiencies in the reliance on automobile decreases and provision of public transit system increase [3].

Long-term economic development is obtained through an enduring economic vitality, or in other words, economic prosperity as an essential aspect of sustainability. The next characteristic of sustainability is diversity, where the ability of the urban system to adopt to change, is increased based on its diversity on the level of economic cultural and biological elements. The last characteristic of sustainability, is the individual well-being, the characteristic extends to the levels of his or her social, physical and mental well-being. Developing the human potential through health and education contribute to individual well-being, which also requires the fulfilment of basic physical and economic needs [4].

[1] W.Maclaren, 1996, p. 1- 2.
[2] Ibid, p. 2.
[3] Ibid.
[4] Ibid, p. 5.

2.3. Sustainable Development

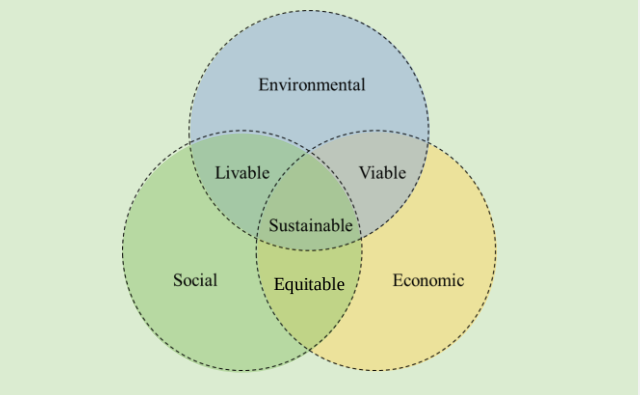


Figure 3: Classic dimension of sustainable development.

Source: (Tanguay et al., 2010)

After discussing the term *Sustainability* and its characteristics, this section will investigate Sustainability as a development process. In general, Sustainable Development has been defined by the world commission on environment and development WCED in 1987. ‘‘Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [(1)], it contains two key aspects [(2)]:

a- The concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given.

b- The idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

Furthermore, the concept of sustainable development comprises and interrelates three aspects and qualities: environmental, social and economic with livability, equitability and viability within a certain territory [(3)]. If it considered a certain territory is considered sustainable, it must incorporate the qualities associated with the interactions and overlapping of these aspects. Accordingly, all aspects must be equitable (interaction between the social and economic dimension), livable (correspondence of the environment to social requirements, referring to the concept of quality of life) and viable (economic development must keep to the supportive capacity of the ecosystems, and reduction of non-renewable resources must be avoided).

[1] Tanguay et al., 2010, p. 407.
[2] WCED, 1987, p.41.
[3] Tanguay et al., 2010, p. 407.

2.3.1. Urban Sustainability

Where the term “sustainable development” comes with three classic dimensions, social, economic and environmental, according to Allen in (2009), urban sustainability adds two other dimensions, which are political and physical sustainability (Figure 4).

The sustainability of the built environment “physical sustainability” is concerned with the capacity of an intervention to improve the livability of buildings and to urban infrastructure for “all” city dwellers without disturbing or damaging the urban region environment. Furthermore, it includes a concern for the efficiency of the built environment to support the local economy. On the other hand, political sustainability is concerned with the quality of governance systems guiding the relationship and actions of different actors among the social, environmental, economic and physical sustainability. Therefore, it implies the participation and democratization of the local civil society in all areas of decision-making [(1)].

All these dimensions are investigated within an urban – regional ecological capacity where the overall aim of achieving urban sustainability is fulfilled within all the urban cycles on the macro level.

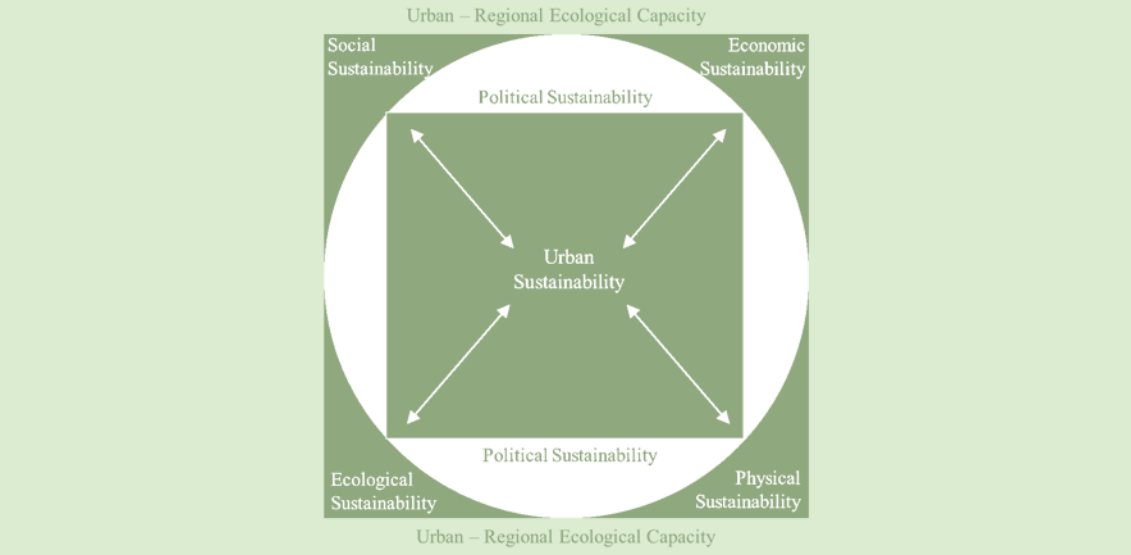


Figure 4: The five dimensions of urban sustainability.

Source: (Allen, 2009)

[1] Allen, 2009, p.1.

2.3.2. Sustainable Urban Development or Growth?

The terms sustainable urban development and sustainable urban growth constitutes an issue of a scientific debate. The terms are very close in meaning, but totally refers to different notions. According to Daly in (1990) the term *sustainable urban development* is regarded as a qualitative concept that emphasizes progress, improvement or positive change, while the term *sustainable urban growth* implies the continuous physical or quantitative expansion of an urban area and the economy supporting it [(1)]. The word *to grew* means to increase naturally in size by the addition of material through assimilation or accretion. While the word *to develop* means to expand or realize the potentials of; bring gradually to a fuller, greater, or better state. Therefore, the word development refers to qualitative improvement or unfolding of potentials [(2)]. Daly in (1990) also argues that since human economy is a subsystem of a finite or limited global ecosystem, which does not grew, even though it develops, therefore, out of her point of view, it is quite obvious that the economic growth cannot be sustainable over a long periods of time. Thus, the term *sustainable urban growth* represent a condition that is not possible to achieve.

Portnov & Pearlmutter in 1999 delivered a different approach. They argue that sustainable urban growth in particular is open to other interpretation, based on his definition to the word development, which means either, growth and/or change. He inferred sustainable growth to cover three dimensions environmental, economic and socio-demographic, discussed in more details in the next section.

2.3.3. Dimensions of Sustainable Urban Growth

Sustainable urban growth remains open to a variety of interpretations. However as discussed before, Portnov & Pearlmutter has interpreted at least three major dimensions in which sustainable urban growth could be investigated: environmental, economic and socio-demographic dimensions.

Within the environmental dimension, sustainability is intimately connected with some degree of self-reliance on the regional level, which does not necessarily represents absolute self-sufficiency. The issue that it is virtually unknown to civilization. In terms of economic dimension, cities obtain increasing proportions of their material support from beyond their own region. In terms of socio-demographic dimension, it refers to the overall stability of population growth in particular geo-graphic areas. In terms of the economic dimension, economic process depends on environmental quality and the claim that the deterioration of the environment is also an economic problem [(3)].

[1] W.Maclaren, 1996.p 2.
[2] Daly, 1999, p. 1.
[3] Portnov & Pearlmutter, 1999. pp. 278-282.

2.3.3.1. Environmental Dimension

Population, consumption and technology, the multiplicative interaction of these three conditionally independent variables constitutes the environmental dimension of sustainable development. Sustainability constitutes those variables as they represent a downward and upward pressure on the existing environmental resources such as food energy ,water , etc… Here, the concept of Bio-regionalism comes about the notion that cultural life is based on nature and the particularities of ecology and place. Bioregion concept stems from the "Urban hinterland model" in which the surplus of the rural resources are provided for an urban based processing, to produce a richer variety of services and products for both the city and the isolated rural population within its spatial proximity. Absolute self-sufficient city is unknown to civilization, it is suggested that until the 19th century, the majority of urban population settled in regions where the amount of urban population was closely adjusted to the carrying capacity of the urban hinterland [(1)]. According to Atkinson (1992) cited by Portnov & Pearlmutter (1999), Bioregions are:

a) Geophysical and ecologically coherent areas of territory. Although, it is not necessarily defined by rigid boundaries. The primary concern is that development strategies should work with, rather than being determined to exploit the resources of the region.
b) Bioregions are culturally coherent entities, in which development can be informed by `local knowledge' more than globalized preconceptions.
c) The concept of bioregionalism focuses on changes in lifestyles and consumption patterns, rather than solely on the dynamics of production and it may be expected to be disseminated (marketed) more by the demonstration of alternatives than by analysis and explanation.
d) The measure of wealth of a bioregion is the degree of attunement to its `carrying capacity,' a concept that only has relevance if its resources are not overburdened by extra regional demand.
e) The bioregional economy is self-reliant, which means that practically everything consumed is regionally produced.

Portnov & Pearlmutter (1999) cited Atkinson (1992), showing that environmental crisis cannot be solved by technical and administrative measures alone concerned with the physical environment, but rather creating a society that will maintain its environment [(2)]. In this sense, bioregionalism also picks up the course of socialism, in viewing the third world cities' unsustainability as a direct result to European colonialism, which has eroded indigenous cultural structures of welfare and environmental management without building satisfactory new ones [(3)].

[1] Portnov & Pearlmutter, p. 279.
[2] Ibid, p. 278.
[3] Ibid, p. 279.

2.3.3.2. Economic Dimension

There is a very strong relationship between economy and environment. The environment provides useful material and energy inputs for the economic process. These functions underline the dependency of the economic process on environmental quality, and the assertion that the deterioration of the environment is also an economic problem. On the other hand, the environment assimilates the waste by-products generated by this process.

Portnov & Pearlmutter, have cited Barbier (1989) who obtained that policy-makers in industrial countries who wish to avoid the environmental degradation, high unemployment, resource scarcity, and misallocation of capital, which may be endangered in the long run by such a pattern of development, they should abandon the sole emphasis on growth as a primary objective of an economic activity. Therefore, it has been suggested that economic development, may be based on a more comprehensive set of welfare indicators: education, health, and quality of life [(1)].

2.3.3.3. Socio-Demographic Dimension

Socio-demographic aspects of sustainable urban development interpret the phenomenon in terms of the overall stability of population growth in a particular geographic area, and deal with specific aspects in particular such as the optimal size of a settlement and the rural-urban balance of a region. However, In order to measure the degree of sustainability among an urban settlement in its population growth, three major indicators are commonly used [(2)]. They are:

a) The overall rate of population growth.
b) Percentage change of urban population in the area; and
c) The average rate of net migration.

Within the case study of this thesis, getting the precise census about the previous figures is quite difficult; therefore, the author will try to investigate the available data within a qualitative approach.

2.4. Relating Sustainable Growth to Suburbanization

Expansion of cities in the modern world comes through natural informal growth or, planned urbanization or development. In the late19th and 20th century with the aim to plan the urban growth, the

[1] Portnov & Pearlmutter, 1999. p. 280.
[2] Ibid, p.81.

expansion of cities aims at absorbing the growing population and the urgent need of housing supply. While the growth and expansion of cities are based on the escalating population growth, which adds to the pressure on the bioregional capacity, to live of the interest of natural resources, and the minimal use of non-renewable resources. In other words, when relating to suburbanization, it would mean reducing urban sprawl and building a compact urban form, in which economic deficiencies in the reliance on automobile decreases and the provision of public transit system increase.

It has been elaborated within the previous sections that sustainable urban growth is theoretically possible, only when a higher policy of sustainable development on the wider scale is implemented. In which city growth through suburbanization is considered as an *urban maneuver* to escape from the deteriorating and non-sustainable conditions of the mother cities. Therefore, the General notion of sustainable urbanization implies "the growth and harmonic development with the environment where services and habitat conditions can provide the inhabitants with optimum living conditions, and where pollution and destruction of water, soil, air, flora and fauna are minimal" [(1)]

The following section investigates the notion of suburbanization and its different forms in relation to sustainability. The section aims to provide the theoretical knowledge needed for the investigation of the case study of this research. Two main models are investigated, the Garden-city model and the Techno-city model. Those two models were selected for their relation with the models both Heliopolis and the new urban communities. The models are discussed in detail within the next chapters.

2.4.1. The Evolution of Suburbs, the Models of the North

Suburbanization has been a dominant player in changing our built environment and a typical trend of urban expansion in various cities along the last decades, the evolution of modern forms of suburbanization is related to the rabid development of cities in the last two centuries. Before proceeding to further understanding to the notion of suburbanization, a brief overview of the development of cities in the last two centuries is essential.

Cities are human made entities inserted into a preexisting environment. Although city planning has existed as an organized profession for less than a century, all cities display various degrees of conscious design and logic in their layout and function. Since the turn of the 19th century and industrialization, cities are used in more ways than before. Driving cities to extend and expand. Industrial revolution caused rising city sizes and an increase in population numbers with a living conditions inside that suffered pollution, overcrowding and the spread of diseases. Within the late 19th century and the early 20th century, the world witnessed many initiatives and developments to cure the illness of the densely populated cities.

[1] Afify, n.d.p. 1.

Urban public health gradually came into concern. There was an urgent need to control air pollution, to apply water purification and to build a sewerage system. However, there was no regulations to the city development. Urban design as a discipline started to emerge to cover up issues such as the expansion of cities, infrastructure, and housing shortages.

2.4.2. The Garden City, *The early 20th Century European model*

Back to year 1898 when Ebenezer Howard book published his book, Garden cities of Tomorrow. He opposed the urban crowding/ density and combined the best elements of the city and country, and avoided the worst elements of city and country in his well-known approach, the three magnets.

Towns represented high wage, opportunity and amusement where country represented natural beauty, low rents and fresh air. The new town-country (or garden city), was separated from the central city by a green belt and formed the basis of the earliest suburbs (Figure 5). Howard's city was to extend over 2400 Hectares with an average of 400 buildings. Garden city is distinguished by connection to the countryside. The city was surrounded by a green built (1) to prevent urban sprawl from one side and to enable the agricultural practice for the residents on the other side.

The first application of the garden city model was the city of Letchworth in England 1899 (2) the city plan was laid by the British planner, Sir Raymond Unwin. The Garden city, model was different from a green city model or a satellite city model, it constituted a place that gathers between work and residence, avoiding the trap of creating a dormitory town. The case study Heliopolis in this thesis is considered as duplicate from the city Letchworh, from the aspects of urban layout for many pragmatic reasons (3).

However, Traces to the development of suburbs, could be found since the 18th century, when suburbs were clusters inhabited by the poor and /or the disreputable people on the outskirts of the town, when city centers were occupied by the affluent rich people and the middle working class. Garden cities represents another case where suburbs was created for the upper and the middle classes, the idea was to

[1] Ilbert, 1985.p 77.
[2] Ibid, 1985.p 49.
[3] Ibid.p 77.

create perfect syntheses of urban sophistication and rural virtue. Suburbia has built its vision of community based on the primacy of private property and individual family [1].

Figure 5: Group of slumless smokeless cities Ebenezer Howard's 'Social City' diagram.

Source: (Howard, 1898)

The invention of railway and especially, automobile transport has extended the horizon for the planning of the physical environment. Residential settlements are no longer limited to the actual distance. It is now related to how much time would it takes to travel a 60 miles? and how flexible the mean of transportation is? The concept of Garden cities comes as a result of twenty to thirty years' timescale thinking rather than the five years housing supply. It is considered as a community based project, where community participate in local governance and manages the assets of the city. From a financial point of view, the finance of the city is highly dependent on the concept of value capture, where infrastructure provision and the proximity to various amenities helps to lift up land values for the benefit of the community[2].

2.4.3. The Techno-City, *Post World War II American model*

While the Garden city model in Europe was mainly depending on providing, a mass transit system through railway transport. The American model of Suburbs or as defined by Gans in 1967 as the

[1] LeGates & Stout, 2000. p.77.
[2] TCPA, 2013, p. 18.

Technoburb (a cluster of Technoburb forms a Techno-city), is dependent on the automobile transport. The American wealth and the high amount of share capital available resulted in mass production of automobile. In 1929, The American Automobile industry was producing as many cars per capita as it did in 1980s. However, Started in the late 20th century, the American parallel development of suburbs as a model of urban sprawl was hindered by the Second World War [1].

After the Second World War, there was a very high demand for providing housing for the coming American veterans. William Levitt [2] capitalized based on the demand of Single-family suburban homes for the returning service men and their new families. There was an enormous success to the whole concept; the area of the settlement was vast, similar to the scale of a county. The single-family housing units were standardized in the same way following the same concept of the automobile industry, where architectural Identity is lacking as a result of mass production. The Levittown has created a new kind of a socio-cultural place where most the residents center their lives around the home and the family, to be among neighbors where they can trust, to find friends to spent leisure hours and to participate in organizations that provide sociability and the opportunity to be of service to others [3]. The lake of work opportunities within the suburb and the long distance of travel have triggered out the evolution of the *Technoburb*. It was needed because the suburb has exhausted itself in ever-longer journeys to work place in a crowded core on overburdened highways and mass transit facilities.

Technoburbia, is a dominant urban reality that can no longer be considered suburbia in the traditional sense. Although Techno-burbs and suburbs are spread along highway of growth corridors, Techno-burbs started to bridge the gap between work and residents. Work opportunities were provided within the Techno-berb through the integration of mixed use planning, not only housing, schools and shopping malls were included , office parks ,industrial parks ,universities ,research Institutes, banks, Hospitals and other services were added to one centralized environment. The Techmo-berb has generated an urban diversity without traditional urban concentration. It also created a peripheral zone to the city, perhaps as large as a county that have emerged as a viable socio-economic units, adding to the concept of the decentralized city [4].

In the United States, the 1950s and the 1960s witnessed the change in job locations core to the peripheries through mainly three steps. The first is the establishment of high tech growth corridors. The second is the movement of office bureaucracies, especially the so called the back office, from the center of the high-rise to the Technoburbs office parks, the third and final phase was the movement of production service, employment ,banks, accountants, lawyers advertising agencies and skilled technicians [5].

[1] TCPA, 2013, p.63.
[2] An American real-estate developer widely credited as the father of modern American suburbia.
[3] Gans, 2000, p. 64.
[4] Fishman, 2000, p. 79.
[5] Ibid. p.83.

Transportation also had a positive effect, different technoburbs that might stretch over seventy miles from the city core within all directions, are often in more direct connection with one another-or with another techno-cities across the country. The beltways put every part of the urban periphery in contact with every other part without passing through the central city at all. The issue that eliminates passing traffic form the city centers, saving a lot of time and effort. Therefore, the Technoburb sprawl with its housing, jobs and services all on the periphery developed its form of relative efficiency [1]. Another side of the story the waste of land inherit in the single-family house with its own yard and the waste of energy inherit in the use of personal automobile. Highways cannot replace railways when it comes to cities cores accessibility, funneling cars in to central cores of the city causes traffic congestion. Inside the Technoburb, a fully developed highway grid eliminates the primacy of central business district. its creates a series of high way crossings which can serve as business centers while promoting the multi-directional travel that prevents any single center from attaining any single importance [2].

What is the Techno-city? It is a composition of several and diverse technoburbs that are spread along highway growth corridors. Along the highways of metropolitan regions shopping malls, campus like office complexes, industrial parks, hospitals, schools, and whole kinds of housing types that succeed each other. Therefore, it's a new kind of a smart decentralized concept that goes beyond the central core of a single technoburb [3]. Here comes the question, Will the cores inside the cities survive suburbanization? Well, according to Fishman (2000) the answer is No, If physical decentralization also meant economic decentralization, then the urban cores of the cities would be ghost towns, but large and powerful organizations still seeks central locations that validates their importance , nevertheless, the historic core of great cities still meet that need better than the outskirts.

The Techno-city concept has spread all over the world, the case of GCR in the next chapter will show how the Egyptian development schemes has been affected by the concept of Technuburb. However, before moving to GCR, what are the problems and deficits of the Techno-city?

Well, first, Decentralization has been a social and economic disaster for the old city and for the poor, who have been increasingly relegated for its crowded, decayed zones. In the United States, it has segregated the American society into an affluent outer city and indigent inner city, while erecting ever-higher barriers that prevent the poor from sharing in the jobs and housing of the Technoburb. Secondly, decentralization has been seen as a cultural disaster, due to the decay of the rich and diverse architectural heritage, the Techno-burb has been built as a standardized and simplified sprawl, consuming time and space and destroying the natural landscape [4].

