

Sustainable Urban Design of Urban Spaces in Residential Areas and Their Impact on Human Behavior

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Abstract- Public spaces in residential areas can be considered as a key controller of people's behavior. As these spaces motivate people to socially interact this by the way tailor their personality and mental processes. Besides, this interaction affects the quality of life of individuals and the way they interact with the environment. Accordingly, it is essential for architects to pay more concern to the design of open areas with more consideration to human aspects rather than just physical aspects only. Moreover, the goals and principles of sustainability, especially social sustainability has to be considered. This attributed to the strong relationship and mutual interaction between human needs, design dimensions of residential open areas and principles of social sustainability. However, in some countries, including Egypt, there is a wide shortage in the proper design of open areas within residential communities as the buildings seem to be scary solid blocks. Accordingly, the individuals misally use the islands in the public streets and squares considering them as open areas. This study aims to solve this issue and avoid this misuse. One of the proposed solutions is to study residential open areas aiming at achieving human needs besides providing appropriate urban design elements. This can be performed by investigating the relationship between human needs and urban design elements in residential areas, as well as linking them to the basic principles of social sustainability because it is the link between urbanization and humanity. Moreover, the study presents a proposition to the effectual aspects that can both achieve a successful design of public spaces and fruit human welfare. These aspects include geographical, physical, psychological, and managerial concerns. Each aspect was divided into several requirements. Then, the proposed relation between human needs, principles of design and sustainability to residential open areas is correlated through the satisfaction of these requirements. In order to examine the efficiency of the excluded principles the people's park were taken as a case study.

Keywords: Public spaces, urban design, residential areas, people behavior, human needs, social sustainability.

I. INTRODUCTION

Urban spaces in modern cities including streets, parks and squares can be considered as the skeleton of the city. These spaces are the center of individual's activity as they encourage them to interact and communicate with each other. The presence of these spaces also provides opportunities for cultural activities and the preservation of heritage areas. Further, it adds a value to the city and tailor its character. Besides they offer a cheap and available play yards for

children. This claim is also supported by several reasons mainly, aesthetic, environmental and economic. Regarding aesthetic and environmental aspects, the presence of urban spaces allows slots for planting different seasonal plants that delight users and enhance the visual landscape. This by the way helps to improve the air quality and muffle noise from traffic. Besides, it maintains a certain level of biodiversity and provides outlets for animals and birds. With respect to economic aspects, active and well-functioning public spaces are a turning point in the economic development of societies. These spaces are a powerful factor that attract business investment and encourage tourism.

General speaking, well-designed public spaces improve livelihoods, environmental quality, and sustainability. Accordingly, public spaces are essential for towns and cities in developed as well as developing countries. Despite of its importance, the condition of public spaces in many cities, especially in developing countries, is far from the desirable quantitative and qualitative terms. The unsuitability of the public spaces location and size has led to the wrong use by individuals for streets and public squares as open areas for recreation. To solve this issue, it is essential during design of public spaces to meet human needs and pay more attention to human aspects rather than focusing only on the material aspect. In case of a breach of equilibrium between these two aspects, public spaces won't be compatible with human needs. The relationship between public places and human behavior is a reciprocal. Besides, any shortage in human studies hinders public spaces from performing their economic, social, recreational, and cultural purposes. Moreover, social sustainability should not be overlooked as it is the link between urbanization and humankind. Fulfilling the sustainability requirements preserve the diverse needs of the existing and future population. It also creates a safe, inclusive, and well-planned environment that provides equal opportunities and qualitative services to all.

Therefore, this study aims at presenting a proposal for effective aspects that can achieve successful and sustainable design of public spaces. This was achieved by studying the relationship between human needs and elements of urban design in residential areas. According to the proposed research methodology the concept of urban design was introduced and the definition of public spaces was presented based of literature studies. After that, the residential open

areas in cities were investigated with prim focus on their classification, component, design principles and criteria. The investigation was extended to involve the human behavior and needs. Further, the concept of sustainability was illustrated with a concern to social aspects. The social sustainability was divided into several principals including population density, accessibility and mobility etc. while human needs were divided into several requirements including subsistence, protection and comfort etc.. After that these correlated principles were examined by applying them into people's park to find out the extent to which this space meets these aspects. The sequence of this methodology was illustrated in the flowchart depicted in Figure 1.

