

# A Smart “Cairo” in the Making: A Strategic Approach towards a Better Quality of Life

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## 1 ABSTRACT

Smart Cities is a term used to describe a development based on information and communication technologies. ‘A Smart Community is a community that has made a conscious effort to use information technology to transform life and work within its region in significant and fundamental, rather than incremental ways. In the last two decades, the Smart Cities movement, spearheaded by software and hardware companies has injected advanced technology into the mix. European, Far Eastern and American initiatives are witnessed to implant infrastructures and develop communities that cope with and verify the concept. It is believed that “Smart city” as a concept has been introduced as a strategic method to encompass modern urban production factors in a common framework and to highlight the growing importance of Information and Communication Technologies, social and environmental capital in profiling the competitiveness of cities. The significance of these two later assets - social and environmental capital - itself goes a long way to distinguish smart cities from their more technology-laden counterparts, drawing a clear line between them and what goes under the name of either digital or intelligent cities.

In Egypt, it seems almost impossible to adopt such a concept due to the multi-layered and multifaceted urban and sociocultural problems altogether. A closer look at our capital Cairo and its over-population, over-density, deteriorated urbanism and pollution brings a doubt about the possibility that it can ever be listed as a “smart city”. The answer was an attempt to create independent self-sufficient cities and compounds as a prologue to embedding smart infrastructure and to develop smart social and environmental communities. For that, several fully-fledged communities, creating comprehensive integrated residential schemes within the New Cairo plan were launched. One of those was El-Rehab city, covering an area of 10 million m<sup>2</sup> to accommodate 200,000 residents. The city has its own transportation system and infrastructure, as well as its own facilities including educational, medical, commercial, sports club, recreational and maintenance facilities. After its success, “Madinaty” was ten times a larger city. With international standards, intended to act as a modern extension to New Cairo. Pivoted on the existence of educational institutions, the city includes hospitals, business centers, hotels, sports and social clubs, household services, and entertainment facilities, which meet the day-to-day needs of its inhabitants. The city has several innovative and unique services on its fringes, which caters to the needs of nearby towns and even to the needs of the inhabitants of Greater Cairo. These services include: water sports areas, shopping centers, and varied educational institutions.

Can those cities be considered „smart“? Are they really planned smart? What features of smartness do they possess? How do their residents perceive them? Can they put Cairo on the list of smart cities by hook or by crook? Do they pave the way ahead of planning smart cities in Egypt? What, then are the criteria of Egyptian smart cities to be? The paper at hand aims at answering those questions. It examines the concept within the Egyptian context with the aim of debating its validity and the liability of its application of its underlying implications in the developing countries. The objective is to propose local vision of smart cities in Egypt. The methodology is based on reviewing the concept of smart city and its various applications. Then an evaluation of the experiment of “Madinaty” city will be undertaken in light of the elected dominant principles of the concept. It is expected that the discussion of the findings will set new norms on how to “plan it smart” in Egypt.

## 2 INTRODUCTION: THE NEED FOR A CONTEXTUAL DEFINITION OF THE CONCEPT

Reviews of a number of international examples, as well as of the available literature prove that there are two main approaches to tackling the concept. On one hand is an approach that describes „smart city“ as the digitally networked and technology-advanced, spearheaded by software and hardware companies has injected advanced technology into the urban mix. On the other hand is an approach that describes smart city that is related to the organic integration of social and environmental systems, where an organic urbanism whole is orchestrated. Between the two approaches, it is argued that „smart city“ is an urban labeling phenomenon of an icon of a sustainable and livable city. It can be then implemented where innovation

responds to the needs of the community through focusing on their objectives, and where strategic management responds to the social challenges and benefits the citizens.

Making a city smart is an extremely emerging strategy to mitigate the problems generated by the urban population growth and rapid urbanization. Smart cities, generally rely on some criteria, or at least try to achieve them: demography, social aspects, economic aspects, civic involvement, training and education, environment, travel and transport, information society, culture and recreation. Utilization of networked infrastructure to improve economic and political efficiency is core to this process. According to literature, E-government, information science, urban studies public administration, are also determinants of a smart cities. The ultimate manifestation of the idea is when investments in human and social capital and traditional (transport) and modern ICT communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.

