

## An Initiative to Achieve Sustainability Criteria in New Gated Communities in Egypt

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### ABSTRACT

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Gated communities are a modern urban phenomenon whose features vary according to the economic, social and urban content through criteria and indicators to achieve sustainability, as it has become a global goal that all countries seek to achieve. They are healthy communities and have a positive impact on their residents. The research deals with an analytical study of the requirements of gated communities, which are represented in the (urban, environmental, social and economic) aspects according to a sustainable future vision with the study of indicators of sustainable development and the needs of distinguished housing within those communities. Therefore, the research paper dealt with the concept of gated communities and the reasons for their emergence in addition to their distinctive features to achieve security and safety within them. The concept of sustainable development and its goals were discussed with the main sustainability goals and indicators to achieve sustainable urbanization, then an analytical study of a distinguished urban community (Madinaty Compound in New Cairo) to reach sustainable urban communities to improve the quality of urbanization.

**Keywords:** Sustainability criteria, gated communities, urban design, luxury housing, safety, privacy



## 1. INTRODUCTION

The development of gated communities is a dynamic process that is reflected in their growth rates, which directly affects the chances of success or failure of the desired goals of establishing these communities. Under the framework of this concept, the importance of having sustainability criteria for the development of these communities to reach sustainable urban communities and achieve human needs appears in order to contribute to directing the urban design of luxury housing on its right track to improve the lives of individuals within their urban communities. The international attention directed towards the need for sustainable development to reach a sustainable future has increased because sustainability is not just a principle that is applied. However, it is an integrated system including all aspects of life. It is represented in the (urban, environmental, social and economic) aspects on the residential environment, the

extent of satisfaction within the residential area and the achievement of security and safety. This goal can be achieved according to the following axes:

- The First Axis: Characteristics of distinguished gated communities housing,
- The Second Axis: Sustainable development goals and Criteria, and
- The Third Axis: An analytical study of a gated community in Egypt (Madinaty).

## 2. THE FIRST AXIS: CHARACTERISTICS OF DISTINGUISHED GATED COMMUNITIES HOUSING

### 2.1. Urban gated communities

A new pattern of urbanization appeared in the last decades of the twentieth century, which consisted of closed private urban gatherings around and within cities. It quickly spread and reappeared in many Egyptian cities and on regional roads, where it was divided into gated communities that enjoy distinct capabilities and services and are isolated by fences and gates, and private housing projects within agricultural projects that depend on the privatization of spaces and their sale with agricultural spaces within their urban boundaries [1].

### 2.2. Reasons for the rise of urban gated communities

First: Because of the rise of neo-liberalism, a political and economic philosophy that defends the freedom of entrepreneurship and private property rights.

Second: Extreme power imbalances and economic inequality often contribute to crime or fear of violence, as may be the case in places such as Egypt, residents' decision to convert to a closed society stems from the need for strategies to protect themselves.

Third: The state may sometimes prove that it is too weak or is already preoccupied with other responsibilities to ensure security in residential neighborhoods.

Fourth: Many countries want to allow investment operations and markets to operate without restrictions, using social groups that may be concerned about social control and separation from outsiders in gated urban communities [2].

### 2.3. Characteristics of urban-gated communities housing

Private urban communities are characterized by the integration of services and facilities, making them a distinct urban and social environment and a better standard of living, with the provision of residential privacy and diverse housing patterns with the possibility of individual communication with his neighbors and practicing all social, recreational and sports activities. The most important characteristics and advantages of gated communities are as the following table shows the distinctive features of the gated urban communities, economically, socially and symbolically, and to identify the function of those communities and the elements that achieve security and safety within them and the amenities available in them and the types, possession and location of housing [3].