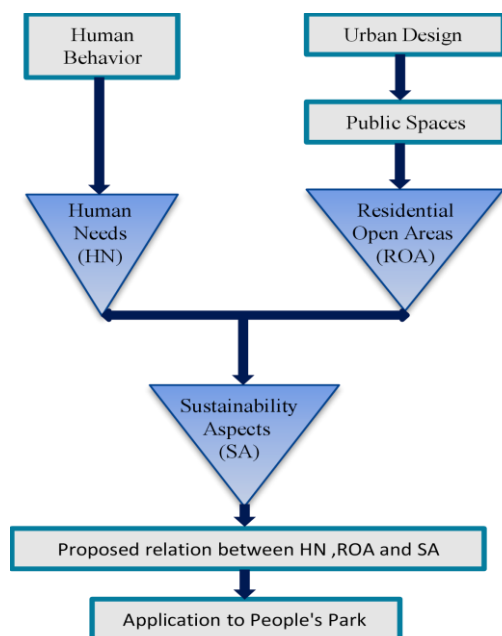


Figure 1: The flowchart of research methodology

II. URBAN DESIGN

The urban design term was first proposed in fifties of the last century in United States of America. After its proposition several relevant contemporary definitions to urban design were emerged including, Childs definition in 2010. Who said that urban design is an interdisciplinary aspect that shapes our settlements to be sustainable, convivial, bright and inspiring one [1]. Also, Biddulph [2] supported this concept and highlighted that the designers have to involve the political and humanitarian nature in urban design. Moughtin [3] saw urban design as the art of city building, that primly focus on the creation of built forms that express social and collective values of the residents. To sum up, urban design is the art of creating places through shaping of physical environment. This collaborative study determines the nature of buildings and the spaces between them. It also clarifies and identifies how a space can be improved or protected to bring benefits to investors, developers, and the wider community.

The studies related to urban design aim at providing a convenient environment for the individuals that fulfill their needs during performing their different activities. Besides, it guarantees the achievement of the physical and moral functions of public spaces. Furthermore, the relationship between human and the environment are not only related to utilitarian boundaries but also it extends to involve the psychological aspects through various emotions or through the acquired involuntary behaviors. So, urban design should extend to include social aspects rather than paying attention to public spaces and its physical components only.

There are several definitions of public space that differ according to their ownership rights, authority to control, access to them, and the way they are used. Public spaces from architects, urban planners, and designer's point of view are the physical space in the city that connects its residents to spaces. While, urban sociologists and social scientists, believe that it is a social dynamic that simultaneously accommodates continuous change and integration. Geographers and political scientists tend to think of it in the context of civil society and people's rights [4]. For example, Madanipour defined public as a space that cannot be controlled by private organizations or individuals, and hence is available for public usage [5]. Also, Carr et al. defined public space as "publicly accessible places where people go for group or individual activities" [6]. Another definition was introduced by Jan Gehl as an open area or a space that allows people to practice different types of activities, including optional social activities [7].

To sum up, public spaces are space between the buildings in the various organized urban areas, which is determined by the facades of the buildings and the city floor. Within these areas the residents of city are allowed to perform general activities. These areas involving several forms of squares, gardens, and parks. These social spaces allow individuals to be in an open environment and helps them interact with the surrounding environmental conditions as well as interact with each other.

Through these definitions, we can confirm that public spaces are a necessary component of our society as they are an integral part of the continuous development of human civilization and have a great role in improving the lives of the inhabitants by providing them with a platform for sharing, meeting, and transactions.