This late 20th century the American environment shows all signs of the two nation's syndrome: One group is caught in an environment of poverty, cut off from the majority culture speaking its own

[1] Fishman, 2000, p.82.
[2] Ibid, p.81.
[3] Ibid, p.79.
[4] Ibid, p. 84.

language and dialects; the other is an increasingly homogenized culture of affluence, more and more remote from an urban environment which found to be dangerous. The postindustrial American wealth has been used to create an ugly and wasteful pseudo city, too spread out to be efficient too superficial to create a true culture [(1)].

2.5. Sustainable Growth within an Ex-Post Analysis, the Importance of the Approach

Although sustainability as a trend has emerged at the late 1980s. Suburbanization and urban growth of cities, within the era of industrialization, has been developing for more than a century. Sustainable development is highly affected by the geopolitical transformations within a certain territory. These transformations are reflected on the local planning and development context. Within a certain duration, the built environment works as a live model in which research could obtain learned lessons through comparison.

Egypt is one of the countries that went through rabid political transformations accompanied by several grass root changes in the local planning and development paradigm. Through these changes, a stimulating research field for researchers and revisionist is to investigate the several practices of planning and its results in reality. From that point, the message would be clear, and the drawbacks behind not achieving a sustainable model is well differentiated.

Within the last century, the development and growth of suburbanization had to sustain development concepts and strategies that minimize cost and attract people away for the deteriorated old cities, within these concepts and strategies, the author argue that sustainability in its intrinsic essence has been tackled. The debate is then opened on the levels of technology in utilizing natural resources that might be outdated when comparing to the late 20th century cases of suburbanization. The analysis of those cities comprise a practical knowledge in the way they developed and maintained urban growth.

When urban growth policies are accompanied with urban development policies on the macro level of both cities. In the case of developed countries, Sustainability had to be tackled within the current irreversible states of urban forms. These developed cities are built within a pattern of regional development that has been associated with unsustainability. These rigid patterns might be irreversible for at least several more decades. On the other hand, in the case of developing countries, the door is still wide open to optimize urban growth and suburbanization in a way that constitutes an efficient base for sustainable growth. Out of the investigation to the concept of sustainable urban growth, urban sustainability depends on how the city grew in the first place and how it has been positioned with a

[1] Fishman, 2000 p. 84.

certain carrying capacity or located within a bioregion. In other words, the degree of self-reliance that the new city could achieve.

2.6. Summery and Remarks

This chapter started with a general understanding to the notion of sustainability by giving a historical outlook to the evolution of the concept and discussing the trend through its characteristics and by and then, by investigating its relation to the urban context through the notions of urban development and urban sustainability.

The author came up to the conclusion that a general definition to sustainable development is where the needs of the present is met without compromising the needs of the future generations to meet their own. It contains two aspects, the word “needs” where priority is given to the needs of the low-income class and the dynamics of limitations of technology and social organization that is being imposed on the environment ‘ ability to meet the present and the future needs.

The difference between Sustainable development and growth is then investigated, showing how the term *“sustainable urban growth”* is an issue of debate between different scholars. The author came to conclusion through his readings that sustainable urban growth could be only envisioned under a bigger umbrella of “*sustainable urban development“.* Within this approach, policies and measures are set to achieve goals and targets for both, old mother cities and the new cities. Through this type of understanding, growth becomes a tool of evading the unsustainability of the old cities and creating a new efficient urban system. A system that faces the current and future challenges of population growth within social, environmental and economic aspects.

Where sustainability as a concept comes with an outlook to the present and future, adopting the concept of sustainability shall not exclude the human experience of growth in the last two centuries. Prior to the emergence of industrialization, suburbanization as a model came as a result to the failure of the old cities to cope with the multi usages, unsanitary conditions and the increasing population pressure. Suburbanization in Europe came as a model of urban growth that revolutionized a new city model “The garden city model”, to create a perfect synthesis between urban sophistication and rural venture. The garden city as model is characterized by railway commuting to the central city.

On the other hand, the American model of suburbanization “The Techno-burb” came as a real estate venture and was not based on preceded theory, it was characterized by horizontal expansion based on standardized residential units connected by a series of road networks. A cluster of Techno-suburbs constituted the Techno-city where, in contrast to the garden city, a series of highways was used to reach the inner old city core. The Techno-city model could be criticized as an automobile-based development

that may result in immense consumption of energy and waste of space through low-density development, and superficial culture thanks to housing standardization.

The notion of a sustainable city in its holistic approach could be understood through many dimensions, characteristics and even principals. However, a city could not achieve the state of sustainability without a certain degree of self-sufficiency on its local resources and at the same time a certain degree of self-reliance on the regional level. The concept of sustainability gathers between long-term economic development and the concept of intergenerational equity in which the current resources are well governed to guarantee the right of the next generations. The concept of geographical equity is related to environmental justice, where the environmental degradation of a community shall not be resulted from economic prosperity of another. Suburbanization had to sustain a development concepts and strategies that minimize cost and attract people to the new settlements. Within these concepts and strategies, sustainability in its intrinsic essence has been tackled in different ways.

For the case study investigation, the author will adopt the dimensions of sustainable urban growth by Portnov & Pearlmutter which investigtes sustainable urban growth through environmental, economic and socio-demographic.

Sustainability as a discipline have been existing for about thirty years, the human experience in suburban growth has lasted for more than a century. The integration between historical experience in urban practice and the knowledge of sustainability, from the author point of view, will boost the development of our metropolitan cities. Furthermore, it will provide a contextual knowledge on the best practices of urban development and growth, in order steer the decision making process into the right direction.

While the aim of this research implies the investigation of the concept of stainability in an ex-post analysis, different dimensions and components of sustainability would not exist in its well-perceived forms. Early developments of the late 19th and 20th entry with the rise of industrialization are worth to be researched and perceived within the concept of sustainability, as they comprise a practical knowledge in the way they developed and maintained urban growth.

3. The Egyptian Desert and the New Urban Communities Development

Since nearly most of the new urban communities' development takes place in the Egyptian desert, this chapter provides an outlook to the notion of desert urbanization, and its corresponding contextual, environmental and physical challenges. Furthermore, the chapter will define the Egyptian desert, their geographical divisions and characteristics.

Afterwards, the Author will proceed to the investigation of the last forty years new urban communities' development in Egypt, its history and classification. Special focus on the new urban communities' development within GCR will help to relate to the same context of the case study of the city Heliopolis, discussed in detail in the next chapter. The investigation of the new urban community's development within GCR also points out to the deficits of unsustainable growth of the new urban communities within GCR. Afterwards the chapter discusses the era of early 20th century suburbanization within GCR and try to provide an outlook to their context of development.

This chapter introduces the problems and deficits of the new urban communities' development in the last 40 years. Where the following fourth chapter will introduce the early 19th century model Heliopolis and argue that the model has managed to evade from these problems and deficits.

3.1. The Challenges of Desert Urbanization

In general, deserts are defined as areas that receive an average annual precipitation of less than 250 mm. It could be also defined as areas where more water is lost by evapotranspiration than falls as precipitation"[(1)]. However, other detailed definitions also exists such as the one cited by Laity (2009):

> Deserts are described as regions of "low and untimely distributed rainfall, low humidity, high air temperatures, strong wind, soil with low organic content and high content of mineral salt, violent erosional work by water and wind, sporadic flow of streams and poor development of nominal dendritic drainages [(2)].

Desert settlements are confronted by several external factors that constrain their developments. Portnov & Erell in (1998) have pointed out these factors, among them are spatial isolation, harsh climate, remoteness and lack of previous development in the area. Spatial isolation is resulting from the considerable distance that is often found between the new desert town and its nearest non – desert city.

[1] Hamdan, 1984a, P. 245.
[2] Laity, 2009. p, 1.

Which mainly result in a shortage of educational and recreational structures, and puts limitations on the choice of job opportunities. Thus, uneven patterns of population growth in the new town is generated, the three desert challenges are discussed in detail as following [(1)]:

Harsh climate, in general (temperature fluctuations, blowing dust, water scarcity and lack of vegetation, heat stress, etc…) places limitations on human comfort and urban amenities. Reducing the attractiveness of the new towns to business activities in comparison to the non-desert cities.

Remoteness, major urban centers around the globe are located outside desert areas, the distance to those urban centers from any desert settlement is likely to be considerable. At least for daily commuting the remoteness of desert settlements increases the cost of infrastructure, the transportation of goods in unavoidable manner, especially the transportation of building materials. The remoteness of the desert settlements leads to substantial problems in recruiting skilled labor. Given these external factors, spatial proximity to urban centers is still a priority to the new enterprises. Therefore, the economic base for the new settlements tends to lack diversity and intensity. Moreover, peripheral desert settlements tends to be more vulnerable to any negative fluctuations in the national economy such as hyperinflation, recession, etc.

The lack of previous development in the area, sites selected for the new desert communities are in many cases away from any previous urban or rural areas. Additionally, these new communities does not have an established agricultural hinterland such as farms or villages, which surrounds urban centers in other urban areas. On the other side, the new isolated desert towns do not represent service centers for the surrounding villages. Therefore, the new desert towns are deprived from their major natural functions. It is also expected that the migration patterns are to and from desert settlement differ from those earlier non-desert settlements.

3.2. The Egyptian Desert

Perhaps, the best approach to define the Egyptian desert is to borrow the words of the Egyptian scholar and geographer Gamal Hamdan in his encyclopedic book *the Personality of Egypt*:

> *"Egypt is a million square meter of a desert; its yearly average precipitation rate is only one centimeter, most of it concentrated at a very narrow coastal region. The square is divided vertically into two semi-rectangular shapes with a very thin line. Nearly third the area is the Eastern Desert and two thirds within the Western Desert. Concerning the thin perpendicular line of separation, it*

[1] Portnov & Erell, 1998.p 268.

only represents 3.5% of the overall area, indeed, same percentage that represents the area of Egypt to Africa, 1 over 30" [1]

Egypt is located in the center the Sahro-Arabian Belt, part of the mid-world desert belt extending from the middle of Central Asia to Atlantic Ocean. The total area of Egypt is approximately one million square kilometer. The topography is divided over four main physical regions, The Nile Valley and Nile Delta, the Eastern Desert, the Sinai Peninsula and the Western Desert [2]. Egypt is predominantly desert, according to the EEAA in 2007, desert account for about 96% of the Egyptian land [3]. Among the main urbanization challenges that face the Egyptian state is to invade the desert. However, according to the Egyptian supreme council for planning, Egyptian population are only living on 5.7% of the total area of Egypt, which is mainly within the Nile Valley and Delta. The percentage is planned to be extended to reach 11% by 2050 [4].

The Nile Valley is around 10 km in width, spans to nearly 33,000 square kilometers and runs from Lake Nasser in the south to the top of the delta in Cairo region. Afterwards it splits into two branches, the Rosetta Branch to the West and the Damietta branch to the East to shape the Nile delta until it reaches the Mediterranean Sea.

Through its Egyptian course, the Nile Valley widens to a maximum of twenty two kilometers when its escarpments diminish on both sides. The valley and its Delta, in contrast to other regions within the country, is blessed with fertile soil and water. It presented a source of attraction and a rich bioregion to many human inhabitants as well as many species of flora and fauna.

The Eastern Desert, which houses the case study of this research and most of the new urban communities development towns, spans over 325,000 square kilometers and represents about around 30% of the total Egyptian territory [5]. The topography of this region is characterized by the existence of Waddis (dry streambeds), running on the mountain cliffs towards both sides the Nile Valley and the Red Sea [6].

The Western Desert, spans over nearly 700,000 square kilometers, comprised mainly form sand dunes, and characterized by the existence of a number of Oases. In addition, many land depressions are scattered from the northern to southern side, most importantly are the Qattara Depression that represent the second lowest point in Africa [7].

The Sinai Peninsula is divided over three subsections the Southern section, the central section and the northern section. The Southern section consists of Egypt's largest Mountains; these mountains form

1 Hamdan, 1984b, p.243.
2 Ali, 2013, p. 165.
3 EEAA, 2007.
4 Elbadawy, 2014.
5 EEAA, 2007.
6 Ali, 2013. p.165.
7 Ibid.

Wadis that channel rainwater and snow towards the Gulf of Suez and Gulf of Aqaba. Due to the availability of water, the northern section is the most suitable for agricultural cultivation. The central section is comprised of limestone plateau and the southern section is surrounded by Al Teeh plateau, which is rich with water resources [1].

3.3. The New Urban Communities' Development in the Last forty Years.

3.3.1. Goals and Objectives

Figure 6: New Urban Communities in Egypt.

Source: (ESC, 2010; Abdel-Kader & Ettouney, 2009)

The new urban communities' development (Figure 6) dates back to the second half of the nineteen century. The development came as a part of a general strategy to tackle the complex issues challenging the Egyptian cities located in the Nile valley. The new urban communities' development is one of the most comprehensive and ambitious development strategies in terms of scale and objectives. Several planning aspects were considered during the development of the new cities. Such as, the relation to primate and major cities, accessibility, and physical characteristics and suitability of the sites [2].

Being developed in the desert land and away from the agricultural land corridor. The New urban communities were thought to be an effective solution to tackle the problems of encroachment on

[1] Ali, 2013. p.165.
[2] Ibid, p.2

agricultural land, deteriorating infrastructure and low quality living conditions. The new urban communities' present status, points-out to their limited success in meeting their objectives and their declared development program. The drawbacks are in terms of achieving an effective resident population, presenting a balanced socio-economic ratio, helping the lower income groups to secure a relative independence and autonomy, and providing a sustainable living and quality setting [(1)].

The new stretch out to the desert and the construction of new towns was intended to absorb part of population accumulation in different cities within the national planning. For this purpose, the Egyptian state has established the New Urban Communities Authority by virtue of law 59/1979 to be responsible entity of preparing master plans, creating, administrating, selecting sites and preparing detailed plans of new cities. A development and construction map has been prepared for Egypt covering until 2017 including the assignment of 24 new cities as new urban communities aiming to absorb 12 million capita, which represent 50% of the expected annual increase until 2017 [(2)].

3.3.2. New Cities Classification

According to Ellahham (2014), and in terms, of sites and function, the new cities are broken down to the following categories [(3)]:

Satellite cities: located around and close to Cairo with the objectives of minimizing population density, benefiting of the available basic structures in attracting population, activities, and creating new job opportunities. Furthermore, the satellite cities shall host economic elements that are associated with the mother city, such as the sixth of October city and 15th of May city (first generation cities). Obour and Badr cities (Second-generation cities). Those cities does not have an economic base but they rather fully depend on the mother city.

Twin cities: Although those cities have their own economic and service base they are closely connected to their closely connected mother cities. In some cases, are considered as a natural extension to the existing cities. Such as, New Demietta, New Beni Suef, New Minia (Second-generation cities).

Independent cities: They are located distant from existing cities in order to support their independence. They are provided by an economic base that would allow them –on the long term- to support their independence. Serving as economic entities that will make them independent economic pols, compiling different socioeconomic activities. Those cities are usually located deep in the desert

[1] Abdel-kader & Ettouny, 2013, p.1.
[2] Ellahham, 2014, p 3.
[3] Ibid.

and away from the Nile valley. Such as, 10th of Ramadan, Borg'el Arab and Al Salhia cities (first generation).

Abdel-Kader & Ettouny in 2013, emphasized on three main deficits within the present conditions of the new urban communities' development, they are considered as a chain of interrelated problems that are most visible in the following points [1]:

- Slow growth rates (even in the cases of the relatively active cities), in terms of target population, percentage of resident labour-force, land development, community facilities completion.
- Imbalanced development and deviations from the planned, in terms of the relation of the present status of the four key urban components; i.e. housing, community facilities, industry and infrastructure.
- Distorted population mix and demographic structure/balance, i.e. percentages/ratios of the socio-income groups: upper, middle and lower.

Abdel-Kader & Ettouny in 2013, emphasized on three main facts that have been collectively gained from reviewing several monitoring and assessment attempts by a variety of consulting firms, research institutes and independent researchers [2]:

- In general, the slowing down of the new urban communities was and (still is) referring to shortage in the implemented housing programs, numbers of settled /resident population (compared to the initial planning targets), and realized community facilities / services.
- Infrastructure costs in many new urban communities were completed in early stages (in the early 1980s and 1990s) at a relatively low cost if compared to the current costs nowadays.
- The development of industrial areas (a key component in the economic base of most new urban communities) is more advanced than the development of all the community development components (such as housing and community facilities).

Abdel-Kader & Ettouny pointed out that the above three facts represent a fare and rational assessment of the new urban communities. Keeping in mind, the failure in reaching the target population within the planned time frame and wasted capital investments [3].

As governmental built cities, today's new urban communities constitutes a different model of development in comparison to case study Heliopolis. Built within the jurisdictions of the Egyptian planning law and by the governmental authority NUCA, their success or failure is directly the responsibility of the government. In other words, the government here is the main stakeholder that would suffer the risks of failure or in case of not achieving the targeted goals. Unlike Heliopolis, built

[1] Abdel-Kader & Ettouney, 2009, p. 9.
[2] Abdel-kader & Ettouny, 2013, p.3.
[3] Ellahham, 2014, p 2.

within a public private partnership. The building, operation and maintenance of the new city and its means of mass transportation was the sole responsibility of the HOC.

The Author has conducted an interview with Engineer Kamal Fahmi, vice president of Urban Communities Development Authority [1], and asked mainly two questions: Why Public- private partnership has not been adopted in the development of the new urban communities? He answered, "The development of the new urban communities was the sole responsibility of the NUCA from the beginning, this policy is being changed at the moment, and we are starting to apply the public private partnership within the field of infrastructure, where several utilities such as water supply and electricity are being developed in cooperation with the private sector". The other question was concerning transportation, why there was no dependence on the mass transit systems to connect to new cities and satellite towns to Cairo. , he said "well, there is a project now to build a new electric railway that would connect several satellite towns East of Cairo, starting from the Al Salam station (near Masr El Gedida district) until the city Belbeis.". Eng. Fahmi pointed out to the new electric railway line that would connect the cities El Obour, El Shrouq, Badr, and 10th of Ramadan. The line would be built in cooperation with Republic of China.

3.4. The Case of GCR today

There is a mass movement to the metropolitan area of GCR, which has been escalating since the early 20th century [2]. There is high need of coordination between both job availability and mobility. The metropolitan region of GCR, from the author point of view, is the right focal for sustainable development in Egypt. Today, the Greater Cairo Region, with a population of 19 million inhabitants, hosts more than one-fifth of Egypt's population while the expected population increase is 24 million by 2027 [3].

The present scene of GCR today is a result to the planning policies and strategies that were set in the late 1970s during Anwar Al Sadat presidency. In order to decongest the Nile Valley and delta, several new towns and satellite cities were set to be established in the desert to redistribute high dense population. Mourad in 2014 cited different resources showing that those cities and towns were a result of Anwar Al Sadat reforms that was a way different from his predecessor Gamal Abdel Nasser [4]. The reforms are more visible In the case of GCR; the geo-political transformations are reflected on the development paradigm. Before president Abdel Nasser, Cairo was oriented to the European model of development, Abdel Nasser was oriented toward the USSR and adopted a policy of making Cairo available for all social classes, while Sadat hoped to westernize Cairo and looked at the American cities

1 Fahmi, 2014.
2 Hamdan, 1984b, p. 298.
3 World Bank, 2014, p 2.
4 Mourad, 2014.p.66

[1]. By that time, Techno-cities (discussed in section 2.4.3) were already starting to spread all over the United States. It did constitute a suburbanization model that is highly dependent on automobile transport and low-density urban sprawl. A decentralized approach was selected to solve the housing shortage. Jenks & Burgess in 2004, have showen that it was as a gegeneral phenomena in the developing countries , regional planners of megacities in the developing countries are looking to relive the pressure of the deteriorated inner cores of the city. The creation of new towns and cities within the same range is considered as a decentralized approach to control urban growth and to sustain and protect the status of the central cities. However, the question here is, whether those cities will succeed in relieving the population pressure on the central cities and control urban sprawl. Alternatively, the result would be an urban sprawl on a gigantic scale as Jenks & Burgess in 2004 mentioned, a gigantic scale of urban sprawl, resulting from the longer-term transportation patterns between and around the new and existing centers [2]. Hamdan in 1996, has criticized the development strategy of GCR:

> If we discuss the strategic plan of curbing the Cairo growth on both levels, urban sprawl and migration control. First, we have to stop the game of the new towns around Cairo; those towns are of quantity not of quality. In principal, no doubt that the idea of new cities represents the right policy for transferring or directing the residents outside the Capital, the policy has been applied with success since decades in Greater London. Nevertheless, the key condition is that those cities shall not represent just a satellite cities or dormitory towns on the fringes of the capital region. Otherwise, the whole process would be legislating the expansion and encouraging its excessive sprawl. [3]

Following the impacts of applying the concept, the Techno-city model of suburbanization will drive us to investigate the mobility and livability of the new towns. Cars constitutes the dominant mode of transportation within GCR [4]. The share of private cars are higher on the major corridors than on surface streets. Car dependency leads to high congestions on the main corridors reducing average speeds between 20 to 40 km per hour. Road travel within GCR is very unreliable affair. Travel times between two points can vary substantially at different times a day, sometimes by triple the time needed in the normal case. One of the main reason of traffic congestion is the inadequate supply of mass transit. GCR is equipped with 1,500 standard buses and 70 km of metro lines only. While the only existing tram in Heliopolis is in need to a major rehabilitation and upgrading. However, for a large mega city such as GCR, the supply of mass transit system is very limited in comparison to other mega cities around the world. While the ridership statistics for the metro network shows the high demand for public mass

[1] Mourad, 2014.p.66.
[2] Jenks & Burgess, 2004, p 41.
[3] Hamdan, 1996b, p.215.
[4] World Bank, 2014, p. 2.

transit system. People tend to use public transportation system and to shift from private cars. The only constrain, is the limited supply of mass transit system [1].