Type	Urban	Economic	Social	Security
<i>These communities function</i>	Safe communities of people and property. Create an identity for the project.	Real estate value development. Protect and provide entertainment.	Giving the possibility and Visual privacy. Internal monitoring.	Influence and power. External control and monitoring.
<i>Safety elements</i>	Nature of fences, short fences, chains, guard booths, surrounding vegetation, arm gates, safe nature, permanent security presence, automatic gates	Impermeable fences, barbed wire fences, reflective glass, topographic feature, boom gates, patrol guards, camera surveillance	The shape of the fences - visually open, private property signs, water elements, sliding gates, access cards, armed guards	Symbolic-electric fences, colored sidewalks, no-waiting signs, fixed-time guards, home alarms.
<i>Means of comfort</i>	Special methods. Open spaces. Institutional facilities	Gathering places. Natural views. Guards	Activity Center. Design quality	Recreational facilities. commercial facilities
<i>Population types</i>	Single age groups	Single class and single layer	Of one ethnic group	They have activities such as golf
<i>Housing possession</i>	Main residence. Freehold	Secondary housing. Joint ownership	Seasonal housing. Land rental	public housing. Leasing
<i>Site</i>	Urban areas	Residential. Suburbs. Green field	Affluent suburbs. Tourist resort	Rural. Inside the city
<i>Size</i>	Closed ends	Adjacent from tens to hundreds of units	A village of hundreds of units,	A city of thousands of units for various uses

Table 1: Characteristics of Gated Societies (Grant and Mittelstreadt, 2004)

## 3. THE SECOND AXIS: SUSTAINABLE DEVELOPMENT GOALS AND CRITERIA

### 3.1. The concept of sustainable development

One of the most important and most famous definitions of sustainable development is the Brundtland Commission's definition, which was contained in Our Common Future report of 1987. This definition states that sustainable development is development that satisfies and meets the needs of the present without compromising the ability of future generations and their needs [4].

They are logical solutions for coexistence between current and future generations. In this formula, development is directed to the benefit of society, taking into account the rights and needs of future generations. This is what gives it the character of sustainability (Ad rich 21) and improving the quality of life. This development includes two basic ideas through which it is achieved [5]:

The first idea (Needs): to create the situation in order to maintain a standard of life for all people.

The second idea: Limits the capacity of the environment to meet the needs of the present and the future according to the level of technology and social systems, and these needs range from basic needs such as food, drink and clothing to sub-needs according to Maslow's model division [5].



Fig. 1: Maslow's hierarchy of needs

### 3.2. Sustainable development goals

The United Nations Development Program (UNDP) is one of the leading organizations in the world and is the basis of the United Nations Sustainable Development Plan and Goals for the year 2030 to achieve the Sustainable Development Goals (figure 2) by working to achieve them represented in [6].



Fig. 2: The Sustainable Development Goals

From the above, it becomes clear to us the seventeen sustainable development goals, which were listed in general. However, we will list the eleventh element (making cities and urban communities sustainable and safe), which is defined as societies that apply the concept of sustainable development and urban development standards that take into account environmental, urban and social resources and economic needs to meet the needs of the current and future generations, represented in [6]:

1. Ensuring access to adequate, safe and affordable housing and basic services.
2. Providing universal access to safe transportation systems and improving road safety.
3. Enhancing sustainable urban expansion and the ability to plan and manage.
4. Reducing the individual negative environmental impact of cities through air quality and waste management.
5. Providing ways for everyone to benefit from green spaces and safe public places.
6. Supporting positive economic, social and environmental links between urban areas.

### 3.3. Criteria of sustainable development

Criteria are one of the mechanisms for achieving environmental sustainability for urban communities.

The following is a presentation of the most important indicators for sustainable development to achieve the principles of sustainable development for new urban communities [7] and these criteria appear in Table No.2.

## 4. THE THIRD AXIS: AN ANALYTICAL STUDY OF AN URBAN GATED COMMUNITY (MADINATY)

### 4.1. Applying principles and standards to achieve sustainability in urban gated communities

An analytical study is being conducted for urban communities for the possibility of applying sustainable design and encouraging innovative planning, design and technical ideas by applying this model to gated communities in Egypt in the form of monitoring sustainable urban design standards while analyzing the urban, environmental, social and economic aspects to reach sustainable urban communities.