A. Importance of Public Spaces

The urban spaces are one of the most important elements of the urban formation of cities. The skeleton of the city is incomplete without these spaces. The importance of urban spaces emerges from that they are required for the concomitant psychological and physical comfort conditions for all segments of society. Accordingly, they affect our society and our personal behavior. Further, the human nature creates a desire to maintain links with the rest of the world. The presences of avenues for movement and a common ground for enjoyment and relaxation satisfy this need and provide this connection [6]. High quality urban spaces are the

starting point for the revival of communities. As the attractive and active urban space is a turning point in the economic development of societies and enables individuals to practice various social activities and provide a variety of jobs that meet human needs. The importance of urban spaces appears in multiple aspects of life as summarized in the following:

1) *Enlivening the public life*: Urban spaces are places for outdoor living, to test moods, mingle and connect with others. In such places people find an opportunity to sense what is going on the community especially in densely populated areas. As noted by Alexander et al. [8] public spaces allow individuals to feel comfortable outside their own properties, helping to feel connected to the social system. Moreover, a well-designed public space creates a platform for participation and discussion for planned and spontaneous meeting.

2) *Increase social contact*: Urban spaces are primarily responsible for increasing social contact, as it encourages individuals to meet, discuss and get to know each other. They serve as a field of public life, helping to develop social efficiency, exchange information, facilitate social dialogue, enhance social awareness, and encourage ethical behavior.

3) *Enhancing the image of the city*: Urban spaces play an effective role in influencing the image of the city. The best cities are said to have the best open spaces. A distinctive and readable environment can also increase the human awareness and strengthening the sense of patriotism and belonging. In short, urban spaces are an important element in giving an impressive city image. Well-functioning open spaces evoke a sense of responsibility or a sense of belonging, creating a sense of community pride and an underestimation of crime rates.

4) *Improving the urban landscape*: Urban spaces decorated with plants, fountains, sculptures, or well-designed outdoor furniture can turn a boring and sterile scene into attractive one. In addition, pleasant urban spaces enrich the visual delight and enliven the streetscape of a crowded city. Besides, visual pollution in the downtown can be relieved by smoothing out the empty and cluttered spaces in the city.

5) *Attracting and retaining business*: Well-designed urban spaces affect the surrounding land market and enhance the real estate value. This leads to attraction and retaining of businesses and economic development.

6) *Improving the urban physical environment*: Urban spaces within densely populated cities improve air quality, light and wind circulation. The lack of open space in crowded cities especially with agglomeration of tall buildings will make the streets look like valleys. Where, the sun is blocked by tall buildings consequently the atmosphere and vitality of the city will detrimentally affect. In this case the slots created by public spaces allow cultivation of different plants that enrich the seasonal color and fragrances of the city and delight the mood of users. These plants also play an important role not only in improving air quality but also in silencing noise from traffic.

B. Classification of Urban Spaces in Cities

Urban spaces can be viewed and classified in multiple ways, including function, purpose and social perspectives. Carr et al. [6] classified public spaces based on their function to the following:

- 1) *Public Parks - central park- downtown parks.*
- 2) *Squares and Plazas - a central square- corporate Plazas.*
- 3) *Memorials.*
- 4) *Markets.*
- 5) *Streets - pedestrian sidewalks.*
- 6) *Playgrounds - school yard.*
- 7) *Community open spaces - community garden/ parks.*
- 8) *Greenways and parkways - interconnected recreation and nature areas.*
- 9) *Atrium/ Indoor marketplace - atrium; market/ downtown shopping center .*
- 10) *Found / Neighborhood Spaces - Found Spaces / everyday open spaces.*
- 11) *Waterfront*

Regarding their purpose they can be classified as follows:

- 1) *Everyday Places*: like everyday venue of interaction for the neighborhood which makes up a public realm.
- 2) *Places of meaning*: which differ from person to person as they have their perceptions towards a space in a positive or negative manner.
- 3) *Social environments*: that encourage social encounters through their design and uses.
- 4) *Places of retreat*: offering a chance for self-seclusion.
- 5) *Negative spaces*: that has experienced anti-social behavior and can be threatening.