New city by name	Population 1986	Population 1996	Population 2006	Population 2014*	Target population
New Cairo	-	34,703	12,239	1,200,000	4,900,000
Al Shrouk	-	-	22,570	170,000	500,000
Badr	-	-	17,158	85,000	840,000
15th of May	24,106	65,560	90,740	200,000	500,000
6th of October	528	35,354	154,093	1,350,000	2,500,000
Al Sheikh Zayed	-	-	29,422	233,000	675,000
Al Obor	-	997	43,600	300,000	600,000
10th of Ramadan	8,509	47,833	125,920	430,000	500,000
Total	**33,143**	**184,447**	**605,842**	**2,753,000**	**11,015,000**

Table 1: Growth of new cities population around GCR (1986-2006).

Source: Cited by (Ammar, 2014. P.187) after CAPMAS statistics in 2006. Population of 2014 and target population adapted by author after (NUCA, 2015). * 2014 population is for those residing in and commuting to the new towns.

Today, it is quite clear that the strategic planning of the New Urban Communities within GCR during the last 40 years, did not consider building a mass transit system. Unlike the planning of the city Heliopolis, the new urban communities relied on vehicular traffic and the existing (or later developed) highways network to connect the towns to Cairo, Giza and Qalyobiya. The only case within the New urban communities in general where railway commuting is developed is the case of Alexandria and the new city Borg Elarab outside the GCR area [2].

[1] World Bank, 2014, p 2.

[2] The development of the new urban communities depended on automobile transport. The development of railway transport or bus rapid transit system (BRT) is lacking from the city early initiation phase. Therefore, development of the new settlements is very similar the development of the Techno-cities in the United States in the early 60s. Where highway infrastructure used to connect the new cities to the central city cores leading to daily wash in and out of automobile transport. Thus, high traffic congestion inside city centers and high use of energy in vehicular traffic. The absence of mass transit system resulted in segregation between the high med income classes and the low-income class. Moving to the new cities demanded the ownership of car plus the ability to cope with its running costs. However, since 2011, the city Borg El Arab, built within the first generation cities, was connected by railway to the mother city Alexandria, in a 650 million EGP pounds project. The project construction started since 2009 with a 60 km length and a capacity of about one hundred thousand passengers per day. Unfortunately until the date of writing this thesis, the line have failed to be open for public as the Egyptian railways set a condition of receiving not less than 470, 000 EGP per month to operate the train (Ammar, 2014). The number that both the city council and the investors association within the city are refusing to pay. Since Borg El Arab city host an industrial areas next to commercial and administrative usages that is being heavily used by labors, employees and students commuting form Alexandria, the railway system would alleviate the problems of mobility and reduce the heavy energy consumption of vehicular traffic.

The other side is that vehicular transportation patterns are already established within the formal and informal sector. The 60 km distance between Borg Elarab and Alexandria, is daily commuted by many buses, mobilized by the factories, schools and companies or belong to the informal sector. The operation of the railway system

The 2006 census available to author (Table 1), shows that the demographic growth of the new urban communities within GCR have been increasing 33,143 in 1986, 184,447 in 1996. In 2006, the population reached 605,842 capita. In 2014, 2,753,000 capita.

The target population of those towns are way beyond near achievement. The author used the official NUCA website and gathered the target population statistics for each town. In 2014, according to the official numbers of SIS, the Greater Cairo Region consisting from the governorate of Cairo, Giza and Qalyoubia was: 21,489,111 (1). When the figure is related to the total number of population of the new urban communities within GCR, 2,753,000 in 2014, the percentage of the new towns within GCR is 12. 8 %.

However, there it is quite obvious (according to NUCA figures) that population growth is lagging behind the eleven million Target population, According to Ellahham in 2014, towns like 10th of Ramadan, 15th of May and 6th of October are supposed to reach their target population in 2017 (2). However, another visit to NUCA's website in late 2015 unveiled that the population numbers where measured according to the number of people residing in the town and commuting to it for work as well.

From a sustainable development approach, the demographic achievement of new cities has to be investigated in relation to the social dimension. A Socio-demographic analysis would include the informal growth within mother cities in GCR. Within GCR, the informal housing began just after World War II (3), migration from Upper Egypt and the Delta caused housing pressures to become critical. Migrants were attracted by the economic development occurring in Cairo, coincided with the massive industrialization policy launched (4).

means next to the loss of the investments, breaking a very fragile informal economic structure that has been established based on daily commuting. The learned lesson from such case is that mass transit systems are integral components of infrastructure that should be established within the initial development plan of the city. Mass transit systems construction during the early growth of the city would be lower in cost and will share some of the basic investments cost dedicated to the establishment of the city.

1 SIS, 2014.

2 Ellahham, 2014.p 6.

3 Khlifa, 2011.p. 43.

4 Sejourne, 2009.p.44.

Ammar in 2014 has analyzed the informal growth of GCR in terms of population in relation to the growth of the new urban communities within the region. The analysis (Figure 7) was from year 1986 until year 2006, Ammar showed that new urban communities didn't cause any population decrease in informal settlements. In contrast, the informal settlements increased in population in a higher rate than the population growth of new urban communities [1].

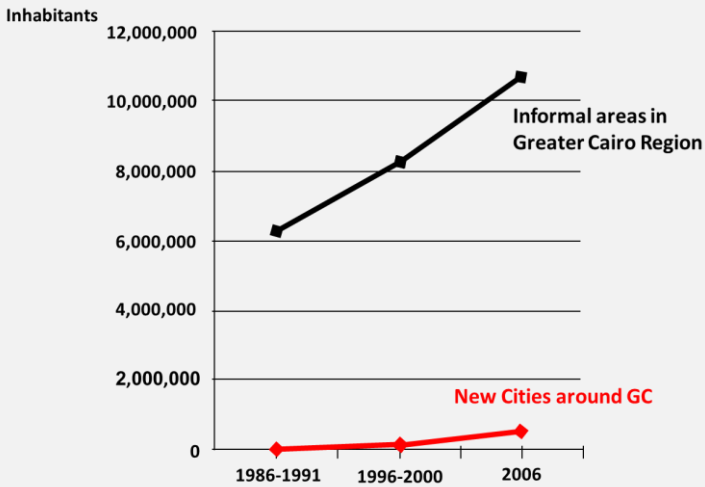


Figure 7: Comparison between informal areas urban growth and new cities population growth.

Source: (Ammar, 2014. P.187)

When we put numbers next to spatial analysis, Figures, 8, 9 and 10 show the gradual growth of GCR since 1973 until 2014. The three maps clearly shows that the informal growth of GCR, the encroachment on agricultural land has been increasing in an astonishing rate.

[1] Ammar, 2014.p.188.

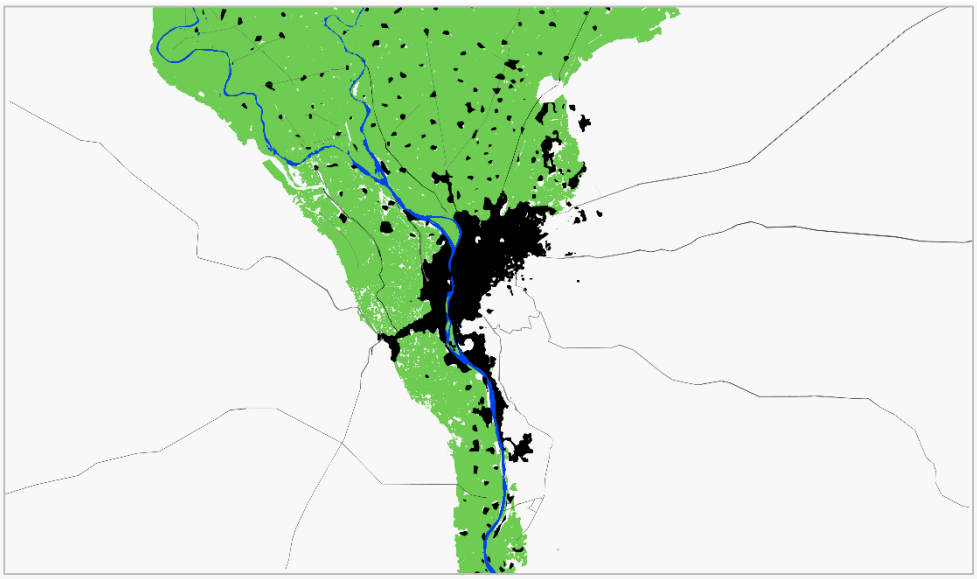


Figure 9: GCR built up area 1973.

Source: Adapted by author after (Hereher, 2012: p. 357).

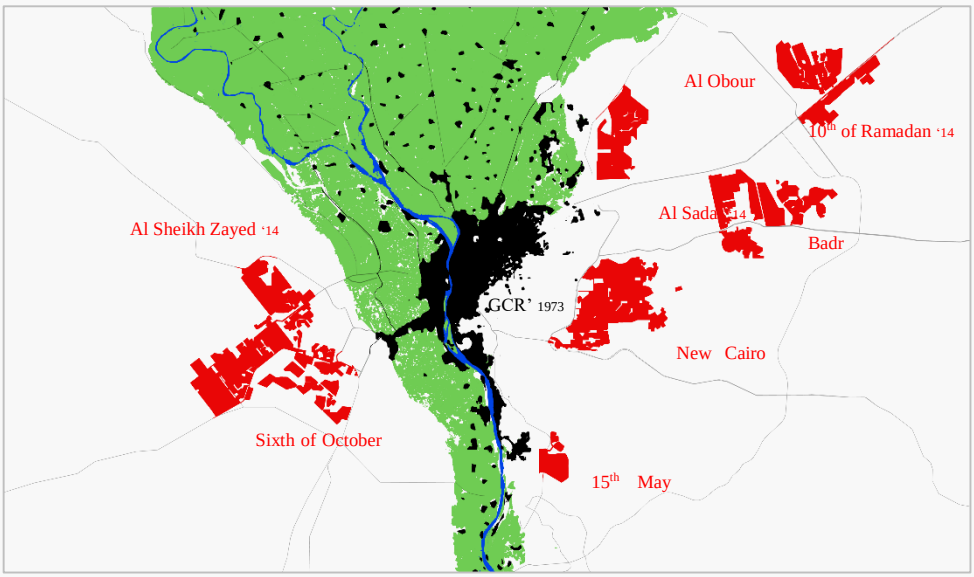


Figure 8: A comparative map combines the new urban communities' built up area of 2014 and GCR built up area of 1973.

Source: traced and combined by author after (Hereher, 2012: p. 357).

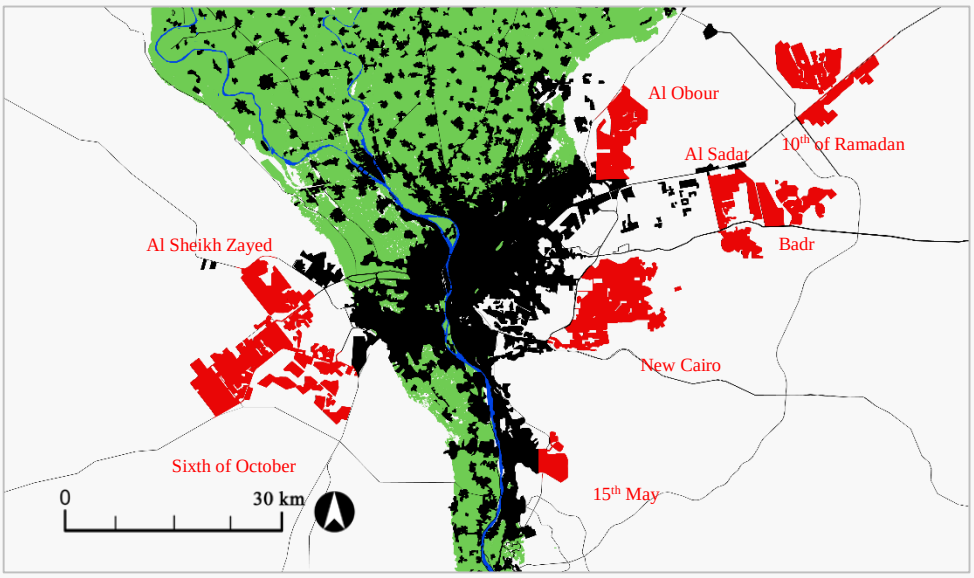


Figure 10: GCR built up area of 2014.

Source: Graphic by author after Google Maps.

3.5. The Case of GCR, Historical growth and the Era of Early suburbanization

Before proceeding to the case of Heliopolis in the next chapter, urbanization within Greater Cairo Region is investigated. Mainly due to interrelation between the suburbs of Heliopolis, Heluan, Maady and El Qouba that resemble the nucleus of today GCR through the modern history of Egypt. The region present a chronological accumulation of urban expansion over desert areas.

3.5.1. Historical Outlook to Cairo, from Desert Urbanization to Suburbanization

Figure 11: View of Cairo Egypt 1901.

Source: (Francis, 2009)

Within Egypt, Cairo region has been the center of gravity of the Nile valley for many centuries. Thanks to its geographical location, it has been a place for the most dominant capitals of Egypt since the ancient Egyptian era [(1)].The growth of Cairo was characterized by gradual and accumulative expansion to the North. By late 20th century, Cairo represented a fan shape growth towards the flat open land of the Nile Delta. The expansion is governed by the topographies of Almokattam mountains to the East and the flooding fringes of the Nile to the West [(2)].

[1] Hamdan, 1984b, p 261.
[2] Hamdan, 1984b, p 268.

Since the start of the Islamic era, what we know today as Cairo constitutes several nucleus of urban growth, which took place because of several political transformations. Cairo evolved and expanded several times within its region through the development of new cities directly adjacent to each other [(1)]. Since the Islamic era, the city Fustat was built by Amr Ibn Al-Aas in year 643 north of Coptic Cairo. Afterwards, another city was added to the north of Fustat named Al-'Askar (meaning the City of Cantonments) in 750. Within the same direction, in year 868 Al-'Askar was succeeded by Al-Qatta'i (meaning the distributed plots) founded by Ahmed Ibn-Tulun. Afterwards, the Fatimid Caliph Al-Mu'izz founded Cairo city in year 969 to the North of the city Al-Qatta'i [(2).] However, within the Fatimid period Cairo was only a stronghold for governance, with lower urbanization and population than Fustat. The Ayyubid period witnessed transferring the city into a popular city when the citadel became the center of state. The city wall extended to the south to contain all the previous capitals of Egypt and Cairo started to expand more than ever before. In the Age of Mamluks, Cairo reached the top of its urban prosperity, its urbanization extended internally and externally beyond its walls its population increased to reach half a million capita at the first half of the 14th century. In the years after, in contrast, to the age of Mamluks, Cairo suffered an urban deterioration and its population decreased below 260,000 capita according to the French campaign on Egypt [(3)]. Afterwards, in the early 19th century, with the evolution of industrialization and moderns means of transportation. Cairo started to grow to the north and north west to merge with Bulaq on the eastern bank of the Nile.

With the rise of population, the city suffered from the typical urban disorders, which rise from rapid and uncontrolled urbanization; among them are congestion due to inadequate transportation system, shortage of housing. It is a biggest problems, however is the problem of alienation and the loss of identity in its planning and Architecture, caused by borrowing of ill-fitted models of the west, rather than evolving naturally from its environment. Giving the present overpopulation and its expected rate of increase [(4)].

[1] Today's Cairo region has been the location of six capitals for Egypt through different Ancient Egyptian, Roman and Islamic eras. The first one, Memphis, was the first capital of Egypt after the unification of Upper and Lower Egypt by king Mena (Around 3100 BC). The Second *Heliopolis*. The third city, *Babylon* by the Romans, then *Al-Fusṭāṭ, Al-Qatta'I and Al-Qāhirah* (Cairo) at the era Islam (Hamdan, 1984a).
[2] Hamdan, 1984b, p 264.
[3] Mahrous, 2006, p.28.
[4] Fathy, 1984,p xxvi.

3.5.2. Suburbanization in the Early 19th and 20th Century

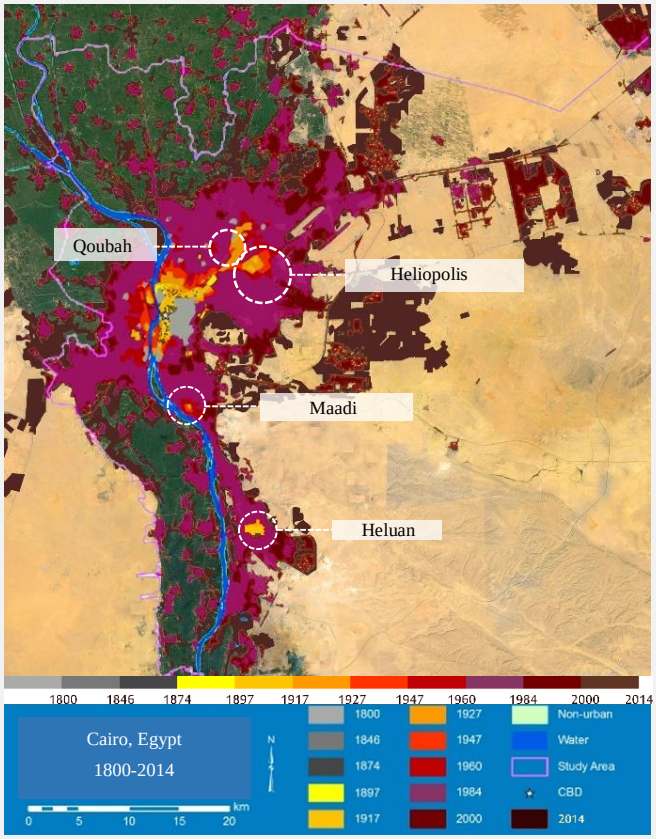


Figure 12: Historical growth of Cairo 1800 to 2014.

Source: Adapted and updated by author after Lincoln institute of land policy (LILP, 2014).

By late 19th century and the early 20th century. Suburbanization evolved in Cairo as a model of urban growth through different suburbs. Mahrous in 2006 argued that the evolution of suburbanization in Cairo came as a result for mainly two reasons: Railway and tram development within Cairo and the prosperity of the real estate market (1).

The first tram network in Cairo was operating by 1849 (2). In two years, seven tram lines has been operating one of them was linking between downtown Cairo and the area of Alabbasiah , which is the line that was later extended to Heliopolis.

By late 19th century and the beginning of the 20th century. The real estate market was in prosperity due to the population increase, the economic stability and the flow of foreign investment into the Egyptian market. The Foreign investments was supported by the Egyptian government policy to grant concessions to the private sector at that time. Several private companies started to buy lands within the

1 Mahrous, 2006. p.28.
2 Dobrowolska, 2006, p. 41.

peripheral areas of Cairo, invest in infrastructure or build houses and then sell or rent it to individual customers. The Egyptian Delta land & Investment Company, the Koubbah Company for development, HOC, and later Al Dokki Land and Investment Company in 1918 [(1)].

Many suburbs has grown in the early 20th century (Figure 12), the suburbs of Elmaadi south of Cairo and the suburbs of El Qouba in the North East. Both suburbs came as a result to the development of railway network. Elmaadi was built thanks to the establishment of the city Helwan 25 km from Cairo and connecting it by railway to Cairo (Figure 13). The Egyptian Delta land & Investment Company started to buy the lands adjacent to the railway tracks and to establish the suburbs. On the other hand, al Koubbeh to the Northeast has been developed thanks to the spatial proximity to the railway, around 100 feddan by the Qoubbah Company for development were bought and the suburbs kept growing until being connected to Cairo.

Figure 13: Left picture: Ariel picture of the city Helwan and the Nile Valley shown at the top of the picture. The picture dates back to 1910. Right picture: Ariel picture of the town Heliopolis 1929.

Source: (Ilbert, 1981) & (SDASM, 2012).

3.6. Summery and Remarks

This chapter started by defining the desert environment by introducing its environmental characteristics. Desert is a geographical area that has been formulated due to hot and dry climate conditions. Desert urbanization is confronted by different external factors that constrain their developments. Among them are spatial isolation, harsh climate, remoteness, and lack of previous development in the area.

[1] Mahrous, 2006. p.29.

The Egyptian desert topography is divided into four primary sections. The Nile Valley and Delta, the Eastern Desert, the Sinai Peninsula and the Western Desert. Desert account for 96% of the Egyptian land. Most of the Egyptian population lives within the Nile Valley and Delta, the areas where the fertile soil that has been accumulated through thousands of years. The Nile Valley and Delta are over populated and the Egyptian population are living on 5.7% of the total area of Egypt. The Egyptian state has a strategic goal to increase the 5.7% to 11 % by 2050. The goal imply the urbanization of desert lands, and orienting population growth outside the Nile valley.