Sustainable development dimension	sustainable development criteria	
Urban Dimension	Define urban community	schematic determinants
	The urban fabric of the streets	Strengthening urban diversity (Private-public urban spaces)
	Coordination of landscape	Strengthening the environment (Integration of Infrastructure Networks Implementation)
	Providing urban security and privacy	
Environmental Dimension	Selection and design for a sustainable site	Rationalizing consumption and providing new water resources
	Stormwater management and sewage treatment	Use of renewable energies and clean technologies
	Waste management and recycling	Recycle materials and use natural resources
	Achieving environmental quality for urban spaces	
Social Dimension	Providing services (Quality of education and public health)	Activate community participation
	Feeling of belonging and satisfaction with the place	Achieving social justice
	Quality of open areas and green areas	
Economic Dimension	Strengthening the urban economy	Achieving economic flexibility
	Achieve economic growth	Encouraging investment facilities
	Achieving economic sustainability	Maintenance efficiency with periodic checks

Table 2 criteria for achieving sustainable development within Gated communities

## 4.2. Monitoring and analysis (Madinity Compound in New Cairo)

### 4.2.1. Criteria for achieving sustainability in gated communities (urban districts)

#### A. Introducing the urban community (Objective of the project, location, area, number of units)

The objective of the project: to design a modern, global city, taking into account the planning of the current and future needs of its residents and frequent visitors.

##### Site

Madinity is located as an extension of New Cairo and on the Cairo-Suez road, kilo 33 Cairo, and 2 km before the entrance to El Shorouk City, it is 10 minutes from Heliopolis and 20 minutes from downtown Cairo.

##### Area

33.6 million square meters

Number of units: 120 thousand different housing units [8].



Fig. 3: A map showing the location of Madinity

#### B. Layout determinants

The general plan shows the stages of project implementation, in each of them a part of the residential areas and their services, as well as a part of the huge services. Each stage is surrounded by arterial roads that connect them with the external roads surrounding the project. That achieves the integration of services and expands the freedom of choice for the residents, which is required as a design objective [8].



Fig. 4: The master plan of the Madinity Compound

#### C. Urban Fabric

At the level of the pool: curved fabric.

Streets: They depend on two types of streets: the first is the main streets represented by the ring road around the boundaries of the project and some internal main roads, which are 15 meters wide and the second curved secondary streets with closed ends, which are 12 meters wide where transportation is available in Madinity.

Boundaries of the project and some internal main roads, which are 15 meters wide and the second curved secondary streets with closed ends, which are 12 meters wide where transportation is available in Madinity. Regular service of private buses inside and outside the city to connect them to areas Cairo is different [9].



Fig. 5: The street network of Madinity project

#### D. Private-public urban spaces

Paying attention to designing urban spaces to be in the field of vision, in which the special urban spaces are represented in: green spaces, internal corridors, parking lots and a swimming pool in each unit. While general urban spaces are represented in: the common elements of services from common gardens between units and industrial lakes, while reducing the vacuum temperature urbanism, by using suitable materials, shaded places, and designing vegetation cover from trees and tree barriers to ensure good visibility [9].



Fig. 6: urban spaces in Madinat

### E. Landscape Elements

Due to the distinction of Madinat and the increased awareness of the interest in the urban and natural value represented in the landscape in order to achieve design sustainability for the spaces and self-sufficiency by choosing the items of the plant and tree elements and urban agriculture on the roofs of buildings and open areas with the provision of an energy-saving external lighting system and the provision of signs and guiding signs for a sense of safety to achieve sustainable urban spaces[10].

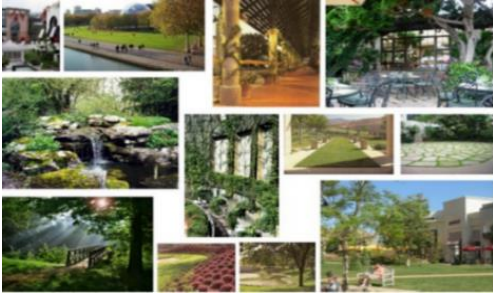


Fig. 7: landscape Elements in Madinat

### F. Implementation of infrastructure networks

The community has all the elements of feeding and draining the basic infrastructure, sanitary and electricity, as the project is committed to water and sanitation services [10].

### G. Privacy at the level of the urban space surrounding the residential unit

Some homeowners plant a row of each one type of tree as a privacy screen and consider planting a mix of different trees along the border. This will create a more natural look for privacy, with consideration to both increasing the distances between units and avoiding parallel and opposite units, using trees and plants in the separation between the units, the road relationship with the entrances to the units, protection against direct vision, and the achievement of auditory privacy by providing a comfortable urban environment [11].