Or, they can be categorized based on social and cultural perspective or ownership as proposed by Matthew Carmona [9]

- 1) *Positive spaces*: Natural/ semi-natural urban; civic space; public open space.
- 2) *Negative spaces*: Movement space; service space; left over space; undefined space.
- 3) *Ambiguous space*: the exchange space.
- 4) *Private spaces*: Private open spaces; External private space, internal private space.

Based on these classifications it can be claimed that urban spaces are dynamic and available in multiple patterns based on models, functions, standards, and usage. Each researcher has his own way in classifying linear spaces and grouped spaces. In this study there will be a prime focus on grouped spaces mainly residential open areas. This type of space was chosen because it is the first space in which individuals interact, exchange ideas, and learn social behaviors and can be considered as a public mirror to complexities. Besides, it is the best place for communication between city residents and helps increase a sense of social and environmental security rather being fragmented community. Further benefit is achieving an understanding of how to live in a smaller community based on respect of diversity and differences.

III. RESIDENTIAL OPEN AREAS IN CITIES

In this section the residential open areas is to be classified and its building component was demonstrated. Besides, the design principles and standards of these spaces were introduced.

A. Classification of open areas in cities

Residential areas can be classified as following

1) *The green belf*: It is along and linear space surrounding the perimeter of residential area as shown in Figure 2. The main purpose of its existence is to restrict and redirect the urban growth. By creating a place for wildlife and encouraging biodiversity.

2) *Separate patches*: They are fragmented open spaces dispersed without forming a coherent pattern or creating continuity as shown in Figure 3. This type is suitable for grid style urban areas and serves as an intimate and inviting gathering place

3) *The hierarchy*: It consists of several connected open spaces of different sizes with a high degree of flexibility. This diversity makes it suitable for satisfying the needs of different generations and makes it appropriate for densely populated cities. In Figure 4 an example for hierarchical open space is introduced in which group of large green spaces are linked to medium-sized neighborhood parks and small-sized pocket gardens by green corridors and paths.

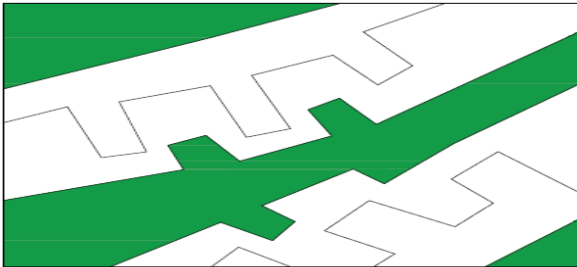


Figure 2: Schematic diagram for green belf as modified per [12].

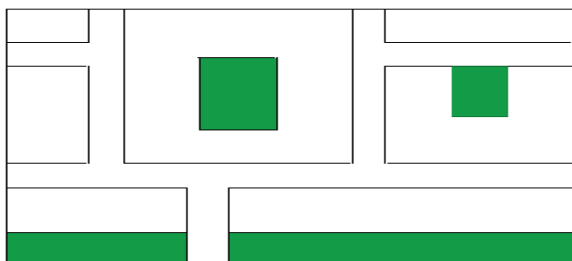


Figure 3: Schematic diagram for separate patches as modified per [12].

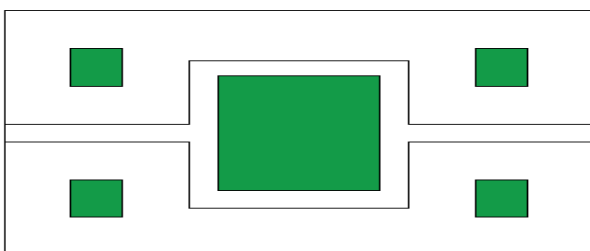


Figure 4: Schematic diagram for the hierarchy as modified per [12].