In the late 1970s, the Egyptian government adopted an ambitious plan to shift population growth outside the Nile Valley. The plan came with three main goals, to reduce encroachment on Agricultural land, to escape from the deteriorating infrastructure of the existing cities and to evade from low quality living conditions. The plan, which has been developed through the following years, was to establish 24 new towns as new urban communities aiming to absorb 12 million capita, which represent 50% of the expected annual increase until 2017.

The New urban Communities development suffers from major drawbacks. Most prominently is the huge lag in achieving the targeted population growth compared to the initial planning targets. The author hasve focused on the development of new urban communities within GCR area. The developed maps showed that the new urban communities' development has failed to absorb population growth within the existing cities. In fact, the urban sprawl, mainly informal, continued to eat up agricultural land and to constitute a huge burden on the current facilities and infrastructure.

In general, according to the author analysis, the new urban community's development was following the techno-city model. The model originating in the US and consolidating within the 1960s and 70s is automobile dependent and depends on the development of highways to connect the new cities to the old cities' cores. In the Egyptian case, the issue has caused in addition to the high traffic congestion, a social segregation, in which low-income population who do not afford to the initial and operational cost of the automobile, cannot move into these settlements.

The Interview with Eng. Kamal Fahmi the vice president of NUCA unveiled the state current plans to provide a mass transit system and to integrate the public private partnership model in the construction and operation of infrastructure.

The author then, proceeded to a historical analysis to the area of GCR, within the research methodology, the historical evolution of cites is added into the pre thinking of sustainability basis. The author has investigated the growth of the city Cairo. The investigation showed that Cairo has been developed through the gradual urban growth resembled in different nucleuses that has been accumulating to the North direction. Nearly with each political change, a new city was built. However, the growth was characterized by expansion and not distant suburbanization.

Suburbanization started to evolve with the development of new means of mass transit, such as trains and electric railways. Within late 19th century and early 20th century, different suburbs were mostly established based on a public private partnership model with the Egyptian Government. Different models such as, El Qouba, Helwan and Heliopolis constituted an early desert urbanization, they were built as a solution to the shortage of housing in the congested Cairo.

The Chapter ends, paving the way for investigating the Case of Heliopolis as model for desert urbanization.

4. The Case of Heliopolis (1905-1961), a New Urban Community within GCR

The scope of this chapter is the analysis of the case study Heliopolis from the period of initiation until the nationalization of HOC, (1905-1961). The investigation will be through the dimensions of sustainable urban growth, environmental, economic and socio-demographic. The chapter will start with a brief outlook to the district of Heliopolis today, to show the significance of the district as key contributor to the modern Egyptian life.

4.1. Heliopolis Today, *In Brief*

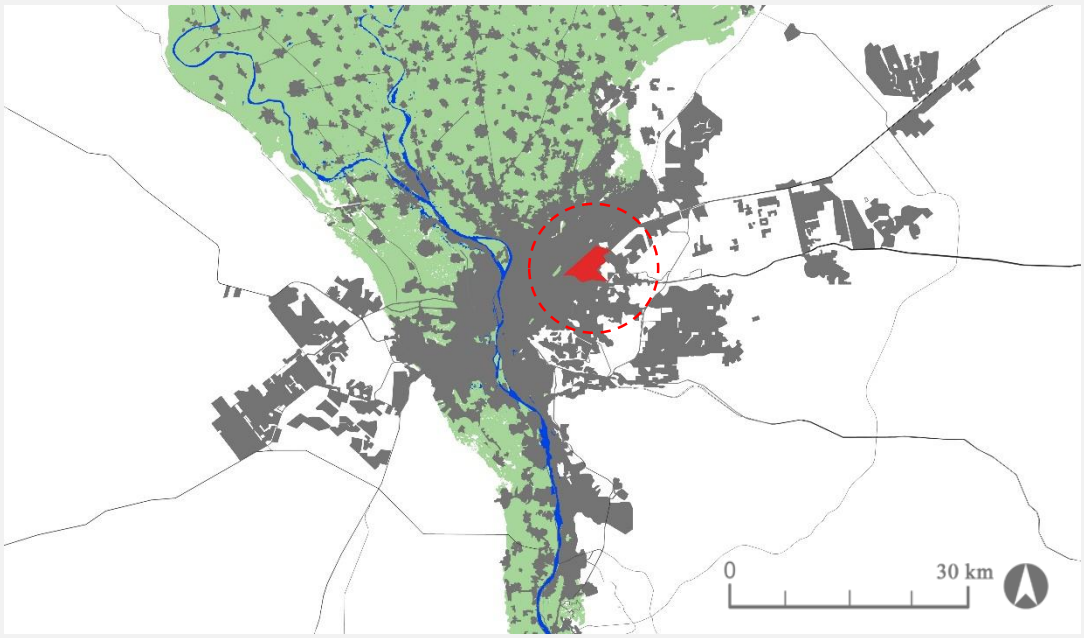


Figure 14: The location of Masr El Gedida district in GCR 2014.

Source: Author.

The district that houses the presidential palace is one of the most prestigious neighborhoods of Cairo. It is the eastern Gate of the city metropolitan Cairo; furthermore, it is the international gate to Cairo (Figure 14), where travelers from around the world pass by the district after leaving Cairo airport at the eastern side of the district. The district is characterized by hosting highly distinguished and key Egyptian personnel on both levels, culturally and socially [(1)].

[1] Belal, 2006.pp 60-65.

The turn from a satellite town to a district was accompanied by one key dramatic change. The nationalization of HOC. The company HOC was nationalized based on political circumstances, when the president of Congo Patrice Lumumba was assassinated on December 1960. President Nasser, issued the law number 1960/285 which demands the nationalization of all the Belgian assets in Egypt. In specific, the Belgian and the international bank and HOC. The company ownership was transferred to the general authority of Masr El Gedida suburbs, following the ministry of local affairs. In 1964, the authority became Heliopolis Company for Housing and Development (HHD) [1].

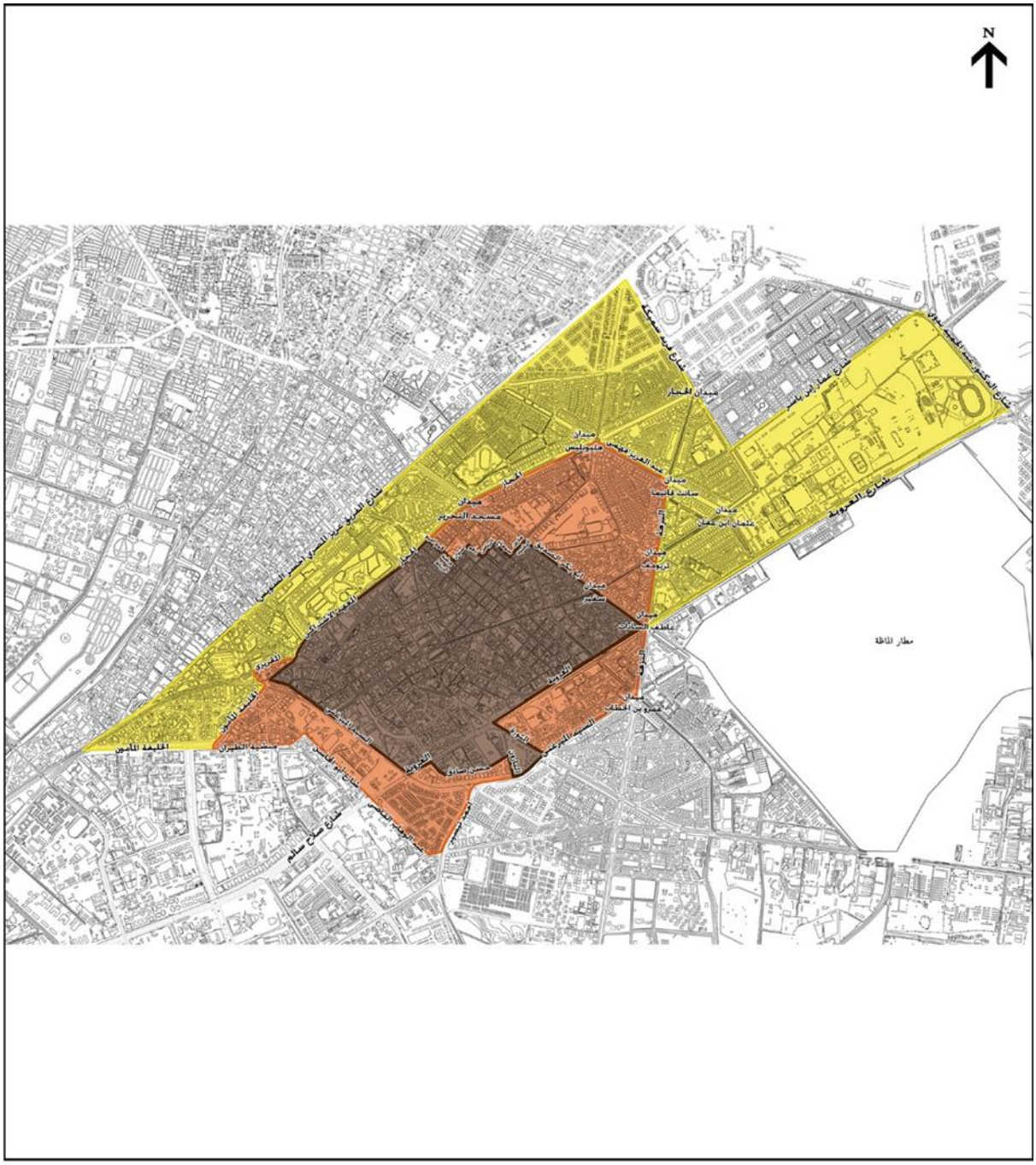
The district has been exposed to several dramatic changes on many levels. Concerning the physical level, the author in (Figure 15), shows part of the area the Mosque Square (*Midan Al Gamee)*, showing the old building of the covered market before and after. In general, those two pictures, somehow stimulates the basic changes that happened to Heliopolis in general, the absence of electric tramline, and the distortion of the architectural theme by individualistic actions. Such as the Covered Market building at the right side of the pictures. The Extension of the building heights on the left side and finally the congestion of cars that replaced the reliable and low-cost mass transit system, the tram system.

In 2012, The National organization for Urban Harmony [2] (NOAH), declared the district as an area of special value and issued special regulations to preserve it. The regulations categorizes the district into three protection zones, A, B, and C (Figure 16) and govern the urban planning and development within the district. The regulations issued deals within the following aspects: architecture, urban fabric and landscape. The regulations are most strict within area A, which constitutes the town area built by HOC, where it includes the prohibition, demolition or alteration of historical buildings classified by NOAH, maintaining urban design, areas of plots and built up area, governing the construction of new building and their heights, elevations, openings and fences.

Figure 15 : left old picture shows the entrance to covered market in the mosque square. The right picture taken by author shows different substantial transformations in the urban context.

Source: left picture (IFE, 2005), right picture author.

[1] IFE, 2005, p.203.
[2] Established in 2001.



Areas with Special Value

According to law number 119/ year 2008.

Limits of Areas with Special Value in the District Masr El Gedida

Area (A)

Area (B)

Area (C)

وزارة الثقافة

الجهاز القومي للتنسيق الحضاري

الإدارة المركزية للدراسات والبحوث والسياسات

الإدارة العامة للسياسات

Figure 16: Limits of Areas with Special Values in the district Masr El Gedida.

Source: Adapted by author after (NOAH, 2012).

4.2. Heliopolis, the Evolution of the Town

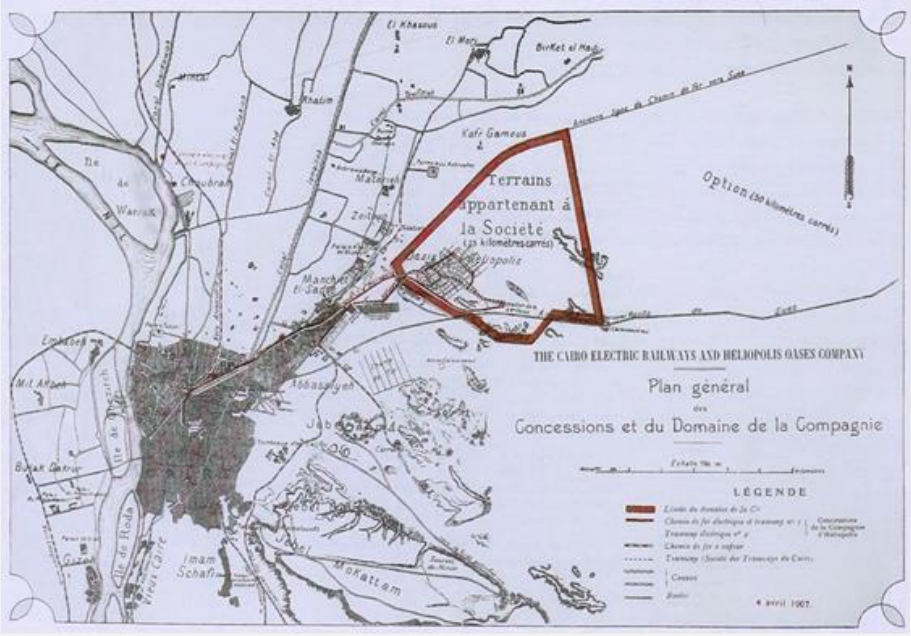


Figure 17: General layout illustrates the concessions of HOC including the land and the electric railway to Cairo (in red color) the map dates back to 04.07. 1907.

Source: (IFE, 2005: p. 24)

In order to understand the early development of Heliopolis, it is crucial to discuss the political situation within the early 20th century. Egypt was a British protectorate during the initial project initiation (1). Although the Khedive Abbas and Prime Minister of Egypt Mustafa Fahmy signed the decrees of the project initiation, the quasi-colonial situation in Egypt allowed HOC to well establish its basis and to have better operating conditions (2).

Ilbert (1981) unveiled the real influence of the British advisors in facilitating the project initiation in the Ministry of public works and the department of cities and construction at that time. In particular, the Under-Secretary of State for public works Sir William Edmund Garstin as a key official that helped pave the way for the project initiation (3).

[1] Between 1882 and 1914, Egypt was an autonomous province of the Ottoman Empire, and the British occupation had no legal basis but constituted a protectorate over the country. Khedive Abbas was the Khedive of Egypt.
[2] Ilbert, 1981, p19.
[3] Ibid, p15.

Before the establishment of HOC in 1906, Baron Empain and his partner Boghos Nubar Basha, approached the Egyptian Government and unveiled his interest in purchasing the north eastern desert land on the peripheries of Cairo for building a new town (Figure 17). He also offered the construction of a mass transportation system to connect Heliopolis with downtown Cairo. The Egyptian government responded positively. The new suburbs of Heliopolis emerged as a public private partnership between the Egyptian government and the new established company HOC [(1)]. HOC had the freedom to design, build and operate its new town including a mass transit system and internal networks of trams, under the jurisdiction of the Egyptian government regulations [(2)].

Baron Empain and his partner Boghous Nubar Basha, established HOC as an Egyptian real estate company with European capital with the purpose of planning and selling land plots provided with infrastructure and ready for construction. Furthermore, it operates three public service concessions, the metro and trams, and the distribution of water, and the distribution of electricity within the limits and conditions established by the concessions act [(3)]. In case of project failure, the risk for the Egyptian government was kept to minimum. HOC was to build all the required infrastructure to sustain the operation of water, sanitation, Electricity, and transportation infrastructure.

Heliopolis constituted an urban transition and a financial success. Baron Empain and his Partner Boghos Nubar Basha intended to create a satellite town near Cairo [(4)]. The town did not follow standard the notion of only a satellite town. Instead, the main idea was inspired by the desert atmosphere at that time, to build different desert settlements in the form of oases and connect them to each other and with Cairo by rapid transit systems. Empain wanted to prove that the desert is as profitable and as habitable as inner cores of Cairo, he choose a land outside of the fertile firings of the Nile Valley (Figure 20).

HOC planned two oases (Figure 18), the first one was planned to be luxurious and consisted of a hotel, a neighborhood of villas & a luxury apartments and the Cathedral. The whole oasis was designed in a circular fashion with the main headquarters of the company in the middle. A broad avenue and a metro track was to join the first oases “Heliopolis” to the second oasis to the east “Almaza”. The eastern oasis lost its luxurious look and was planned to house all the subordinate staff of the company. The oasis was planned to contain workers residents, workshops depots, sinter plant, transportation utilities and the mosque. Every Oasis is surrounded by desert and, if it was successful, it would be extended to the north by Oasis (3), Oasis (4), and (5), etc. ….

The concept of the initial plan could be considered as a form of social segregation between the high and low-income classes, it also could be understood as an ethnic form of isolation between the Egyptian Muslims and the foreign (non-Muslims). Alternatively, probably the most valid interpretation is that Empain envisioned the creation of touristic settlement where the real estate economics would be

[1] Ilbert, 1981, p.14.
[2] Annex 1
[3] Ibid, 1981, p.18.
[4] Dobrowolska, 2006, p. 87.

profitable, and another -behind the scene- settlement where the supporting population and functions of Heliopolis growth exists.

However, this was the initial plan, by 1909, due to the financial crisis of 1907, the two Oasis were combined into one. Baron Empain and his partner Boghos Nubar Basha faced difficulties in financing the project. The financial difficulties were met by changing the original planning of the town and the idea of Oases. All the development efforts were concentrated in the first Oasis to benefit from the already built infrastructure and at the same time to achieve a reasonable profit. The new model of development followed the garden city model coping with the models already being built in Europe at the time (Figure 19) [(1)].

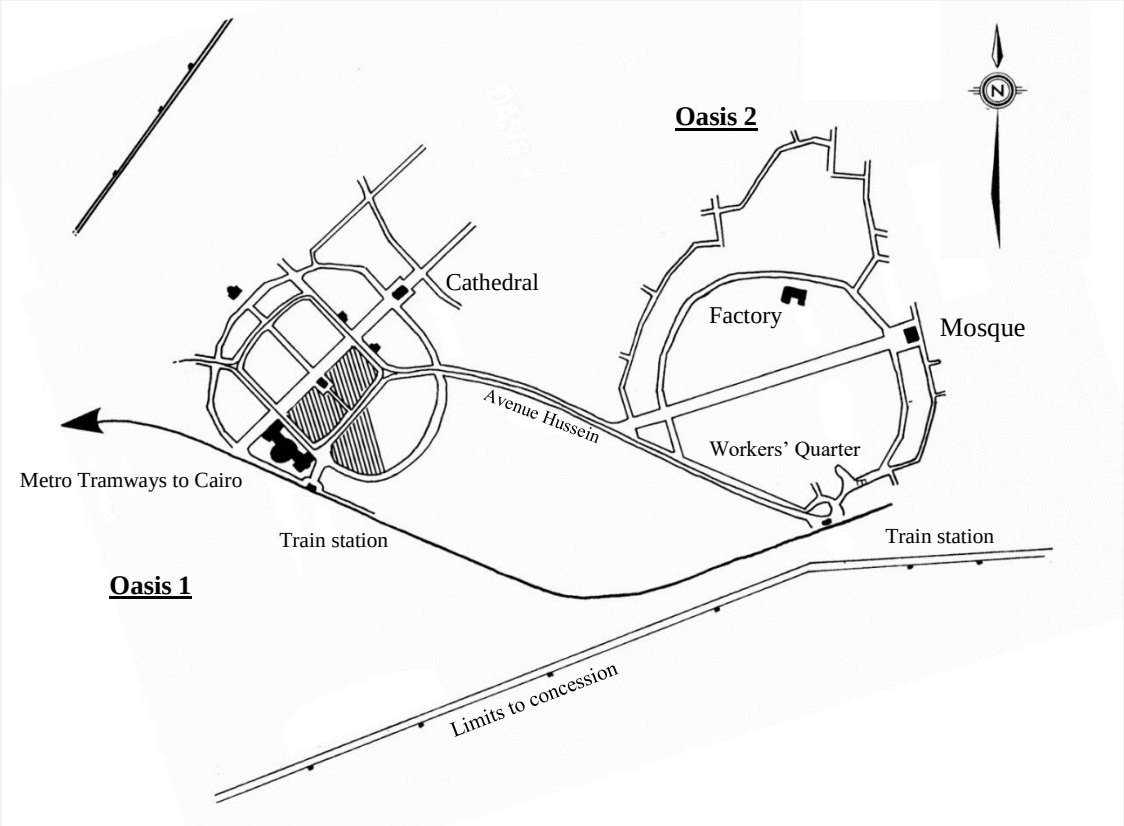


Figure 18: Illustration shows the initial project layout in form of two Oasis.

Source: adapted after (Ilbert, 1981: p.61.)

There are clear similarities between the planning and development of, the garden city Letchworth that drives to the conclusion that Heliopolis was reoriented into the path of a garden city model. The real form of the urban oasis could be traced in the town layout and form.

[1] Ilbert, 1981,p.36.