Fig. 8: Using trees and plants to separate housing nits

## 4.2.2. Criteria for achieving sustainability in gated communities (environmental aspects):

### A. Sustainable site selection and design

The urban planning philosophy of Madinat, which has an area of 33.6 million square meters, allocating 27.3 million square meters, is based on providing a distinct community within a newly planned city. That takes into account the varying needs of the population, including for residential areas with its different stages that contain a service center in each stage, in addition to 6.3 million square meters for services. The huge city will be a popular destination for city residents [11].



Fig. 9: The general location of the Madinat

### B. Rationalizing consumption and providing new water resources

In Madinat, there is a high-tech network for distributing pure water to the various units, in addition to the availability of an irrigation network necessary for afforestation and irrigation of green areas, maintenance and development operations with the latest scientific methods that ensure optimal use of water.

Irrigation system used:

Sprinklers system + drip system + emergency manual hose system



Fig. 10: Types of irrigation methods used for green areas in Madinaty

**C. Water consumption for the garden:**

The amount of water consumed in the villa is consumed through the balance charging system. This system is applied to all residential units in Madinaty. It is an accurate system depending on the user (using the credit card), then entering it into the water meter, and the balance appears on the screen. The water is used up as well as the remaining balance [12].

**D. The use of renewable energies and clean technologies Electricity:**

Madinaty has high-efficiency electricity networks from multiple sources that ensure the regularity of the electric current service. The city also contains units to generate electricity that operate in emergencies to ensure the continuity of service [12].

**Solar energy:** Solar energy is used to generate the electricity needed to operate the garbage collection system, in addition to using solar heaters to heat water in the villas area. The air conditioning system in the main mosque in the building area depends on solar energy [12].



Fig. 11: Using the cells for a solar cell in Madinaty

**E. Wastewater management**

The provision of sewage treatment plants was taken into account when designing the sewage network that it should be sufficient for the perpetuation of the sewage process, with planning for the stream of rain and torrential streams and a complete rain drainage network, in addition to the efficiency of gray water treatment and reuse for spraying fountains and latrines and in irrigating the vast green spaces in Madinaty [13].

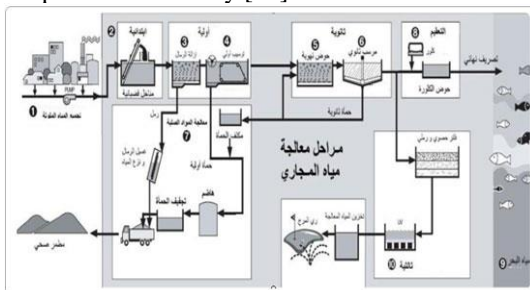


Fig. 12: Wastewater treatment in Madinaty

**F. Waste management and recycling**

Madinaty administration has introduced the latest system in the world of garbage collection bins, where the bins are located underground to reduce pollution. Madinaty is the first environmentally friendly city in planning and classifying a distribution network for garbage collection bins, re-sorting and recycling for reuse, where there are three colors of garbage bins: Food waste section (green bag)

Solid waste section plastic and metals (blue bag)

General waste section (orange bag)

Each section of the baskets is different from the other and the purpose of use is written [13].



Fig. 13: the collection and separation system for garbage bins in Madinaty

**G. Recycling of materials and using natural resources**

Madinaty administration has introduced using local and manufactured materials at sites such as natural stones in pedestrian paths to reduce transportation and maintenance costs, recycling building materials and construction elements, and using and preserving natural resources represented in garbage collection bins (environmentally friendly) and using recycled materials in infrastructure such as paving streets and pedestrian paths [14].



Fig. 14: Use of stones in pedestrian paths in Madinaty

**H. Achieving environmental quality for open spaces (green spaces)**

All apartments have more than one destination so that their residents can enjoy the greatest amount of sun and fresh air. Every building in Madinaty overlooks green areas and because privacy in Madinaty has it. Respecting them, no commercial activities are allowed in residential buildings, and there are spaces designated for cars in front of buildings with an increase in the percentage of green areas until it reaches 75% in the form of paths, green

slopes, roads and play areas for children. All this meets the needs of the privileged groups [14].