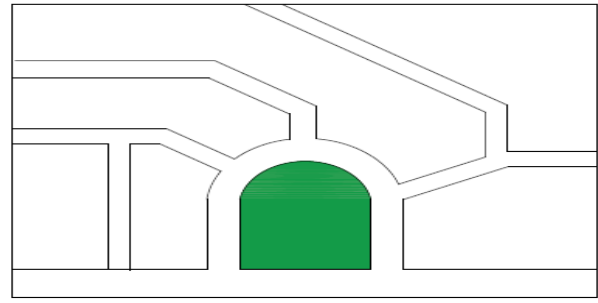


Figure 5: Schematic diagram for composite urban open spaces as modified per [12].

4) *Composite urban open spaces*: They are closed geometric spaces that can act as a main artery connecting residential areas to an existing network of public and communal spaces as shown in Figure 5.

B. Components of residential open areas

In general, residential open areas consist of four basic elements including walls, floor, ceiling and coordination and visual and aesthetic elements.

1) *Walls*: It is the vertical plane that defines the space and it may be natural like trees or physical like walls represented in building facades. And it has a key role in the sense of privacy and containment, as well as directing movement within the space.

2) *Floors*: It is a base for the space on which the various activities are held, so it must be prepared and equipped to suit the activity and the specific use of it. This can be controlled through finishing materials and changing the levels of floor. Consequently, the sensations to the users and their movement patterns can be controlled. For example, paving floors in yard provide a sense of scale and unify the space by connecting the center and edges [9].

3) *Ceiling*: It is the aesthetic determinant of space which is often the sky. However sometimes some parts of the space could be covered to suit its specific use. The selection of the ceiling is of great importance as it is possible to determine the feeling to be connected to the user, whether it is a sense of containment or aversion.

4) *Visual and Aesthetic Elements*: This element includes seating, landscape, and street furniture.

a) *Seating*: This element is a certain prerequisite in any space regardless of the temptations in the space. It allows individuals to gather, stop and rest. Accordingly, it should be placed in adequate positions and fabricated with different shapes, styles, and materials.

b) *Landscape*: The basic purpose of this element is to improve the visual shape of the space. As it defines the environmental and psychological impressions of the space. This can be performed by hard landscaping: such as bricks, stone, etc., or soft landscaping: such as plants, trees, etc.

c) *Street furniture*: This element is related to any elements that aids the development and improvement of image and identity of a space. Including lighting elements, benches, columns, and litter boxes. These elements have to

be located in an appropriate manner and conform to quality standards and expectations.

C. Principles Design of residential open areas

Many literatures dealt with the design principles of public spaces and several models were proposed. Including Vikas Mehta [10] model, who emphasized the importance of feeling safe, comfortable, physical, and a sense of control and pleasure. While Nemeth and Schmidt's model [11] addresses three main components of public space: users, management, and ownership. These three components influence each other but fail to address the physical elements of the urban space that affect the users of the space.

Therefore, the prime focus of this part is to define the design principles for establishing well designed residential open areas. This won't be achieved until we satisfy human needs and compromise between human, environmental and seeking for a safer, more attractive, and desirable urban environment, these principles are

1) *Protection and safety*: It means to provide the individual with a sense of security with in the space. This motivates him to use these spaces and effectively spend more time. Accordingly, safe equipped tracks are to be adopted with a protection against weather conditions such as wind, rain, cold, dust, noise, etc. . Besides clear means of inspection is to be established, such as security personnel, police, and other means that help users feel safe.

2) *Comfort*: Individual's level of comfort depends on various factors such as levels of security, familiarity, weather, and physical conditions. The comfort of space is very delicate and depends mainly on the physical configuration and design of the space. For example, places with high humidity and heat require more shade, while places with cooler climates prefer

more sunlight. Usually, the convenience of space gets overlooked despite of its importance in attracting individuals to space.

3) *Pleasure* :This principle refers to photoability of the space as described by lynch [13]. For more clarification the shape, color or arrangement of the space that makes it clearly identifiable. Pleasure can also be achieved through surprise or the animation level in the space.