Another decision was related to the financial crisis of 1907. Initially, HOC did not intend to build an entire town. The intention was to sell fully serviced land plots after financing the infrastructure and facilities that represents an added value [1] (Value capture that was previously discussed in garden city as form of suburbanization section (2.4.2)). Due to the financial crisis, the company changed its plan to invest in construction and to deliver residential units for rent. Land sales also existed but customers had to follow HOC planning and building regulations. When the rate of land sales escalated after the 1921-1922 in contrary to the company plan, the profits declined significantly due to the large number of units provided by individuals on the land sold by HOC [2].

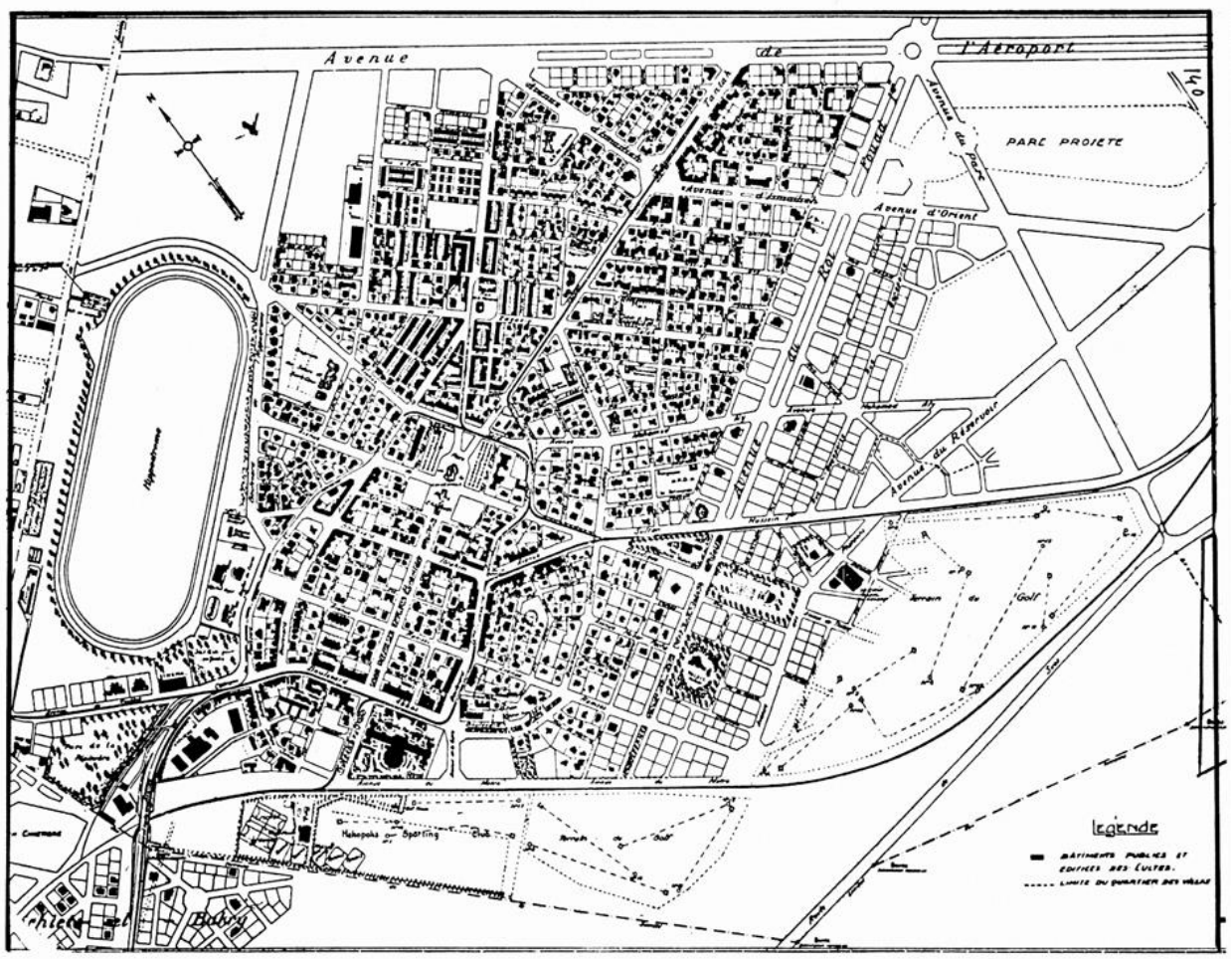


Figure 19: The city Heliopolis, General plan 1930.

Source (Ilbert, 1981. P 69)

The company had no construction service; Instead, HOC delegated construction to subcontractors and used many inspectors to insure the compliance of the work constructed and the deadlines. Many

[1] Mourad, 2014. p.23.
[2] Ilbert, 1981, p. 28.

subsdiers were established as well, such as Heliopolis Palace Company (HPC) to take some key constructions [1].

The government granted HOC an area of 2,500 hectares and a seventy years concession of electric railways and two tramways. Further negotiations took place to define the contract conditions. Both partners had to carry on several duties. For example, the Egyptian government had to carry on maintenance to the already built Cairo-Suez road adjacent to Heliopolis site. Furthermore, to support the railway connecting the town to Cairo with lighting and to provide security and a post office. In terms of planning regulations, the government designated 16 % of the land sold to HOC for buildings, streets, and green areas. The other 86% should be left as a desert area [2]. For the project initiation, a timeframe was set for delivering the final plan of 9 months and 18 months for construction [3]. Ilbert (1981) stated

Figure 20: Arial picture showing Heliopolis development away from the fertile agricultural land of the Nile Valley, the picture dates back to 1924.

Source: (Ilbert, 1981: p 59)

[1] Ilbert, 1981, p.30.
[2] Several years later and during the project development and. The Egyptian government decreased the desert area percentage to be 75% based on HOC request.
[3] Ilbert, 1981, p.15. (Ilbert, 1981)

that until the year 1920, the Egyptian government did not fulfill parts of their contract duties, HOC had to build a post office a telephone central and a dispensary [(1)].

To sum up the roles and duties, HOC was an Egyptian real estate company with European capital. HOC purpose, was the planning and selling of built land. Furthermore, it operates three public service concessions, the electric railway and the trams; the distribution of water, electricity is within the limits and conditions established by the concession act. During the company operation, it has to manage a large rental service, huge number of employees and provide maintenance to the apartment and housing repairs when the occupants changes [(2)].

Building a new town requires the concentrated effort of many people. Empain had the talent for hiring the right architects, engineers, builders and administrators. Empain adopted a strategy to recruit well-connected people from broad backgrounds, including people with high influence from Belgian colonies and French experts who helped him in the construction of Paris metro. Furthermore, British clerks residing within Egypt helped him to liaise with the Egyptian local authorities [(3)]. Recruitment is made through a recommendation letter by a responsible position. In 1908, the company employed sixty-five people, twenty of them were hired directly from Brussel and Paris, and covering all the major positions in the company. All employees had free lodging in Heliopolis; the directors have their own palaces within the town. All employees were given a free passage to work on the tramways, and engineers go on first class. However, within the company organizational structure, colonial attitudes were visible, early records shows no Muslim or female names were among the employees. Local hired staff were mostly, drivers, guards and office boys [(4)].

Empain had the power, as he was the executive director and the owner of HOC. Empain avoided creating a heavy architectural service, as it would require several architects and for him, it was a question of cost. The same reason why he never had his own construction service. The company followed standard tender procedures and delegated its powers to the contractors, for the cheapest and most reliable. On the other hand, the company used many inspectors to insure the compliance of the work and the deadlines [(5)].

Residents in Heliopolis have to go to the company headquarters to obtain a construction license or to purchase a membership card to the metro, for the payment of electricity, rent, water and even for a complaint of theft [(6)]. The recruitment policy was oriented toward limiting the staff number. The numbers of employees were considered relatively small in comparison to the large number of activities.

[1] Ilbert, 1981,p.32.
[2] Ibid,p.31.
[3] Dobrowolska, 2006. p.41.
[4] Ibid., p.48.
[5] Ilbert, 1981.p.3.
[6] Ibid, 1981, p.32.

For example, the electric railway service had only four engineers and fourteen employee [(1)]. HOC had a very light organizational structure and most effective one as well.

Working time of HOC was ten hours per day, and two days of rest per week. However, the wages were higher than anywhere else. The employees enjoyed free medical care when accident or illness were work related. The staff were housed in the town free of charge assuring loyalty among employees. Tensions and clashes within the company employees arose due to the company colonial policy to favor hiring foreigners and non-Muslims [(2)]. The problem was deepened due to the language barrier between the Egyptian workers and their managers. The Egyptians were literate and the only language they can speak was Arabic. On the other hand, the company language was French, the issue that broke the possibility of conflicts in dialogue and mutual misunderstanding.

There is a record of strikes by the workers due to their suffering from extreme disparity in terms of wages and working conditions. The workers acquired the reduction of the working hours to be eight hours per day, the increase of wages, higher compensation in the case of illness, free travel and compensation in case of dismissal. HOC responded to many of the requests and created an office of investigations for the regular follow up of work. Social stratification was responsible for all the intense clashes or socio-political conflicts, the company had a colonial image, same as many companies in Egypt, although its high wages, HOC was colonial on its structure and centralized and hierarchical as many European companies [(3)].

HOC had three offices in Cairo, Brussels and Paris. Only Brussel and Cairo office contained architectural departments. Paris office confirms all the decisions taken in Cairo office including financial decisions while Brussels office received monthly statements of all revenues received by daily trams.

[1] Ilbert, 1981, p.32.
[2] Ibid, p.34.
[3] Ibid, p.37.

4.3. Environmental Dimension

In this section, environmental dimension is being investigated through five main subdivisions. Water and Energy, land and housing, Microclimate, and solid waste management.

4.3.1. Water and Energy

The word "Oasis" in the name Heliopolis Oasis Company (HOC) is the English translation to the word *wāḥa* in Arabic. The word *wāḥa* means *"a fertile patch in a desert occurring where the water table approaches or reaches the ground surface"* [(1)]. In the same land where Heliopolis has been established, an artesian water aquifer was already in the area [(2)].

Far away from the Nile valley, HOC acknowledged that water was the most essential and crucial public service for the new town residents. HOC decided to explore the existing water resources in the desert area, the company made the decision to carry out water exploration mission on its own and without the support of Cairo Water Company. That was a way to keep the municipal service of water supply as a sole duty and responsibility of HOC [(3)]. During the early construction phase, water was brought to the construction site from Cairo. Afterwards, water was dug out from artesian wells within the town, a collection of artesian wells of a hundred feet deep were dug to collect the water infiltrated on the ground from the Nile valley [(4)]. The water was pumped to a 12-meter high reservoir constructed to the north. The reservoir supplied the water needs of the town for nearly half a century before additional water supply from the Nile valley was needed [(5)].

The prices of water was significantly lower than Cairo, adding to the several competitive advantage of the settlement. Water consumption increased from 44,000 cubic meters in the early years of the town to 1,800,000 cubic meters in 1923[(6)]. Water availability enabled the company to sell the water for irrigation as well [(7)]. However, by 1960s, the artesian aquifers were not sufficient to fulfil the town needs. Additional water piping from the Nile were extended [(8)]. HOC utilized the recycled water from Chubra power plant on the Nile and pumped it for irrigating the gardens [(9)]. Amazingly, urban Agriculture was practiced in Heliopolis. On the nursery grounds, the company cultivated several crops,

[1] Collins, 2014.
[2] IFE, 2005, p.31.
[3] Ilbert, 1981, p 50.
[4] IFE, 2005, p.31.
[5] Ibid, p.185.
[6] Ibid, p.50.
[7] Ilbert, 1981, p.30.
[8] IFE, 2005, p.203.
[9] Dobrowolska, 2006, p.108.

such as, Barsim, Alfalfa and Corn (usually eaten by livestock). Two Cotton Feddans were also cultivated with good results. Agriculture was used to support the cavalry of the company [1].

Through the rapid growth of the town, wastewater management constituted a huge problem for HOC. The sanitation system was based on sewer piping that collects the wastewater and send it to septic tanks at the bottom of houses and then to leaching pits to the west of the town. Two to three times a week the sludge had to be removed and spread over an open field to dry [2]. Such an operation was a source of unpleasant odor keeping in mind the wind direction from the northwest. Other solutions such as infiltration ponds were also experimented but it had other drawbacks such as the spread of mosquitos and the unpleasant odor. Eventually, the problem was solved in cooperation with the Egyptian government. Local sewers were connected to the sewers of Cairo in 1909. Septic tanks were kept in case of overflow. Sanitation became the only public service that was not inclusively provided by HOC [3].

In the field of Energy generation and electricity. The Energy sector was highly developed in Egypt in comparison to many European counties in the early 20th century. The Egyptian Government granted concessions to European companies for Gas production and electricity provision. In the early 20th century, cities such as Cairo and Alexandria were provided with Electricity [4].

The Egyptian government granted a concession for Electricity generation and distribution to HOC. The company wanted to safeguard its total freedom and to ensure its profitability in a fast manner. HOC erected two Electric power stations in Cairo. The main one in Choubrah on the eastern bank of the Nile, which provided electricity for domestic and industrial use (starting from 1912), and the other one was in Demerdash, to provide electricity for the trams.

HOC built an industrial area to the north of the town with one factory designated to build limestone bricks and two factories to provide Gas [5]. HOC secured public and private lighting with a fixed price per kWh. The price was cheaper than Cairo to increase competiveness. From an economic point of view, electricity provision in Heliopolis helped to overcome the weaknesses of many others sectors and helped ameliorate HOC early losses [6].

There are mainly two points that could be linked with sustainable growth in this section. Those two points increased the degree of self-reliance of the town. The concept of Bioregional capacity is interlinked with utilized underground water as a temporary water resource until providing the permanent water supply to the residents. The second point is concerning Energy, the manufacturing of the building materials within the town have led to saving in energy consumption result in from materials

1 Dobrowolska, 2006, p.56.
2 Ilbert, 1981, p.50.
3 Ibid, p.50.
4 MOEE, 2013.
5 Ilbert, 1981,p.31.
6 Ibid, 1981,p.30.

transportation. Limestone brick usually consists mainly of sand, and characterized by its low production cost.

4.3.2. Land and Housing

By building a garden satellite town in the desert, Empain turned out for the first time to real estate development [1]. Empain envisioned a curved and concentric grid with greenery and open spaces instead of a rigid rectilinear pattern of streets. His design was based on British urban models such as Welwyn garden city and Letchworth [2].

On the physical level, Heliopolis was surrounded by waddis and the spatial distribution preserved the maximum use of topographic conditions, the wadies were preserved in their natural state [3]. Developers of the master plan underestimated the effort needed to prepare the desert for habitation. The underestimation came mainly in two points, the first, is the slope of the land, (it was toward the Nile), and the second point was that the whole city area was low in elevation, between 60 and 40 meters above sea level. Thus, the whole area was in danger of flooding in case of heavy rain. Therefore, additional measures had to be taken in order to tackle the problem of heavy rain and flooding. HOC reinforced the rails and built trenches to make the water flow away through the railway ground platform.

Heliopolis consisted of several usages that increased the self-reliance of the town, residential, commercial and, leisure center, and industrial use were all set within a harmonic and homogeneous development. Different types of inhabitants were served through a simple network of Boulevards and avenues. The grid was not rectilinear rigid but rather concentric, in the south of the town, a circular boulevard imposes the form. The town have taken final structure between 1907 and 1909. It is rather difficult to immediate distinguish to the divisions within the town. However, as a master plan, there was a quite strict zoning. Industrial zone was located at the north of the town. Hotels, sporting facilities and clubs were located at the southern fringes. Villas and palaces were located the southeastern side close to the desert. Within the town core, HOC has constructed huge buildings with spacious rental apartments. Between the city core and the industrial area to the north, the company built houses for the working class. The rest of the master plan was divided into standard sized plots with an average size of twenty meters by thirty meters.

Empain declared at the early beginning that he wants the architecture in Heliopolis to conform to the traditions of Egypt [4]. Sakr in 1993, has defined the architecture style in Heliopois as a Barouqe neo-Islamic style[5] (Figure 21). He argued that the buildings with the islamic revival style were

[1] Dobrowolska, 2006. p.41.
[2] Beattie, 2005. p.185.
[3] Ilbert, 1981.p70.
[4] Dobrowolska, 2006. P.48.
[5] Sakr, 1993,p.62.

dispersed throughout the urban pattern of the city Cairo by the time . Helioplis was unique as the buildings were situated together in order to create a harmonious visual image. The systemization of architectural and decoative motifes as well-as the studied vsiual image creates a coherent and variegated style [1]. On the other hand, the arcitecture of Heliopolis, according to Sakr 1993, did not follow a specific islamic style (Annex II) . Many scholers has critcised the architecture of Heliopolis as the isalmic architectural elements motives used were somhow rehortic. They did not always represent a profound understanding to the traditional islamic Architecture in Egypt. The use of the minerate for example attached to a resedential building, same as using domes and arches in several cases for purly ornamental effect. That was not the genral case, Ilbert in 1981 obtained how the use of dome in villas has contribited to control the climate inside the building, the dome stores the heat during the day and expell it through its base opennings during the night [2]. Eventually, the Neo-Classic Barouqe islamic style has led to sustaining cairo's image, and to add to the cultural sustainability of the town.

One key point of success , was the HOC managment to the planning and building regulations, building regulations were strict, privately owned land had to comply with these regulations even before construction. If the land was empty, the owner was obliged to preserve it clean in its original state. The company set building regulations that was to be signed and attached to the contract of any sold plot for all the privately constructed buildings in Heliopolis. HOC reserved the right to reject the design of the buildings that constitutes a breach to the overall form of the housing settlements in terms of , design, form, type or color of the used building materials[3]. HOC enforced a 50% built up area for apartment buildings, for prime villas, only one over third of a lot. Buildings lining with the street shall occupy the entire width of their lots. Building heights shall not exceed one and half time the width of the street, and not taller than five stories [4]. Villas and Bourgeois buildings represented half of the town area, there were no fences surrounding a gated community. Instead, in the case of villas, there were fences surrounding each villa with a maximum height of one meter.

The new town was designed to insure healthy living conditions; the neighborhood should form a group of airy, clear and broken down buildings. A decree of Tanzim (Alignment regulation authority) required a number of assurances regarding the solidarity of the buildings, (foundations, roofs, walls, and respect of Public space) [5].

Residential mobility was increased due to adopting a rent system to the units in Heliopolis, People moving from Cairo the new town, did not face the obstacle of high initial cost of units that result from selling the units by HOC.

[1] Sakr, 1993,p.66.
[2] Ilbert, 1981, p.109.
[3] Contract of plot number 8/189, HOC Building Regulations Archives.
[4] Dobrowolska, 2006, p.116.
[5] Ilbert, 1981,p.70

Ernest Jasper and Alexandre Marcel, where the main designers who created the architecture of Heliopolis. Jasper has designed Heliopolis Palace Hotel in addition to most of the buildings in Heliopolis and he is the most responsible for the style. Marcel designed the basilique and the famous Baron palace in addition to some smaller places and villas(1) . However, some of the plans were created by architects, who never visited Egypt, this were obvious as some of the plans were of European layout and did not comply with the Egyptian culture.

Architect Ayrout, one of the famous architects of Heliopolis obtained how, he figured out that some of the buildings he designed for the workers did not fit with their daily use. He recognized that the workers did not make use of balconies, patios or Backyards. He then decided to configure his design according to their living conditions. He relied on an Egyptian entrepreneur who went to the site, started to elaborate a list of needs, and proposed changes out of the resident's point of view.

Afterwards, Ayrout has introduced houses with two bedrooms and a courtyard. In the same spirit windows was reduced in height and the Mashrabiya was introduced to increase the privacy. The courtyards was used for livestock rearing and for baking traditional bread in the oven (2).

The construction materials used in Heliopolis was very much related to the desert context. HOC established a brick factory to support the construction of the town, initially most of the building materials were imported from Europe, however, due to the economic crisis of 1907, the plans were changed to produce the materials locally. The local bricks factory, produced the calcium silicate bricks used in most of the buildings in Heliopolis, the brick is made from sand and hydrated lime. Rough Stone masonry was used as well in combination to reduce the cost (3).

[1] Dobrowolska, 2006, pp.145-146.
[2] Ilbert, 1981.p 109.
[3] Dobrowolska, 2006, pp.112-113.