There are several workable definitions of the term "smart city" and there are several related idioms. However, it is argued that ambiguity is always associated with the explanations and practical approaches to implementation. Descriptions of a city that has characteristics like: forward-looking way, awareness, flexibility, transformability, synergy, individuality, self-decisiveness and strategic behavior are rather vague, and keep the explanation of the concept uncertain. Several planning and urban conferences accentuate that smart cities as a concept refers to making sustainable communities happen. This requires flexibility of planning criteria by introducing socio-cultural indicators that change from a place to the other. Analysis of socio-spatial phenomena and the everyday practices are paramount; understanding places and their impact on people, and their perceptions of and hence their definitions of "smartness" in their cities. Identifying the maximum number of inhabitants, emphasizing the urge for a large percentage of open/green public spaces, calculating and considering transportations means, maximizing the use of renewable energy sources, while determining to decrease the harmful effect of energy consumption. High standard of services and infrastructures, separation of urban functions, and the special fragmentation of the city. Socially oriented city that involves its inhabitants' awareness and sensitivity, sense of belonging through participation, all under foresighted governance and management describe a holistic a smart planning approach that relies on developing theoretical research to be manifested and evaluated. All considerations that make smart cities and deal with smartness as a continuous innovation process are regarded as a political and economic issue in the first place.

Along the past two decades, sustainable, resilient, livable, green and other terms were in fashion, and nowadays the term smart city is envogue and without accurate specifications for deferentiations. Jane Jacobs described the city as "cities have the capability of providing something for everybody only because and only when they are created by everyone". Hence, a smart city is this city that primarily identifies its challenges and hence struggles to find new innovative and efficient solutions for such challenges, and regularly observes its indicators of "smartness". The challenge therefore is rooted in the need for tailored planning solutions that affect place making where quality of place is reflected on the quality of life. Revisiting the concept of smart city, therefor, suggests that there should be more flexible parameters for city planning. From which are the development of more integrated and inclusive urban models, applying more strategic management of natural resources, applying new modes of mobility, greater valorization of all citizens, eventually expected to lead to an overall better quality of life.

While there is no single blue print for a specific description of a smart city, it becomes prerequisite to investigate peoples' identifications of places and to recognize what they really want out of their cities. The aim is to shed light on some issues that should exist in a city to become „smart“, while at the same time link and bridge any gaps or misconceptions between aspects considered by desicoin makers, planners and designersm and residents' perceptions. Based on a content analysis of available literature on the topic, I came to the construct such that features of smartness comprise five major ones (Governance, Technical Features, Pysical Measures, Socio-Cultural Attributes and Environmental articulations). Those aspects and their underlyig categories will be examied in the next part of the paper.

### 3 THE CASE OF CAIRO

As observed, documented and widely discussed ,the mismanagement and swelling of the metropolitan cities have resulted in a global shift towards prohibiting building new housing projects in the cities while promoting the concepts of gated communities. With respect to the case at hand, Egypt is one of the



developing countries facing critical problems of environmental degradation that poses a threat to regional growth prospects and to human well-being. Along its modern history, dramatic changes occurred in Cairo's residential communities under different influences. In 200 years, the old medieval pattern, which housed a homogeneous social group, became a metropolitan city with a wide range of residential types and lifestyles. Blocks of flats represent the common form of housing in western urban pattern for middle class families, in the formally planned public housing for low-income and in the informal contemporary housing areas scattered on the capital's fringes (Christians et al. 1986). As a response, a national strategy has been proposed for sustainable development. The major goal was to satisfy human needs and attain social welfare over time, while maintaining the human and natural resources and avoiding environmental degradation. Implementing this strategy emphasised two important issues concerning the design field:

- Land reclamation, urban and rural development, and new communities were the major part of human and economic development that should be targeted to satisfy human needs and to attain social welfare.
- Human and economic development, environmental protection and resource management were considered the key aspects for sustainable development.

Evaluating the implementation of such issues fall beyond the scope of this paper. However, with its 18- 20 million inhabitants, 40 cm/person of open/green areas, and a 35000 inhabitant/feddan, the desert land around Cairo has witnessed dramatic changes. As part of the response to such overwhelming urban tragedy, the Egyptian government has allowed both the private and the holding sectors' involvement in developing the suburbia and creating new communities, In addition to several other governmental efforts for developing low-cost – out –of Cairo fringe huge projects (argued to be total failure as per theorists, critics and their inhabitants). The reason behind the private sector involvement aimed at the enhancement of competitiveness in applying recent affordable physical and technological advancements and to reduce environmental impacts of the city's over population and densification. Starting as opportunities of desert land reclamations for the agricultural projects, the foundation of the ring road and several road conjunctions attracted many investors who started new housing projects, hence, establishing new communities for upper middle class families, together with some educational, cultural, medical and commercial facilities (GOPP 1993).