4) *Inclusiveness*: The degree of diversity and the possibility of choice are key principle of any intended space. In order to ensure inclusiveness of any space one should consider the hosted activities, races, ages, and genders of involved individuals. Also, the space accessibility and ability to use the space are to be considered.

5) *Interaction*: It refers to the degree to which people participate in the active life of the city and in the activities that take place in the spaces. Due to heterogeneous nature of these activities, a delicate balance that allows a normal activity on the city at any time to develop freely is required. Such a balance will encourage individuals to use the space and interact with the environment and its elements.

D. Design criteria of residential open areas

The literature showed several attempts of researchers to define design standards of residential open areas. Some of them focused on the functional aspect and others were interested in the human and social aspects. They highlighted that the success of residential open area is directly related to the individual's participation. That is why these spaces must provide what individuals want in an attractive and safe environment. These aspects are summarized in the following diagram Figure 6.

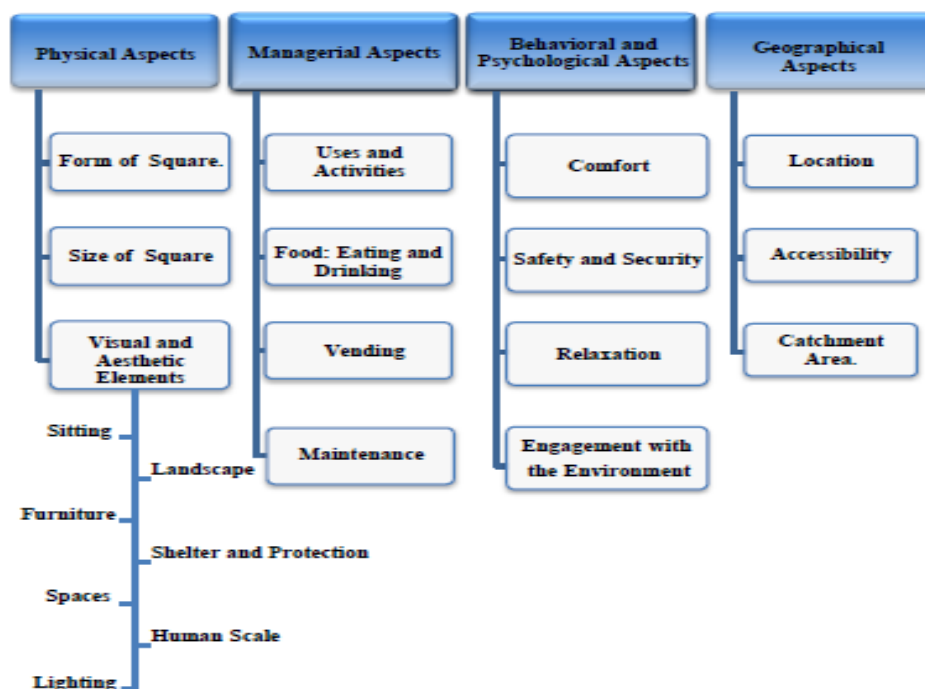


Figure 6: Design aspects of residential open areas.

IV. HUMAN BEHAVIOR

According to social and behavioral theories, there is mutual relationship between human behavior and environment. As, human behavior is formed through the activities that an individual performs in his life to meet his daily needs. This behavior is affected by several factors that may be related to physical factors like age and health. Or it related to personal and emotional factors emerging from surrounding environment and life experiences. Besides, genetic factors have a great influence in determining the individual behavior as asserted by Aristotle. While, Plato said that the behavior of the individual is formed as a result of the experiences that he acquires through interaction with society.

The main aim of studying human behavior is to determine human needs. The culture and traditions of the community have an important role in shaping human needs. As they reflect their way of life, morality, and interaction with surroundings. Various researchers have proposed different models for basic human needs. This includes theory of Human Motivation by Abraham Maslow [14], Nonviolent Communication by Marshall Rosenberg [15] Human Development by Manfred Max Neff [16] and The Quality of Life by Robert Costanzo [17].