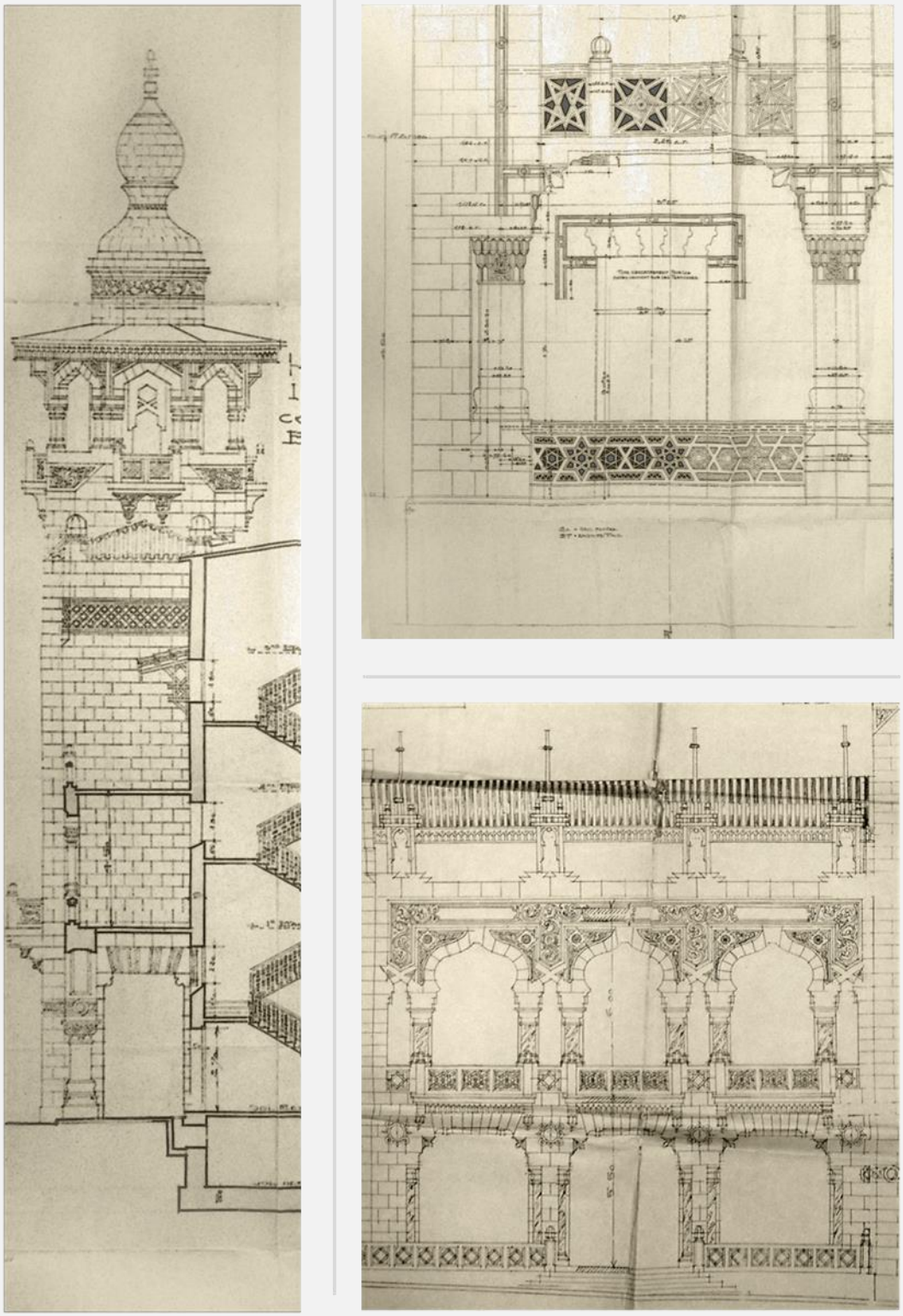


Figure 21: Left and right bottom graphics show details form building 57 in Boulevard Abbas (now, Ibrahim El Lakany Street). Top right picture shows part of the elevation of building number 33 in basilique square (Alahram Square).

Source: HOC Archives.

4.3.3. Microclimate

Figure 22: Basilique square surrounded by green areas full of Jacaranda trees. The Picture dates back to 1954.

Source (Church, 1954)

Greenery in Heliopolis was not only a tool to overcome the heat of the desert, but also to add a feeling freshness to the town in order to attract affluent customers. HOC decided that 8 % of land is dedicated to parks, public gardens and playgrounds. Furthermore, urban layout was designed to keep vast open areas with greens distributed on the town plan, east of the city was the palace district with vast areas of parks, the southern part behind Heliopolis palace was the Heliopolis club. On the west was the Pyramid Avenue. All avenues are lined up with trees and vast amount of interior gardens this choice lead to the creation of a real garden city in addition to the creation of a belt of continuous planted areas [(1)]. In the middle of the town, where the Basilique square, a central green area, planted with Jacaranda trees contributes to enhance the microclimate of the area (Figure 22).

HOC had several problems with the desert habilitation. Despite the attentive care, some plants were almost experimental. HOC created a nursery to make experiments on plantation on the desert sand where they chose not to provide daily irrigation and examine the ability of the different plant species on sustaining itself without irrigation. Trees such as Jacaranda and Casuarina were the best. The center of the town was the Pyramid Avenue with all the planted Jacarandas, Hibiscus, Date palms, with bins of Snapdragons, Geraniums and Agaves. In the beginning, plants such as Eucalyptus were planted massively while proved too greedy to be generalized. Mulberry, Pistachio were planted in a massive form everywhere, sometimes, it was used as fences as well. Along the gardens, they planted Hibiscus,

[1] Ilbert, 1981, p.55.

Vicus and Vines such as Nasturtium, Jasmine, and Honeysuckle Bougainvillea, which although they grew slow; they furnished the town with colors. By the year 1915 the town started to lose its desert look, it did start to be colorful, and full of shadow, every part in Heliopolis started to represent the idea of oasis(1).

The neighborhood should form a group of airy clear and broken down buildings. The choice of the site also illustrates that desire. Creating a garden in the desert required water as well as fertile soil. HOC brought fertile soil from the Nile. It was brought by using horse carts and then later by trucks (2). In 1906, the company brought the Nile silt, which was later spread on the sand to plant lawns and flowerbeds (3).

In terms of urban layout, the author visit unveiled some of the planning regulations that helped to enhance airflow and maximize shaded areas. Interview with engineer Nagy Mustafa Kamel the head of the construction license department at HHD, unveiled that according to his words, the real cause behind why people feel a difference in air temperature within Heliopolis. He said, "*The spacing set between buildings, the plantation and greenery has enhanced the temperature."*[4] . Several Specifications documents archived at HOC building regulations department, set a limit to the built up area of 50 %. The area could be increased to 60% in case of adding terraces arcades or external staircases. The author argues that arcades, (Figure 24), has contributed substantially in enhancing microclimate. Arcades has provided pedestrian with shelter from the direct sun heat. HOC was keen to provide all commercial paths with arcades; sun protection would increase walkability, and, thus increase the opportunity for the shops to be exposed to more pedestrians (Figure 23). Figure 24, shows a wall section in building 57, arcades on the horizontal level was part of a modular design in the elevation. Above arcades, a spacious

Figure 23: shaded arcades at Boulevard Abbas (Now Ibrahim Al Laqqani Street).

Source: Left picture: Right picture: (Eastman, 2001), left picture: (Wikis, 2009).

[1] Ilbert, 1981, p.53.
[2] Dobrowolska, 2006, p108.
[3] Ilbert, 1981, p.55.
[4] Kamel, 2014.

terrace was placed at the first and second floor. Once covered with a concrete or by a wooden cantilever shading system. Openings through the arcades were arched to reduce sun exposure. High ceiling heights contributed to good ventilation.

Although, the wall section was designed within the ten percent increase within the built up area. It did has a huge impact on enhancing the microclimate on both levels, the pedestrian level and the interior of the building. On the other hand, Ilbert has criticized Heliopolis for being scattered over vast amount of land and not being compact. There was a vast area within the town where no protection form sun and wind is provided [1]. Perhaps, the part of the feeling of the microclimate today could be resulted from the densification of Heliopolis and the construction of high-rise buildings. However, the initial design of the urban form was criticized for not being compact and not adjusted according to the direction of the solar path.

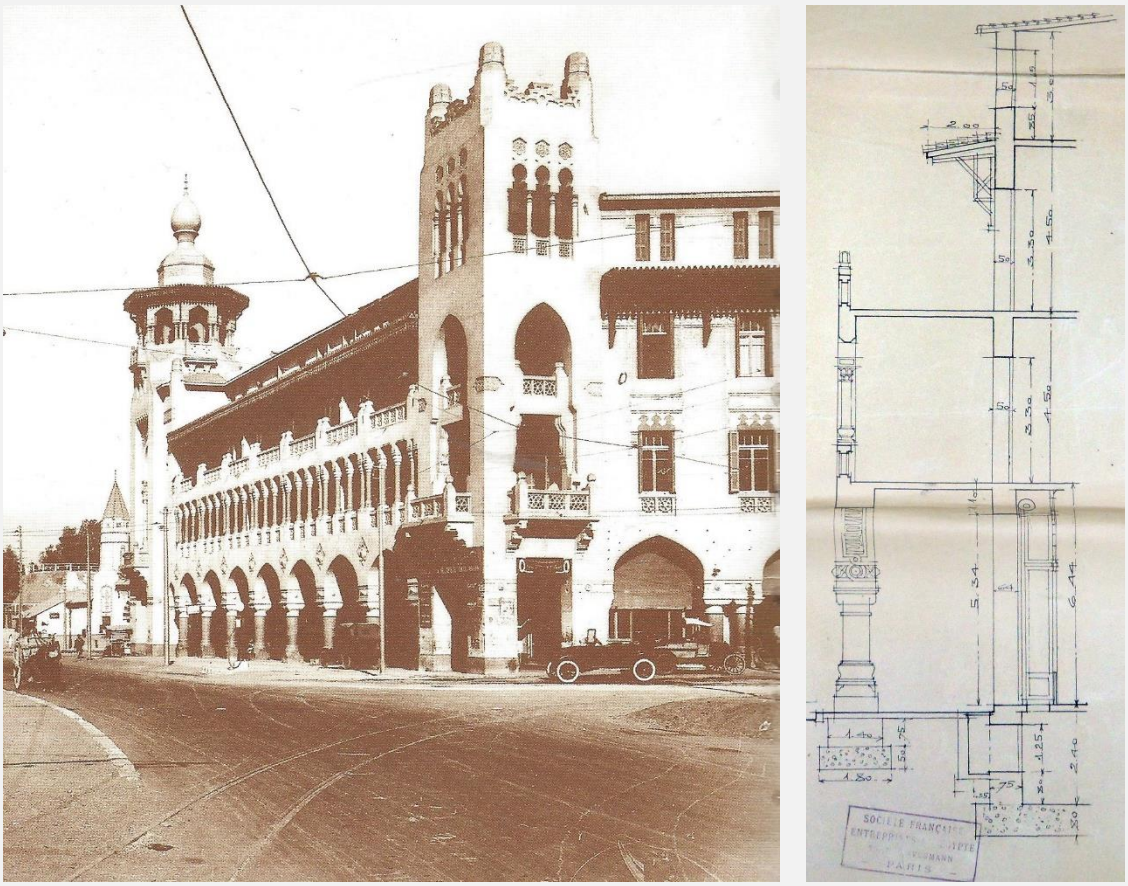


Figure 24: Right picture showing the shaded arcades at Building 57. Left picture shows the wall section at the same building from HOC archives.

Source: left picture: (Dobrowolska, 2006: 56). Right picture: HOC archives.

[1] Ilbert, 1981, p.74.

4.4. Economic dimension

Heliopolis was a real estate venture that introduced a new model linking the extreme challenges of urbanism with the extreme challenges of economics in a new and profound way. The technology of the mass transportation system helped to gradually, shift the concentric population of Cairo to the desert. Moreover, urban economic dimensions in Heliopolis increased the competitiveness of the town, making the town a welcoming environment for many target groups. Financial management was coming from Paris as the French had the biggest share.

4.4.1. Economic Development

Perhaps the best preface to this section is to point out that the contract between HOC and the Egyptian government was in the form of a public private partnership. The Egyptian government was not to suffer any risk in case of project failure. As HOC provided nearly all the infrastructure and services for the town, it remained independent from the Cairo for many years. In 1913, HOC lost its court case aiming to avoid paying taxes to Cairo governorate. HOC applied its own service taxes on the residents of Heliopolis. According the Ilbert (1981), HOC did not become profitable until year 1922 [(1)], the economic recession of 1907 during the early initiation of the real estate venture, played an essential role in extending the project payback period. However, shareholders accepted the delay in gaining profits and acknowledged the fact that all capital invested was directed in fulfilling the needs of project development. Moreover, there was confidence in the political stability in the country [(2)]. Egypt was economically stable and far from the raging political conflicts in the north.

Initially, Empain expected a low cost for the project initiation, however after the 1907, he decided to invest more money and to deliver housing units instead of fully serviced plots. Therefore, Empain increased HOC Capital from fifteen million French francs to thirty million French francs [(3)] [(4)]. Furthermore, different other subsidies were established to contribute to the development of the town. The sum of subsidiaries capitals were of nearly 29 million francs. However, there was no brutal economic exploitation, infrastructure cost was always doubling [(5)]. European capital was the major resource for financing the project, apart from Belgium, France was the biggest investor, and the banks that financed the project were mainly European banks.

[1] Ilbert, 1981, p.43.
[2] Ibid.
[3] Ilbert, 1981, p.41.
[4] Nearly equal to 510, 000 EGP based on currency price of 1920 cited by (Ilbert, 1981) .
[5] Ibid.

Ilbert argued that HOC acted as multi-national corporate, the capital was imported from Europe, invested, recovered and profits were exported back again to its origin. The capital was only dedicated for infrastructure [1].

There is no doubt that HOC benefited from the immigrating population during WWI between 1914 and 1918, but it is also considered as a compensation to the economic recession that faced the company in its early years.

Adopting rent instead of selling the units has encouraged people to move to Heliopolis, creating residential mobility. Housing economics were in the benefit of Heliopolis, even when rent prices were escalating in Cairo between 1914 and 1922 by 60 %, HOC rent prices did not exceed 30 %. In general, HOC provided a competitive rent rate in comparison to Cairo. While the average villa in Cairo costs 15 LE/ month [2]. HOC offered 20 villa prototypes with a rent rate, between 4 to 18 EGP per month. The average apartment of four rooms in Cairo did costs at least 6.70 EGP per month, in Heliopolis it costs only 4 EGP/ month [3].

Ilbert showed that HOC granted Egyptian governmental officials special benefits in Heliopolis such as, priorities to rent for the first built apartments and villas, and discounted prices for them in Heliopolis. The special benefits were part of an unofficial deal, that lead to grant HOC planning benefits. The benefits could be seen later as an increase of built up area (from 16% to 25 % built up area), and regaining control over public services [4]. This policy of HOC gave the town a popular character although all the governmental residents were executives.

Baron Empain bought the desert land for his new town for one EGP per feddan, Market price for land on the outer perimeter of Cairo at the same time was one EGP per meter square[5]. Thus, the price of the land was very cheap for Empain. The governmental conditions for selling the land to Empain at the time of selling was to build one over sixth of the land area only. The built up area would be designated for buildings, streets, and plantation. Even though, the price was cheap as the value of the Egyptian Pound was equal to nearly 7.5 gold grams by that time.

Empain independent “Empain Group” was with a broad area of activates that stretched over Russia, to Spain and China. Empain was the financial controller in all of his companies through his own bank founded in 1881. His bank helped to finance his projects worldwide and helped his companies to overcome financial crises but not to compensate for losses. The financial power of Empain helped to sustain HOC and during its early days of development [6].

1 Ilbert, 1981, p.45.
2 Egypt used the gold currency standard from year 1885 to 1914. One EGP was equal to 7.4375 gold grams (OANDA, 1996).
3 Ilbert, 1981, p.22.
4 Ibid.
5 Ibid, p.14.
6 Ibid, p.39.

In addition to his financial power, Empain adapted a policy for creating different subsidiaries in Egypt (next to HOC) to compensate risks. Empain was either a founder or a co-founder for different companies under the umbrella of "Empain group (Table 2).

Next to HOC, Empain significant shares in other subsidiaries that have contributed to the development of Heliopolis. Empain used this policy in order to compensate for possible risks [1]. These companies officially were officially independent form HOC, and in some cases, their founders were in the board of directors of HOC.

HOC, the parent company was supported by three main companies that helped developing Heliopolis, such as, Société des terrains du caire (Cairo Suburban Building Land Company), Société française d'entreprises en Egypte, (French Society business in Egypt), Société des Travaux Publics du Caire (Cairo Public Works Company). Subsidiaries were in charge of taking part of Heliopolis development plan, based on their own budget, and against some financial benefits. Subsidiaries helped in more than one way, they helped call new capital of various origins to be invested in Heliopolis. They also were legally independent, and helped to diversify risks in case bankruptcy [2].

Establishment date	Company name
1906	Cairo Electric Railway and Heliopolis Oasis Company.
1906	Société Anonyme Tramways du Caire, established as a subsidiary.
1894	Société Anonyme de chemins de fer a voie étroite de basse Egypte.
n.d.	Menzaleh Canal and Navigation Company Ltd.
1906	Société Anonyme des Terrains du Caire et de sa Banlieue.
1906	Société des terrains du Caire.
1907	Société française d'entreprises en Egypte
1908	Egyptian Mail Steamship Company Limited.
1906	Société des Travaux Publics.
1909	l'Héliopolis Palace Hotel du Caire.

Table 2: Empain group, compenies working in Egypt.

Source: Adapted after (Ilbert, 1981: p . 40)

[1] Ilbert, 1981, p, 40.
[2] Ibid.

4.4.2. Marketing

Heliopolis, as a desert settlement, was a magnet for many customers. The desert atmosphere, in contrast to Cairo inner core, was healthier to live in. The sky was clear to see the pyramids and many other landmarks from the top floor within the town buildings [1]. Attracting population to a desert town is not an easy task. Empain adopted different methods to market Heliopolis within the national and international levels. In 1907, Baron Empain has contributed in establishing a company to open a naval line between Marseilles and Alexandria, Egyptian Mail Steamship Company Limited (Figure 25, picture number 4). On board of the first ship, many visitors and Journalists were invited from many countries to see Heliopolis emerging from the desert, to contribute to its growing reputation. The line was intended to target European customers and transfer them to Heliopolis Palace Hotel, or Heliopolis House Hotel for a stay at lower cost, to know the town and experience the desert atmosphere.

Figure 25: Pictures (1), (3), (5), (6) a group vintage posters shows how HOC market Heliopolis through its Hotel Heliopolis Palace. In picture (2), the great aviation week of Egypt. Picture (4) the British mail streamers advertisement.

Sources: (Humphreys, 2011), (Heliopolis Aviation, n.d.), (RAWI, 2013), (ESC, 2010), (Humphreys, 2011), and (RAWI, 2013).

In Figure 25, pictures number 1, 3, 5 and 6 shows a number of advertisements aimed at marketing Heliopolis through the hotel Heliopolis palace. The advertisements aimed at showing the desert atmosphere through different times of the day, the clear panoramic view of the stars at night, camel rides and excursions in the desert, the sunshine, the nomadic life… different themes to attract tourists and visitors. Heliopolis palace Hotel was an indirect way to attract European customers and brand the

[1] Ilbert, 1981, p, 53.

town Heliopolis. The rich and cosmopolitan clientele were attracted by the exceptional luxury with the huge sports fields and the special hunting in the desert. In fact, a British specialist hired by HOC, designed the sports fields of the prestigious Heliopolis club. He designed fields for polo, tennis, hockey, cricket, squash, racket and swimming pools [1]. Heliopolis did not only has hotels, bars, restaurants, casinos, but also clubs, racetrack, airfield (aerodrome), cinema and theater (1930) and the Luna Park The first amusement park in Africa and the Middle East [2].

Beside having one of a kind recreational infrastructure, Empain organized major events to attract the eyes and ears of the media. In 1910, the first week of aviation was held in Heliopolis Aerodrome, as a result the numbers of population commuting to Heliopolis increased substantially[3].

In 1914, a major retrospective for Arab Art was organized in Heliopolis, where the Arab museum of Islamic Art and the ministry of endowments were invited. The exhibition was to inform the public and the industries of the means comparing the product of today with those of the past century, and encourage the Artists come and see how their profession was developed. The committee of the exhibition pursued the collected art by the Egyptian .The initiative were under the chairmanship of king Fouad and controlled by the conservation committee of Islamic Art [4].

Figure 26: Top left : picture showes the Louna park 1912 , top right the Aerodrome c 1918, and the Hippodrome. Source: (Urbanile, 1912), (AWM, 2015), (HHD, 2015).

[1] Ilbert, 1981, p, 53.
[2] Ilbert, 1981, p.53.
[3] Ibid, p.57.
[4] Ibid, p.109.

4.4.3. Mobility and Livability

Egypt had a key position in the geopolitical map of the 19th century. When the British Empire gained control over India, strengthening the communication routes between the north and south acquired improving the transportation network through Egypt [1]. In 1854, as a result to the British interest, Egypt railroads was the second railroads to be established in the world after England [2]. Afterwards, further railway developments took place within the Nile Delta and the Nile Valley. Meanwhile, Tramways were also developed in cities of Cairo and Alexandria.

A closer understanding to the evolution of railway and tramway development in Cairo region, unveiled that Heliopolis tramway has emerged within a context of development manifested by several foreign railways companies. The British occupation in 1882 has paved the way for several concessions provided by the Egyptian government to several foreign railway and tramway companies [3]. Vitalis in 1995 mentioned an example of a public private cooperation that was shaped in this era. The ceding of the state owned railway Tura-Helwan to the Suarès group. The ceding purpose was for further development of railway, and to extend it to Bulak district in Cairo. Afterwards, the railway was leased back by Suarès to the Egyptian government [4].