In most cases the design features of these new communities were profit-oriented and determined by land developers. Presenting a global commodity and a cultural icon consumed by urban elites world wide, the compounds promote themselves as alternatives tot he hectic, polluted, congested and croded Cairo. Characteristics of the gated communities provided attractive new living conditions for the upper and upper-middle class Egyptian families: low density, extended green areas. Accordingly, a considerable portion of the population living in nearby overcrowded Cairo districts chose to move seeking a „better quality of life“. In turn, conspicuous consumption, retreat of he elite from the city and its problems has created demands for new procedures and imposing an extensive use of cars for long distances commuting to and from the city, with a limited availability of public transportation (Abdel-Hadi & Elazhary 2009). Accompanying and following the January 2011 revolution and up to date, we are experiencing an era of tremendous change, geopolitical and economic frameworks; a complete sociocultural upheaval with new urban needs. This causes a rapid urban deterioration that in turn puts the entire residential essence at risk. While the details of the urban problems of Egypt fall beyond the scope of this paper, yet, it is worth mentioning that they are wicked and tangled. There are basic technical, physical and material problems that obstacle any urban development. These are:

- Messy disorganized urban fabric.
- Unique problems of subcultural conflicts.
- Difficulty in waste management.
- Scarcity of resources (water, electricity and fuel altogether)
- Air pollution.
- Human health concerns.
- Traffic congestion.
- Inadequate-deteriorating and aging infrastructure.

More social and organizational problems include multiple and diverse stakeholders, high levels of interdependence, competing objectives and values, social and political complexity. Based in the preceding it is on top of the national necessities that the city should be rethought, with the recurring social and cultural changes. Such necessities include, but are not limited to:

- Development of more integrated and inclusive urban models.
- Strategic management of natural resources.
- New models of mobility.
- Greater valorization of all citizens.
- An overall better quality of life.

Back to the private sector contributions to the national developmental strategies, one of the large developers has initiated the idea of a fully-fledged community 15 minutes away of East Cairo in 1996 “El-Rehab city”. East of Heliopolis on Cairo-Suez road, outside the ring road. El-Rehab is planned to accommodate 200 thousand residents. All facilities and services included schools, a sporting club, business and banking zone, medical center, clinics, transportation means. Residential clusters vary from apartments buildings to town houses to villas. All surrounded by greenery and connected through pedestrian passageways. Upon its success, and learning from its faults, a 10 times the area was “Madinaty”, more 15 minutes far. Out of the city-borders gated residential communities that 15 minutes north of El-Rehab, close to the second ring road (under construction). Planned as a totally self-sufficient city, to accommodate a population of 600 thousand in 120 thousand housing units of apartment buildings, town houses and villas. Pavements and green areas, pedestrian walkways and bike paths are alongside all roads. Wide promenades for pedestrians lead to the service areas, limiting pollution and guaranteeing the safety and comfort of pedestrians and children. Exceeding the measurements of compounds, both EL-Rehab and Madinaty were attempted to create independent self-sufficient cities as a prologue to embedding smart infrastructure and to develop smart social and environmental communities.

#### El-Rehab City:

Primarily intended for the lower middle class in the mid nineties. Upon its success, it was transformed into one of the most expensive communities. An escape from the original crowded, overpopulated, noisy and polluted districts. Switching home from an apartment to a villa, residents chose El-Rehab city seeking for a better quality of life; private, quiet, green, and healthy environment, with all services included. One of the most successful aspects on which it was based on is the provision of services and transportation of bus lines to and from and from Cairo.



El-Rehab city Master Plan

#### Madinaty

Madinaty was initiated a decade after El-Rehab has proved to be one of the most attractive communities. The commercial areas contain shopping centers designed according to international standards. All local and international merchandise is readily available in addition to varied entertainment facilities.

The commercial areas also include districts situated within the zones that are near the residential areas, providing its inhabitants with their day-to-day needs. There are also districts clustered in different parts of



Madinaty that provide major services; open-air shopping areas (like the promenades, for pedestrians only) or malls for international brand names. Technology is utilized to optimize the water used for the irrigation of the existing gardens and golf courses available.