Fig. 15: Illustrating green spaces and open spaces in Madinat Yammouh

#### 4.2.3. Criteria for achieving sustainability in gated communities (social aspects)

- A. *The diversity of Madinat Yammouh services that residents need, such as educational services for the quality of the educational level, medical services to maintain public health, administrative services, hotel services, shopping services, exhibition and conference services.*
- B. *Activating community participation through the availability of recreational, sports, social and water games.*
- C. *Increasing interaction and social communication between residents of the urban area with the availability of commercial areas and their division into areas in the middle of residential areas to provide the daily needs of the residents and a sense of belonging and comfort to the place.*
- D. *Creating more attractive areas surrounded by trees and lighting poles in an atmosphere of fun, whether in open shopping areas as main streets for pedestrians only or as shopping centers while providing opportunities for a good living for all to achieve equality and social justice.*
- E. *Providing children's play areas and green spaces for the quality of open areas and creating environmental and healthy communities with social dimensions to form an integrated system [15].*



Fig. 16: Diversity of social activities in Madinat Yammouh

#### 4.2.4. Criteria for achieving sustainability in gated communities (economic aspects)

- A. *Interest in strengthening economic relations by supporting mutual relations between the population that depend on mutual respect between people and between different cultures and other beings.*
- B. *Supporting economic development by understanding different cultures and customs to balance the preservation of heritage on the one hand and economic development on the other hand to achieve a better quality of life.*
- C. *The development of investment strategies by encouraging investment facilities and the work of economic entities within the framework of the economic cycle & green economic.*
- D. *Achieving economic sustainability by providing infrastructure networks at a high level of efficiency, using energy-saving lamps that operate on solar energy, relying on local resources and raw materials, providing fruitful gardens for self-sufficiency, cultivating rooftops and public gardens to supply food.*
- E. *Preparing a future plan for periodic maintenance correctly to support innovation and smart technology to achieve an environment of sustainable production [16].*



Fig. 17: Diversity of social activities in Madinat Yammouh

## 5. RESULTS

The research reached to confirm the research problem and achieve the goals through the sequence and integration between the previous study stages, through which some results and recommendations were reached that lead to the application of the principles and criteria of sustainability within the gated communities, including the following:

1. The characteristics of gated urban communities have been identified. They are a mixture of quality in the urban, economic, social and security aspects, looking for luxury, privacy and security.
2. The criteria and indicators of sustainable development have contributed to a positive impact on luxury housing in gated communities in Egypt to achieve a distinct urban environment and a better standard of living.
3. Criteria were reached to achieve sustainability within distinguished communities by relying on development projects and plans based on the study of urban, environmental, social and economic characteristics to achieve sustainable green construction.
4. The concepts of sustainable urban development, its importance and standards were realized in the statement and monitoring of the progress of the distinguished urban communities in Egypt towards achieving their goals.
5. An analytical approach has been reached for gated urban communities that depend in their planning and design on sustainable design standards as an entry point for development or upgrading to reach sustainable urban communities.

### 1. RECOMMENDATIONS

1. We recommend that the principles and standards of sustainable development and the needs of luxury housing be presented to government agencies and those in charge of development operations in the country to improve the quality of urban and architectural design to reach a sound urban development process.
2. We recommend conducting more comprehensive future studies in the areas of urban development to study sustainability criteria and their relationship to quality of life indicators, in order to derive renewed and continuous criteria for community needs and a better standard of living.

3. We recommend taking into account the basic principles and concepts of the concept of sustainable development and its objectives by applying the principles of sustainability and studying the environmental, social and economic aspects within closed gatherings.
4. The commitment of architects, city planners, civil society, and policy makers to increasing the dissemination of the concept of sustainable urban design as a field and framework as an integrated research system based on global organizations for sustainability.
5. Forming a special apparatus or a separate department in one of the bodies concerned with designing future societies to support environmental, cultural and social awareness projects at all levels (the urban designer, the user of urbanization, the responsible authorities) in order to achieve a balance between natural resources and the main life needs of the population.

Credit Authorship Contribution Statement:

**Marwa G. Eladham:** conceptualization, Methodology, analysis, writing.

**Mostafa M. Abdel Hafeez:** Supervision, conceptualization, methodology.

**Marwa M. Ahmed:** supervision, conceptualization, methodology, review, editing.

Declaration of competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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