Within Cairo region, Heliopolis was not the first suburb to depend on railway commuting, the suburbs of Helwan, built 25 km to the south of Cairo depended on railway transport. Helwan Junction was the oldest suburban railway station in Cairo region [5].

The railway line Cairo - Helwan opened in 1889, has contributed to the emergence of other new suburbs such as Al Maadi. Helwan did not follow a specific model of urbanization whether a satellite t or a garden city. It was a city, which emerged as a health resort, and was later connected by the railway [6]. Empain had a significant capacity to build and develop railways and tramways. His company "Empain group" built and managed railways and tramways across Europe, Africa and Asia [7]. In addition, Empain had a very solid grounds and a significant experience in the local Egyptian railway and tramway developments.

The tramway developed by Empain to connect Cairo to Heliopolis was preceded by a set of tramways operations spread around Egypt and mostly dominated by Belgian companies in which Empain was a director. The companies were *S.A. des Tramways du Caire* and *S.A. des Chemins de*

[1] The British Empire was keen to coordinate with the Egyptian government in order to establish a railway linking Alexandria to Cairo and then to the city of Suez on the red sea.
[2] ERA, 2014.
[3] Vitalis, 1995, chapter 1.2.1.
[4] Ibid, chapter 1.2.1.
[5] Raafat, 1997.
[6] Dobrowolska, 2006, p. 42.
[7] Vitalis, 1995, chapter 1.2.1.

Ferde le Basse-Egypte and the *S.A. des Tramways d'Alexandrie* [1]. In 1894, Empain Subsidiary S.A. des Tramways du Cairo was established in cooperation with his Belgian partner Jules Urban, six months later after the establishment of the company, the first Egyptian tramway line was up and running [2].

"The transport industry was Empain's specialty that made him bring a desert to life, through the blood veins of electric railways", Empain had the Cairo tram concession also with his partner Boghos Nubar Pasha who was an engineer, a founding member in the railway company of Alexandria and Rhamleh and the director of the Cairo Railways Company. Boghos Nubar Pasha became Empain's local partner in his new project connecting Cairo to the new desert town Heliopolis [3].

The tramway mass transit system was part and parcel of the planned development of Heliopolis. Heliopolis could be defined as a satellite city rather than a garden city when analyzing the transportation system. The city was connected by a mass transportation system that bridges over the 10 km desert distance between Heliopolis and downtown Cairo in fifteen minutes [4]. The electric railway was not established directly at the begging. During the first two years, a double decker bus used to connect both sites Cairo and Heliopolis. Afterwards, two electric railways were build. The first one was from Heliopolis to Qoubah, where it met up with the state owned railway linking Matariah to Cairo. The second railway, operated at the 1908 linking between downtown Cairo (Alattaba) and other transitional stations until it reaches Heliopolis. The initial duration of the trip was about 45 minutes. In 1910, the trip duration was reduced to 15 minutes only thanks to the opening of the new direct metro line. The Line was in operation with time intervals of 10 minutes [5]. The electric railway was in operation in two lines between downtown Cairo and passing by the central station and reaching its final destination at Heliopolis. From an economical point of view, the electric public transport was crucial to the project success. There is a relationship between the tramway and the growth of the town Heliopolis [6]. Meanwhile, the tramway service was competitive and affordable. The price for the first class ticket was 10 Millimes and the second was seven Millimes much lower than the Cairo tramways at that time. The tram service was from 06.00 am until 01.00 am with intervals of 5 min, the frequency of departures increased in peak hours. Especially in late afternoons when the civil employees start to go back home in Heliopolis [7]. Most of the inhabitants of Heliopolis worked in Cairo [8].

[1] IFE , 2005, p.11.
[2] Dobrowolska, 2006, p. 41.
[3] IFE, 2005, p. 183.
[4] The electric railway started from the intersection of avenue Fouad and Emad Eldin intersection and ended in Tantah Street, Heliopolis.
[5] IFE, 2005. p.182.
[6] Ilbert, 1981, p 56.
[7] Tarabeily, 2003, p.356.
[8] Ibid, P.55.

Figure 27: The picture shows the tram in Cairo between the 50s and 60s, a light rail transit for all social classes.

Source: (FEHP, 2014)

Modes of traffic were diverse. The town was designed to handle pedestrian and vehicular traffic. Thirty percent of the town area was designated to roads and pedestrian spaces. A wide street design was considered in Heliopolis to handle the expected increase in the vehicular traffic [(1)]. Streets Hierarchy was set with a minimum width of 10 meters for the local streets. 12.5 to 16 m for side avenues. 20 to 25 to main streets and 60 meters for the main arterial streets. By 1925, all the streets macadamized and fitted with curbs and sidewalks. Sidewalks were not less than 2.5 minimum width for a wide clear field of vision. However, wide street design had a drawback on the economic side, costs of Infrastructure installations such as water and gas pipes has were expensive [(2)].

The mass transit system in Heliopolis managed to feed in all the social classes into the town. It did not only provide a safe and reliable transportation system, but a low cost mobility that made the town an integral part of Cairo. Ilbert (1981) showed that most of the inhabitants of Heliopolis worked in Cairo [(3)]. Transferring the low-income class into the town has contributed to the reduction of the town dependency on Cairo; low-income class tends to provide different services that contribute to of the local economy. In addition, workers ability of daily commuting helped to accelerate the town early growth, and boosted up the construction of the town. (Figure 27) shows one of the Belgian made tramcars, carrying a mixture of different social classes.

[1] Ilbert, 1981, P.77.
[2] Ibid, 1981, p. 75.
[3] Ibid, 1981, p. 35.

4.5. Socio - Demographic Dimension

In this section, the socio demographic dimension of sustainable urban growth is investigated through Social conviviality and demographic growth. Social conviviality is investigated within a qualitative approach based on the data available by Ilbert (1981). While in the demographic growth analysis, a quantitative approach was adapted to measure the demographic growth of the town in relation to Cairo.

4.5.1. Social Conviviality

The new town represented another case of social tolerance and conviviality right after the Egyptian cites of that era. Heliopolis was the town of ethnic and cultural diversity. The various religious buildings planned in the town are key evidence for the social and cultural homogeneity within the city. According to Ilbert in 1981, Heliopolis contained Five Catholic Churches and a chapel, Bishop seat, a Greek Catholic, Coptic, Catholic, Maronite churches and a Jewish Temple, An Anglican church, and three mosques. The company HOC donated the land and sometimes to the buildings for the cathedral & the bishop, for the religious schools, the land was sold in a symbolic price. The Religious diversity was reflected on the educational level as well. Where each community had a mixed school, Muslim, American, English, Jewish, Greek, Catholic, Armenian, etc…. [(1)]

HOC envisioned that in order to encourage families to come and settle in Heliopolis, diverse school systems that would fit to various ethnics should be built. Therefore, for the new customers, they would not suffer any social exclusion.

Ilbert provided statistics that shows the ethnic diversity of the town in year 1914 (Figure 28). The numbers could have many interpretations. However when investigating the numbers together with the number of population according nationalities. Ilbert in (1985) obtained that Egyptians population was the highest from the beginning. At least half of the population were local and 20% Europeans (in particular Italian and Greek), about 30% Levantines [(2)] [(3)].

The existence of town utilities and transport were enough to attract population form the high mid and low-income social classes & even from the proletarian segment. There was a minimum need for coming to Cairo, popular housing were first occupied by those providing the daily life of the town [(4)].

[1] Ilbert, 1981.p.50.
[2] Ilbert, 1985.p. 39.
[3] Levantines were Turkish, Lebanese, and Palestinian.
[4] Ibid.p.53.

In fact, the social tolerance and homogeneity in the town was remarkable. The town was an urban platform that embraced religious and cultural diversity. The urban setting was designed to contain the people and to limit conflicts and ghettos [1]. The homogeneous nature of the population was because of many factors most importantly, the existence of true recreational infrastructure such as the Hippodrome, the Luna Park, the Aerodrome and Heliopolis club and many other recreational activities. Indeed, architecture was a very high point of interest as well.

The People felt like belonging to a big club and had a sense of mutual ownership to the place. Furthermore, According to Ilbert (1981) HOC seems to have managed to cluster residents around their places of worship, ethnic and religious distribution seems to have existed.

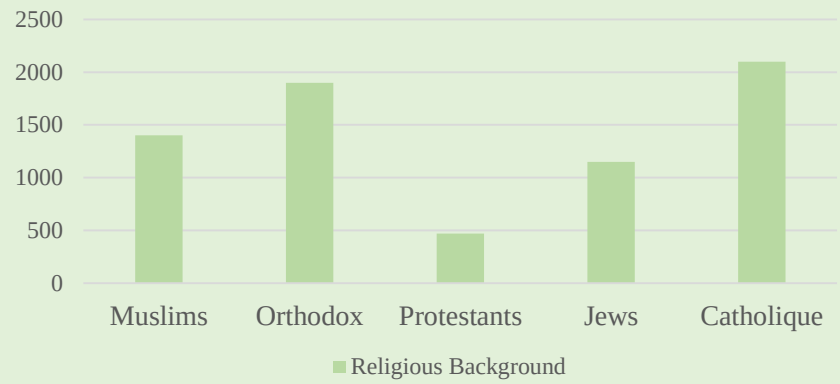


Figure 28: Population by religious backgrounds in Heliopolis 1914.

Source: adapted after (Ilbert, 1981: p. 22)

However, there are some drawbacks, Heliopolis was not the perfect place in terms of social equity. Although there was a high level of coexistence between the high and low-income classes [2].Ilbert in (1981) unveiled that a governmental school was not favored by HOC, the reason that kept the Muslim bourgeois (as defined by Ilbert) from settling in Heliopolis [3]. Another example of social exclusion was what Ilbert unveiled regarding the sporting club, which was very difficult to join for Muslims and was "theoretically" reserved for Europeans. Only if a Muslim family was very rich and honorably known then it could at most cases enter the club. Muslims were somehow forced to stay away as they refused to live a life where parties, men and women open relationships takes place [4].

[1] Ilbert, 1981, p.113.
[2] Ibid, p.121.
[3] Ibid, p.126.
[4] Ibid.

4.5.2. Demographic Growth

As discussed before in the theoretical background (section 2.3.3.3) – in order to measure the level of sustainability among an urban settlement in its population growth, three major indicators are commonly used, the overall rate of population growth , percentage change of urban population in the area and the average rate migration. (Figure 29), shows that, Heliopolis population growth was exceeding the population growth of Cairo by over 156 % between 1917 and 1927, the figures shows the desert settlement has managed to absorb and decentralize population of Cairo to a high extent.

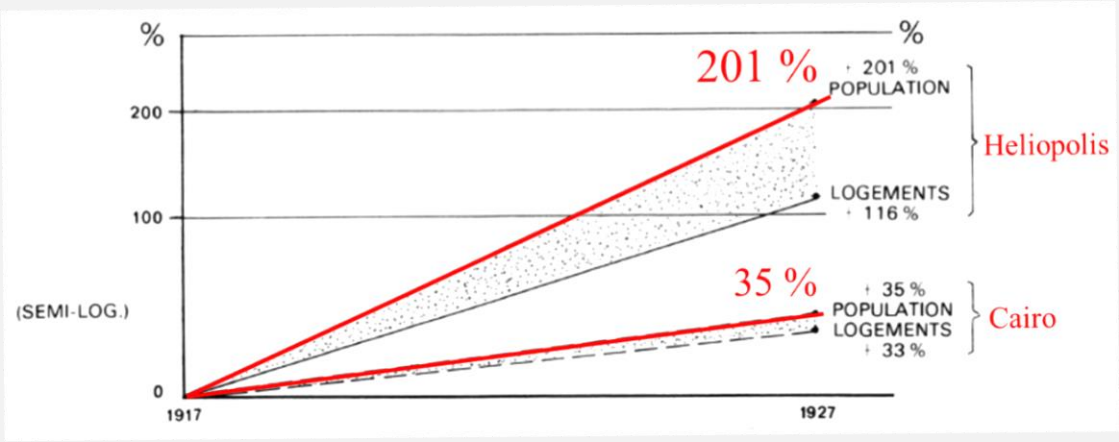


Figure 29: Relative increase in population for Heliopolis in comparison to Cairo 1917-1927.

Source: (Ilbert, 1981: p. 23)

It could be debated that Heliopolis (next to having a stable population growth) has been growing faster than todays' new urban communities' development within GCR. However, as a historical case, finding the complete data that enables the author to set the previously mentioned hypothesis is difficult. Fortunately, there are census made available by Ilbert (1981) to the growth of population in Heliopolis until year 1927. Hamdan also in 1984 cited formal statistics on the historical demographic growth of Cairo.

By compering both figures, the population of Cairo in 1927 was 1,064,000 [(1)], Meanwhile, the population of Heliopolis, in 1927 was nearly 24,000 capita [(2)], which constitutes 2.25 % of Cairo population.

[1] Hamdan, 1984b, p.288.
[2] IFE, 2005, p. 203.

Later census available by IFE (2005) for the year 1960, unveiled that the population of Heliopolis, in 1960 was nearly 150,000 capita [(1)]. On the other hand, within the same year in Cairo about 3,353,000 capita [(2)]. Relating the two figures together shows that Heliopolis constituted about 4.5 % of Cairo population at that time.

Relating Heliopolis population number to Howard's ideal population number of a garden town, equal to 33,000 inhabitants, reveals that, by early 1940s it could be argued that the town has reached its optimum population size.

The numbers shows that Heliopolis was steadily growing in population and was coping with the population growth in Cairo. The city Cairo, by 1960s, contained several consolidated suburbanization models such as Maadi, Qoubba and Helwan. The 4.5 % figure could indicate that by the late 1950s, the suburbanization of Heliopolis and many other suburbs have managed to absorb the escalating population growth of Cairo. Taking in consideration the rural urban migration as a major contribution to the population growth within the same period. The figure could reach up to 9.3 % [(3)].

4.6. Summery and Remarks

The satellite town Heliopolis has been surrounded by the rapid urban expansion of Cairo that transferred the satellite desert town Heliopolis to the district of *Masr Elgedida*, one of the most prestigious neighborhoods of Cairo. The district, thanks to its historical and unique urban characteristics has been declared as an area with special value by NOAH in 2012. However, the district has significantly changed in terms of architectural style, density and transportation modes and many other levels. Still, in particular areas, the district still unveils its true image.

The initial planning of Heliopolis considered the establishment of a satellite town near Cairo consisting of two oases. The satellite town would be connected to Cairo by a rapid transit system, the electric railway, and two separate two oases will be connected to each other by a light tram system. HOC intended to deliver full serviced land plots equipped with infrastructure. However, due to the financial crisis of 1907, there was a huge shift in plan, the proposed desert oases model has changed into European garden city model and the new idea of desert oases has never been completed. Furthermore, HOC changed the aim of the real estate venture, from delivering fully serviced land plots to the construction of buildings and delivering flats and villas for rent.

[1] Hamdan, 1984b, p.288.
[2] Ibid, p.288
[3] By year 1947, the number of Egyptian population living inside Cairo and was born outside was 765,000 constituting nearly 37 % of the total Egyptian population of Cairo. (Hamdan, 1984b: p. 309). Therfore Cairo without the migrating population was equal to 481,950 capita. Assuming the city have reached the population of 45, 000 capita by 1947 (IFE, 2005, p. 203.), thus, Heliopolis constituted about 9. 33 % of Cairo population.

Then, the chapter proceeded to investigate the structure of HOC, how it was formalized in order to manage the development of the town. Building the new town needed the collaborative efforts of many people. Empain attracted different talents from broad backgrounds. However, within the organizational structure, it is worth saying that there was a colonial nature of HOC, which resulted in raising conflicts inside the company. Furthermore, it led to the feeling of exclusion and segregation among the employees of the working class.

The author then proceeded to the analysis on the basis of sustainable urban growth dimensions, environmental, economic and socio demographic.

Within the environmental aspect, investigating water and energy unveiled that Heliopolis depended on underground water for sustaining the life within the town during its early growth, water supply was the sole responsibility of HOC, the service was provided in a much cheaper prices than Cairo, recycled water from the energy power plant in Choubrah were piped to Heliopolis for irrigation. There are also numerous data available shows that urban agriculture was practiced within the town. Wastewater treatment was directed to Cairo, as HOC had no sufficient technological capacity within the town to treat the wastewater. In terms of Energy provision, HOC carried out energy supply to the settlement in a competitive price.

Within the environmental aspect, the land and housing section showed that HOC adapted a neo-islamic baroque style that represented a new visual extension to Cairo, in a way that sustained cultural identity. Empain provided different housing typologies to fit with all the social class, low middle and high income within the town. HOC strictly managed the construction and governed the urban theme within the town. Buildings were studied as units within a monolithic visual image. HOC utilized local materials and the desert sand in producing the building materials for most of the buildings. On the other hand, the company underestimated the effort needed to prepare the desert land for development, later, the company started to build trenches under the metro line and to reinforce the rails against water flows. Investigating the Microclimate of the town revealed that the company paid special attention to greening Heliopolis through examining most different plant species and their water consumption levels. They created several open and vast areas of green areas. They kept the built up area to 50% and planted trees and greenery in integration with the urban form. In terms of Architectural design, apartment buildings were designed to protect both residents and pedestrians form the sun, through creating arcades, terraces and shades.

Within the economic dimension, Heliopolis was financed by European capital, HOC acted as a parent company with several subsidiaries to call for capital, and to diversify risks. The Company was of colonial structure but it actually acted as a multinational corporate, where European capital was imported, invested, recovered and then the profits were sent to Europe. HOC marketed Heliopolis on the international level, the biggest Hotel in the Middle East and Africa was a stationary place for the

customers to be introduced to the town. Empain was keen to organize major events to host key personal and to attract population.

The electric railway and tramline was part and parcel of developing the new satellite town, the mass transit system helped to, evenly, transfer all the social classes into the town. The mass transit system provided reliable transportation system that kept people attached to Cairo and to their work places.

Within the socio-demographic dimension, Heliopolis was designed carefully to be a place for ethnic and cultural diversity. In addition to the various religious places, different school systems were adopted to fit with the different ethnics. Therefore, families found no obstacle in moving to the new town. Recreational infrastructure within the town helped to entertain all the ethnics and cultures. People felt like belonging to a big club.

The analysis of the figures illustrating the demographic development of Heliopolis unveiled that the demographic growth of Heliopolis was stable. The population of Heliopolis represented only 2.25 % of Cairo population in 1927, 4.5 % in 1960. However, the analysis shows that Heliopolis (next to other suburbs of Cairo) absorbed a very reasonable percentage of Cairo population.

5. Summery and Conclusion

The main questions of the dissertation was: could the satellite garden town Heliopolis between 1905 and 1961, be considered as the best urban practice towards sustainable urban growth, in comparison to the new urban communities' development within GCR?

Within this chapter, the author will try to answer the research question through providing a summary to the master thesis and developing the conclusion.

First of all, and out of the theoretical background. Sustainability, in its broader sense, prioritize intervention for the low-income population and acknowledge the needs of the future generations, It implies different characteristics such as the long-term economic development, minimal impact on the environment, economic, biological and cultural diversity and individual well- being through health and education. It also tackles other characteristics such as intergenerational equity on the social and geographical levels, and living of the interest of renewable resources.

Sustainable development is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs. It contains the concept of needs, in particular the needs of the world's poor, and the concept of limitations imposed by the state of technology and social organization on the environment ability to provide the needs of the present and the future.

The first chapter led the author the conclusion that sustainable urban growth as concept comes as an integral part in the broader concept of sustainable urban development. Where quantitative growth result in a qualitative improvement in a sustained approach. Furthermore, a key factor in shaping urban sustainability is to adopt a sustainable urban growth strategy during the early formation of the town. The chapter came up with three dimensions of sustainable urban growth in which the analysis of the case study Heliopolis would be conducted. The three main environmental, economic and socio-demographic dimension are investigated. The environmental dimension depends on population, consumption, technology and the adjustment of the urban population according to the carrying capacity of the urban hinterland.

Within the economic dimension the economic processes is dependent on the environmental quality. Economic growth shall not be the primary objective of an economic activity. Alternatively, development shall be based on a set of welfare indicators, such as education, health and quality of life. The socio-demographic dimension refers to the overall stability of population growth in comparison to the optimum size of the settlement is investigated.

Suburbanization was investigated as form of urban growth. Two primary models were investigated the early 20th century garden city model and the post-world War II American models. The models were selected due to their similarity with the modern suburban developments in GCR.

The garden city model was mainly depending on railway transport and was intended to create the perfect syntheses between rural virtue and the urban sophistication, a garden city would come as a community based project that consolidates during a period of twenty to thirty years' timescale thinking rather a five years housing supply. On the other hand, the techno-city model, presents an automobile-based model that relied on building highways and the standardization of housing units. It was to achieve fast housing supply within short time; however, as an automobile dependent model, funneling cars into the central cores of mother cities causes high traffic congestion and high energy consumption.

Sustainability could be investigated within an ex-post analysis. , adding the historical dimension will help to understand the evolution of the urban setting and obtain the learned lessons on how city growth could be linked with achieving sustainable urban development.