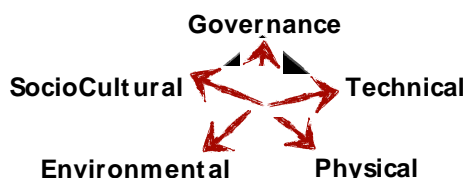


Madinaty Master Plan

Although Madinat is a private sector gated community, however, in its advertisements, a claim of smartness was avowed. So I decided to examine the aspects of smartness claimed through my personal observation. Doing so, I will also be examining how do the residents perceive their city through participatory investigation. Accordingly, I would be able to read through both findings and achieve the objectives of the paper.

#### 4 THE FIELD RESEARCH

The methodology of the next part of the paper is an in-depth qualitative study, exploratory in nature, based on a grounded observation included reflections of the smartness of Madinat, and a field survey that investigated the residents' perception of the concept. Tools for data gathering relied on photographic and observation methods, together with an integrative multidimensional tool applied on a random sample of a number of thirty residents. Residents comprised different age groups, genders and affiliations. However, analysis of the findings did not consider demographic or cultural backgrounds variations. Further more, there are other stakeholders that were not included in the investigation, such as representatives of the owner company workers in the city, and frequent visitors.



The field research relied on that test aspects as listed in the following table:

Governance	Technical Features	Physical Measures	Socio-Cultural Attributes	Environmental Articulations
Holistic/integrative vision Objectives and goals Strategic and action plans Decision making policies Monitoring and assessment research and development Operational costs and maintenance	Wired driven & networked Integrated data base Connectivity and accessibility Digital divides Information & community gatekeepers powered	Land use & activity locations Spatial fragmentation Infrastructure and mobility Public services Open/public and green spaces Minimizing influence of roads &	Connectivity, awareness and solidarity Participation & partnership Creation of small jobs Sense of belonging, privacy, security, identity	Monitoring and decreasing environmental impact Renewable energy resources Energy efficiency & consumption Reducing environmental stress

#### 5 FINDINGS: FEATURES OF “SMARTNESS” IN EL-REHAB AND MADINATY:

Both the personal observation as well as the residents' investigations revealed the following:

Governance:

Governance showed no smartness. Although there is an attempt to involve residents in decision making through creating (owners' council), However, vision, objectives, plans (strategic or action), decision making

practices, are all central and city is entirely run by the owner company, There proved to be random residents satisfaction surveys but regretfully there was not a sign of action/participatory or post occupancy evaluation research that would feed any research and development decisions.

**Technical Features:**

Madinaty can be considered as on the correct path in developing into a digital city. However, technical smartness as described/defined of smart is still in its birth phase. The city is integrated with a wired-driven network. Indeed there are “community-connectivity” yet, residents are not connected to the city database. Residents have to run their errands and accomplish their chores physically rather than virtually.

**Physical Measures:**

There are several aspects can be described as smart. From which are the spatial fragmentation/separation of urban functions/landuse/info, structure and mobility, public services/ percentages/open-public and green spaces/ minimizing the influence of road and vehicles in the residential plots. However, there are other aspects that can be depicted as “not smart”; from which are the traditional building materials and building techniques that are not entirely climatic-responsive, high building and maintencae cost. Some residents also expressed dissatisfaction with the monotonous designs. More over, residents expressed their dissatisfaction with the energy/environmental unfriendly designs causing the consumption of a higher percentage of electricity in air conditioners, etc. Although the city provides transportation to and from sevral spots in Cario, and also offers transportation inside the city, however, relying on the car/vehicle is extensive.

**Socio-Cultural Attributes:**

Madinaty can be described as partially smart in this respect. People are connected via group websites, small groups and subgroups are developed, creating minor solidarity and partnership. More smart aspects were proved; sense of privacy, sense of security, sense of belonging, security from physical attacks, intrusio, insult,, invasion by unwanted social groups, etc. The overall life style seemed convenient to residents. It can be argued that a smart community is in its in birth phase.