Within the third chapter, desert urbanization is accompanied by extreme challenges, such as harsh climate, remoteness, and lack of previous development in the area. The desert accounts for ninety six percent the Egyptian land, Egypt is suffering from the loss of fertile land within the Nile valley and desert urbanization became one of the state solutions to tackle the problem urban encroachment on agricultural land.

The new urban communities development was initiated within the late 1970s to be a partial solution to solve the problems of encroachment on agricultural land, lack of urban land for development, deteriorating fabric, infra-structure and facilities, and low quality living. A development plan was set to build 24 new towns aiming to absorb 12 million capita by 2017. New cities were categorized into satellite cities, twin cities and independent cities. Today, the new urban communities' development suffers major drawbacks. Among them are failure to meet target population and attract residents, imbalanced development and distorted population mix and demographic structure.

The Author has focused on the metropolitan Cairo region (GCR), analyzing the new urban communities growth within the urban development context of the region. The analysis aimed to investigate the current model of suburbanization and obtain its characteristics. The author concluded that informal growth has not been ameliorated as a result of suburban growth, in contrast, the informal growth, in terms of population increase, increased in a much higher rate. Additionally, it is quite obvious that the new urban communities are lagging behind their goals, most prominently the lag in achieving the required target population.

From a spatial perspective, the author has analyzed the growth of GCR, through analyzing GCR built up area since 1973 until 2014. The analysis unveiled that the horizontal urban expansion of the new urban communities has not been resulting in the reduction of urban sprawl within the mother cities in GCR. A historical study to GCR area has been initiated to unveil the original configuration of the city and relate today's developments to the past. Cairo region has been the place for many capitals of Egypt through history, since the Islamic era, the city has been formed thanks to the gradual spatial development to the north. In most cases, the gradual development consisted of new capitals that were

added prior to each political transformation. Within the era of industrialization, railway development has opened the opportunity for a more distant suburban development; most of the suburban development in Egypt, was managed by foreign private companies benefiting from the colonial situation in Egypt. The European colonialism has been criticized for eroding indigos cultural structures of welfare and environmental management without building new ones. However, the case of Heliopolis was different from many aspects.

From the town Heliopolis to the district Masr El Gedida, the author provided a brief overview of the district Masr Elgedida in the beginning of the fourth chapter. The same place of the oriental town, but different urban settings. Both, the satellite garden town and the central district, have played a vital role in the modern Egyptian life. In a fast overview of the condition of the district Masr El Gedida , it could be highlighted that there is a high level of deterioration to the original urban fabric of the town. Recently in 2012, the district has been declared an area of special value protected by laws and regulations of NOAH.

Heliopolis (1905-1961), has been analyzed as a suburbanization model in relation to the dimensions of sustainable urban growth. The analysis unveiled that the evolution of Heliopolis as a suburb has tackled several dimensions of sustainable urban growth.

Within the environmental dimension, the author started with analyzing the water and energy sector, Heliopolis depended mainly on the underground water supply for nearly half a century until additional supply from the Nile valley was needed. HOC provided the infrastructure for water supply, as well as for electricity supply, while depending on Cairo governorate treatment facilities for wastewater treatment. However, the three services provided regular income paid by residents as a service tax that helped HOC to sustain the growth of the town.

HOC strictly managed the urban theme and the built environment. Additionally, for an economic purpose, Heliopolis was mostly built from the desert sand and stones. Technology was adopted to produce calcium silicate bricks and using it in most of the buildings in Heliopolis. In general, architecture was developed to protect the residents and pedestrians from the immense sun heat. On the other hand, the urban form was criticized for not being compact and not adjusted according the solar path. The investigation of microclimate unveiled that HOC adopted an experimental approach by establishing a nursery and examining the ability of the different plantation species on sustaining itself without irrigation. Therefore, the company ability to green the desert town came into reality.

Within the economic dimension, HOC acted as a multinational company with mainly, European capital. HOC adapted long-term economic development policies. The company did not start be profitable until year 1922. The investment were dedicated to basic technical infrastructure in addition to educational, religious and recreational infrastructure. Out of the theoretical background, sustainable economic development shall be measured by the development of health, education and quality of life.

Empain created several subsidiaries to help call up for capital and to diversify risks. He adopted a marketing strategy through attracting tourism to the area. The Heliopolis place hotel was the stationary point that helped introduce the new customers to the town. Same as many recreational infrastructure and the diverse religious places and school systems.

HOC developed Heliopolis as a transit oriented development, the electric railway and the tram as mass transit systems were part and parcel of the development of the new town. Out of an economic point of view, the mass transit system enabled all the social classes to commute to Cairo in a cost effective and reliable way. Furthermore, it constituted an investment and a source of sustained profit that helped finance Heliopolis growth. In contrast, NUCA, within the initial development plans of the new urban communities, did not include planning and development of mass transit systems for any of the new satellite towns within GCR. The lack of a low cost mass transit system has resulted in social segregation and imbalances in the new towns.

Within the socio-demographic dimension, Heliopolis was the town of religious and cultural diversity, the religious diversity was reflected on the educational level as well. The town was an urban platform that embraced ethnic and cultural diversity. The urban setting was designed to contain the people and to limit conflicts and ghettos. However, different incidents unveiled that social segregation was visible within certain contexts.

There was a minimum need to go from Heliopolis to Cairo, thanks to the provision of housing utilities and transportation infrastructure. Within the initial development phase, the popular housing was occupied by those who provided the daily life of the town.

Analyzing the demographic dimension within Heliopolis unveiled key facts and figures about the desert town, first it has been growing in both population and construction in a higher rate than Cairo according to the data available from 1907 to year 1927. Secondly, Heliopolis alone has absorbed a minimum of 9 % of Cairo population. The figures are open to debate, in relation to the present progress of the new urban communities within GCR.

To answer the research question, based on the qualitative investigation and on the knowledge gained through the course of this thesis, the answer is **yes**. Heliopolis between 1905 and 1961 could be considered as the best urban practice towards sustainable urban growth, in comparison to the new urban communities' development within GCR.

The Author answer is based on reviewing the notion of sustainability in its broader sense. Sustainability contains two concepts, the concepts of needs, in particular the needs of the poor, in which an overriding priority should be given, and the concept of limitations imposed by the state of technology and social organization on the environments ability to meet present and future generations.

Out of the economic dimension of sustainable urban growth, targeting low-income population in Heliopolis was not only by providing low cost subsidized units. It was by acknowledging them as a

partner in developing the new town and providing them with the infrastructure and utilities that enables them to overcome their economical vulnerability. Within the initial development phase, the popular housing was occupied by those who provided the daily life of the city. This has been visible in terms of building a transit-oriented development, building special designed units for the low-income group according to their needs. In addition, providing the needed religious, educational, commercial, cultural, and recreational infrastructure.

In the contrary, within the new urban communities' development, the automobile is usually a prime agent for decentralization within the new urban communities' development. Following the techno-city model, it led to a social segregation and the exclusion of vulnerable low-income class who cannot afford the cost of automobile. Within Heliopolis, technology was best utilized to contribute to sustainable economic growth.

Heliopolis, although built by foreigners, constituted a socio-cultural extension to Cairo. It did preserve the Egyptian identity to a high extent. A new urban community that was on the international touristic map, rather than being built for supplying the local housing needs in globalized and standardized way. Heliopolis were a place for ethnic and cultural conviviality. From the outset, the ethnic and cultural tolerance in Cairo have found their continuation in the desert town. It was a place based on diversity, one of the main characteristics of sustainability.

Planning urban growth within Egypt is challenged by the desert environment, Heliopolis managed to achieve a high level of self-reliance in providing water and energy for their residents. Moreover, most building materials were manufactured locally by using the desert sand and stones. Architecture was optimized for residents and pedestrian comfort by using contextual solutions and measures. Plantations were experimented to define the best suitable species that could survive the low irrigation rate and the immense desert heat. Heliopolis was designed to work with the environment and not to exploit the resources of the region.

Sustainable growth is possible when urban growth is accompanied with the development of the mother cities inner cores. New urban communities were built with an overall aim of saving mother cities and its surrounding environment within the Nile valley. There was barely any progress undergoing within this direction. Therefore, whether the new urban communities succeeded or not in absorbing population, the real goals has not been achieved to a very high extent.

In contrary to the new urban communities' development, Heliopolis was not a result to a new political change; it came as an absolute real estate venture that benefited from the quasi-colonial situation already taking place. Although having the sufficient financial resources, the Khedivate of Egypt did not plan for such a mega project. The government was a partner in a public private partnership. HOC ability for providing technology, calling capital, and building the required capacity was higher. However, Heliopolis should have been mainstreamed, as a development strategy, in case of having a local partner or an international partner and in case of Heliopolis the mostly European capital was invested,

recovered, and the profits were sent back to Europe. Most of the profits were not fed back into the Egyptian economy, not to build a new town or to support the strategic development plans of the country.

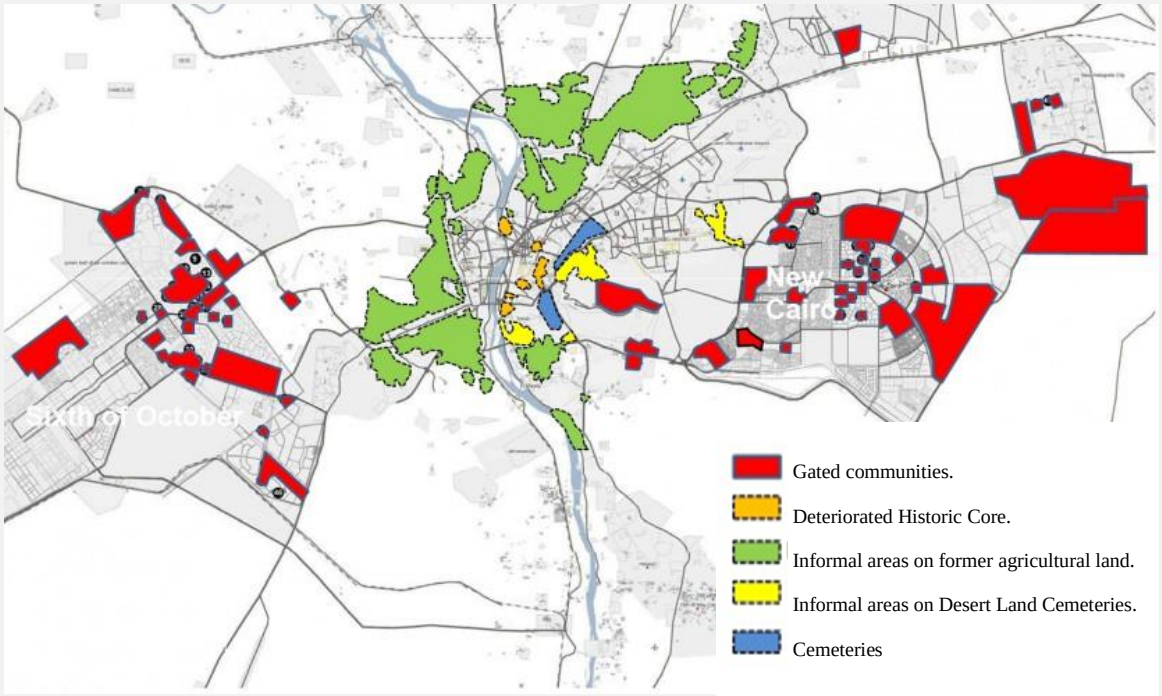


Figure 30: Spatial distribution of different areas in Cairo.

Source: adapted by author after (Mohamed, 2015).

Heliopolis is an urban model that not only represents solution to the complexity of today's urban context, but also, shows how an authentic and contextual urban environment would drive for social coherence. In contrary to the New Urban communities' development. There was no single gated community in Heliopolis, although being designed for all income groups. Social segregation is very visible in the present scene of GCR. Figure 30, shows a recent study by Mohamed in 2015 that unveils the scale of social segregation resulting from excluding the low-income class from the new towns. Furthermore, the scale of informal sprawl on agricultural land and the deteriorating city core of Cairo.

The new urban communities' development is in urgent need for a grass root changes on many levels. Gaining the learned lessons from suburbanization models within the early 20th century in Cairo, will help to redirect the development to the right path towards sustainable urban development.

Annex I

Sale Contract to the land well known as the Oases of Abassiah Desert [(1)]

Between the Egyptian Government, on behalf of the minister of public works according to the decree of the Egyptian cabinet on the 20th of May 1905 (first party)

And his Excellency Monsieur Boghos Nubar Basha, owner of assets in Cairo, Egyptian, and his Excellency Monsieur Eduard Empain the owner of the bank of Brussel Belgian Bank. Represented afterwards as the owners of the concessions act, and they act in this contract unified in solidarity, and their chosen location in Cairo at the party of his Excellency Boghos Nubar Basha in Nubar Basha street number 12 (Second party)

It has been agreed on the following:

Article (1)

The Egyptian Government sold, yielded and transferred the rights to his Excellency Boghos Nubar Basha and his Excellency Edward Empain, an area of 2,500 Hectares (nearly 5952 Feddan) at the desert of Abbasiah located to the northeastern side of the Shooting Field and the southeastern side to the bridge of the old Suez railways. (This Area is defined by letters A.B.C.D.E.F. on the attached site layout signed by both parties and attached in two copies). The Authority of Survey will measure and define the area mentioned on the expenses of the buyers).

The buyers paid before signing this contract the price 5,952 EGP to the Ministry of Finance with the invoice number 157 – and this is considered the sum of all price.

Article (2)

The deal has been approved provided that the land is designated for the purpose of residential use only, (Or for other such as mosques, churches, hotels, theaters and schools). The area for construction, streets, networking shall not exceed one cover sixth the sold land area. The rest of the land shall be kept as a desert land and shall not be used for other purposes only after a written approval from the government.

The built up area shall not include the roads connecting the oasis or, railways, trams, its accessions, and the governmental buildings built within the built up area.

The buyers have the right to buy another area double the area of the contract, about 5000 hectares (nearly 11902) within the same conditions in this contract, for constructing new oases designated for the same purpose. They have the right to do so after only seven consecutive years after signing this contract.

1 Mahrous, 2006. P. 203 after (Abualneil, 1991)

The new area would be 5,000 hectares (11902) in one section. The location selection will be based on the decision of the agreement between the government and the buyers. The condition is, that the land has to be on the eastern side of the land in this contract within the desert direction.

The buyers shall perform, on their expense, the needed reparations for the street of the old Suez railway, or repaving it with compaction, from the Shooting Field until the eastern boundary of the sold land.

The government has the right to ask HOC to construct a new road branching from the railway of Suez and extended to the southern side of the land sold. The execution of this operation shall be according to the drawings set by the ministry of public works and approved by the ministry of war. The buyers shall light all the road (including the railway designated for them) from Al Qoubah Street to the oasis.

In the case the two buyers received the additional area stated before within the right of extension, they have to perform on their expense, the additional reparation for the Suez road through the new land. They also shall provide the lighting and maintenance for this new section.

For the construction of houses and other buildings, and for the construction of roads, sanitation network & water supply the orders and the regulations of the planning authority, roads and the public health authority has to be followed, including the ongoing regulations and those, which be later issued. In addition, all the laws and regulations of the Egyptian government (ongoing or later issued) in all the area sold within this contract.

The current streets and transit networks existing and what will be within premises in condition of expansion, should be designated for public use.

The buyers are committed to establish within their owned land, a police station equipped with the necessary equipment and placed under the liability of the Egyptian government without charging the Egyptian government. The buyers are obliged to establish a post and telegraph office. The Egyptian government shall approve the location of these offices and their architectural drawings. It is already agreed that the area of those buildings shall not be included in the built up area determined before.

This contract does not affect what the authority of monuments preserve as their rights. In the case that buyers have discovered an ancient art work, or ancient buildings , money, medals ,or any object of precious metals etc.… they shall inform the Egyptian government immediately to use it in the way the government envisions. The buyers have no right to ask for a share of what has been found and they also has no right in a financial compensation.

The buyers are committed to pay the Egyptian government at the end of each year the money that would be spent in the operation of police and security inside the sold land according to this contract. The buyers shall bear all the additional fees required that the government envision the necessity of

spending it for the sake of public security due to population increase as a result of utilizing the additional land mentioned before according to this contract. In all the cases, the buyers has no right to stir any dispute in case police force is not enough, or to ask for a compensation of any kind due to this issue.

The Egyptian government is not responsible for the compelling incidents that could hinder the buyers or prevent them from utilizing the sold land according to this contract.

The buyers state that they cede the request of any compensation or fees in exchange for what have been accomplished of selling lands, before, now or what could other parties have as rights inside the boundaries of the sold land within this contract.

The buyers should all the court cases or inquires that could be raised due to this selling or because of its timing. They also should disclaim m the government from any court decisions upon the Egyptian government resulting in financial compensations, interests and fees.

If the court decision acquired, additionally, to terminate this contract or part of it. The government is then not obliged to hand the buyers any other land in the surrounding desert area equal to the area belongs to the terminated part of the contract.

As a guarantee, the buyers paid the ministry of finance an insurance of 2,000 EGP with invoice number 158. This amount of money is paid as bonds of Egyptian debt with the formal price. The buyers have the right to withdraw profits vouchers within the due date.

In case the buyers breached the conditions of this contract, or any pledges that have been set on them. The ministry of Public works has the right decide (accept in the cases of compelling incidents) that the buyers have no right in refunding all the paid insurance or part of it. Without breaching article (15) of the concession act signed in the same date designated for the establishment of railway and tram of the oasis of Alabassiah desert.

The buyers has no right to disclaim this contract without a written agreement from the Egyptian contract. The buyers have the right to establish an Egyptian Joint-stock company. In this case, the contract has to be submitted without fees.

Attached to this contract:

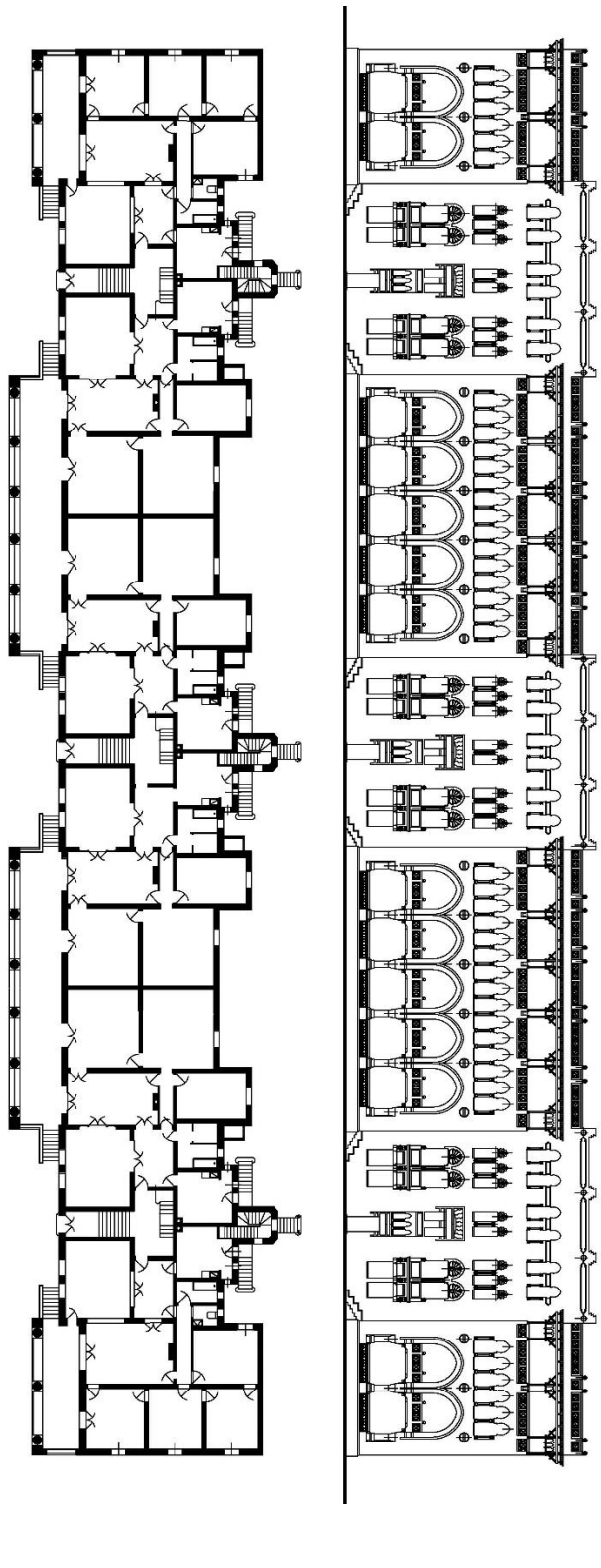
- Site layout - A copy of the concession act.

- Procuration from Mr. Edward Empain to Boghous Nubar Basha to sign after him.

Written in two original formats in 23 May year 1905.

Minister of public works	Boghos Nubar Basha
Hassan Fakhry	Adward Empain, under his procuration Boghos Nubar Basha
Registered 10/9/1908	Time 09:00, number 8339, the first department.

Annex II



Heliopolis Oasis - Building 33

Southern elevation and ground floor Plan.

Source: Drawn by Author based on original drawings at HDD archives.

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