**Environmental Articulation:**

Seems also environmental smartness in Madinaty is in its birth phase. However, the city proved to be on the track, with respect to the application of renewable energy, reducing environmental stress, recycling, waste management, minimizing resources. However, there proved to be no clue on the monitoring and decreasing environmental impact. There seem to be lack of awareness with respect to the concept of environmental smartness, as a core, basically- which is a dilemma in the Egyptian paradigm in general. Solar panels appeared here and there, use of recycled water was obvious, however, many other envirnmental aspects are missing.



waste management and solar panels



green and play areas

This suggests that yes, indeed Madinaty has unconsciously applied several aspects of smartness. The case at hand can be considered as a pilot, underdeveloped project that can be developed into a real “smart city” example. Despite the fact that some aspects are still in their birth phase, and other aspects are still controversial, yet, it can be argued that such project is an integrative approach for understanding initiatives that smart cities revolve around, such as governance, policy context, economy, technology, roads, open/public spaces, buildings and infra structure, people and community and safeguarding the natural environment.

As for residents’ definition of the concept (based on ranking and few open-ended questions in the investigation tool), it can be asserted that residents define „smartness“ based on socio-cultural aspects and their associated physical aspects. Activity locations, separation between urban functions and the urban fragmentation, affordability of services, greenery, privacy, security, children safety and landmarks are aspects that primarily involved in their definitions. Madinaty has really succeeded in achieving the home zone scale; minimizing the influence of road and vehicles on the layout, creating a perceptible territorial geographic boundaries, a shared ownership and responsibility for communal space, while creating a more holistic mental image of the entire residential environment.

## 6 DISCUSSION: SOLUTIONS DEVELOPED OR QUESTIONS EVOKED?

While, Lynch emphasized people’s perception of form and imageability leads to argue that the human side of the built environment is still not incorporated in the physical features of planning and housing design, codes and legislations also marginalize the socio-cultural attributes of resident user groups. Egyptian cities are really at risk, rapid and mismanaged swelling of the metropolitan has caused a socio-cultural confusion. Heterogeneous social mobility did lead to chaos in the residential areas in the city. The example at hand of Madinaty is an example for a private sector project. Hence, it has several potentials that can be easily developed into a smart city – only IF awareness of the urge to transform into a smart city became a belief for all involved stake holders, decision makers, investors, planners and designers. However, there are several questions evoked here:

- Will smartness be a privilege for only the upper and upper middle class gated communities, as reviewed in this case study?
- When will it be the approach for dealing with the new housing projects that are scattered everywhere in all Egyptian cities, that are constantly being built without any considerations for any of the mentioned smartness parameters mentioned in this paper, except for „shleter“?!

It is my belief that such an approach needs to be adopted and applied for low cost communities for the majority of under spoken cairenes who suffer from inhumane housing conditions.

## 7 CONCLUSION

This study at hand needs further work, it should target the other societal sectors, and it should focus on the governmental perspective; seeking a holistic explanation/definition of the concept and on practical integrative approach to its application. Any how, it is argued that, to really create a smart city, is to create the conditions of continuous learning and innovation. Understanding mechanisms and how cities are constructed, convert and manipulate relationships that grow in urban environment. On this basis, it has been proved that when dealing with the issue, an integrative multidimensional approach is required. This means that generating an integrative knowledge base which follows a research based design process; then,

practicing with collaborative and shared attitudes; also, breaking the boundaries between the design field and other fields of specialisations; all previous approaches are essential for creating smart cities. Such integrative approach can be summarized as follows:

- (1) Define a vision as part of national governmental plan.
- (2) Prepare a strategic and action workable plan.
- (3) Launch and apply a model for smart city innovation.
- (4) Assess and develop initiatives.
- (5) Set and promote short term challenging goals.
- (6) Balance the optimal theories on smart cities with residents' perceptions and aspirations.

To sum up, this study draws on several directions for further research. As indicated in the results, perceiving „smart city“ is still in its birth phase with respect to the Egyptian decision makers, planners and designers. While for residents, smartness is related to identifying places that contribute to a better quality of life. Accordingly, it is believed that the study at hand is merely a prologue for future investigations concerning the awareness of what a „better quality of life“ is. The design and maintenance of a better environment that grants the well-being of its inhabitants implies both the planning and the demonstration of the built-environment in accordance with the socio-cultural attributes of the residents, together with their psychological and intellectual needs and preferences. Such manifestation is a collaboration of political, economical and legal decisions, together with the physical planning and design (World Bank 2008). Accordingly, residents' identification of place is derivative for the generation of ideas and frameworks for all parties involved in the creation of cities.

To conclude, a smart city is this city that offers innovative solutions to its urban problems, hence insuring a better quality of life that results in the prosperous of satisfied residents. It is my hope that the current state of Egyptian upheaval would consider such priority.

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