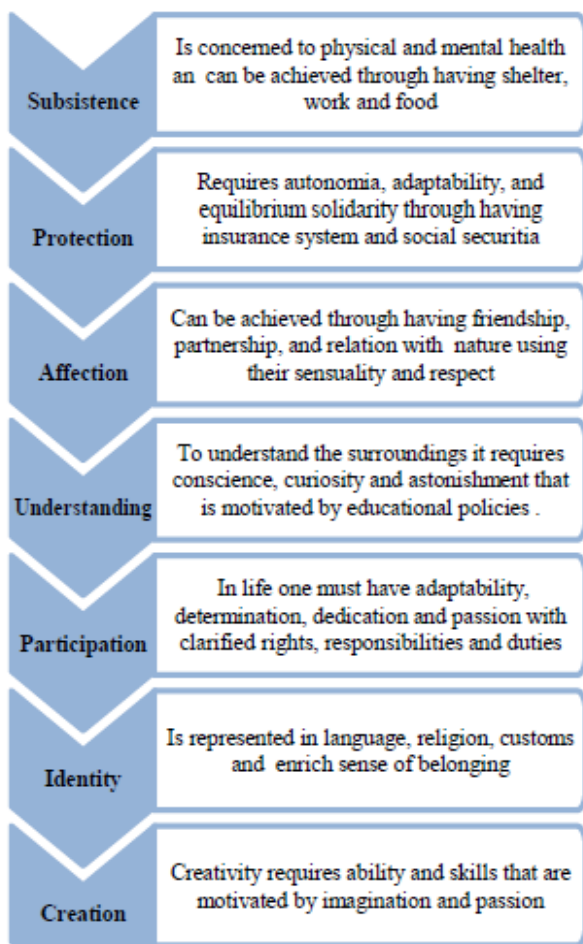


Figure 7: Human needs schematic

All of these theories model the basic human needs seeking at their development. Each one has identified a list of indispensable human needs that insures creation of a mutual relationship between society and individuals. Despite the different cultures and customs, there are common human needs among these societies that cannot be dispensed with. They are summarized as shown in Figure 7.

V.SUSTAINABLE DEVELOPMENT

Sustainable development is concerned with satisfying the present needs without subverting the resources of future generations. This concept emerged due to the population explosion and the great technological progress that necessities the preservation to the environment resources. This can be performed through achieving global development, intergenerational equality, and social justice. Consequently, sustainable development is to be considered as a basic requirement of the broader goals of any state.

Sustainable development problem can't be solved without identifying its pillars. The original three pillars of sustainability according to recommendation of world conference on sustainable development were social, economic and environmental sustainability. Over time, these pillars were modified to include culture and governance as important metrics for sustainability. These pillars are summarized in Figure 8.

In this study, it is intended to focus on social sustainability because it is the link between urbanization and individuals. Besides, it aims at encouraging social cohesion, inclusion, justice, a sense of identity, social interaction, integration, and communication. Moreover, residential open areas create opportunities for interaction and are considered as critical nodes for improving and achieving social sustainability. Further, the design of residential open areas is important because of their central role in significantly enriching the quality of life of a civilized society.

VI. SOCIAL SUSTAINABILITY

Recently, among the pillars of sustainability social one is of prime importance after years of negligence. Since residential open areas are the first environment for social interaction, the individuals experience depends largely on the urban features of these neighborhoods. According to literature, social sustainability refers to social justice by equally distributing the resources and access to services [20]. This guarantees a wide improvement in the quality of human life and satisfies human cultural and psychological needs. Therefore, it is essential to pay more attention to social sustainability and focus on satisfying its aims. The aims of social sustainability are as follows:

- 1) *Satisfying basic human needs*
- 2) *Enhancing education, creativity and human capacity development for the whole society.*
- 3) *Preserving the cultural and biological heritage and promoting a sense of connection to history .*

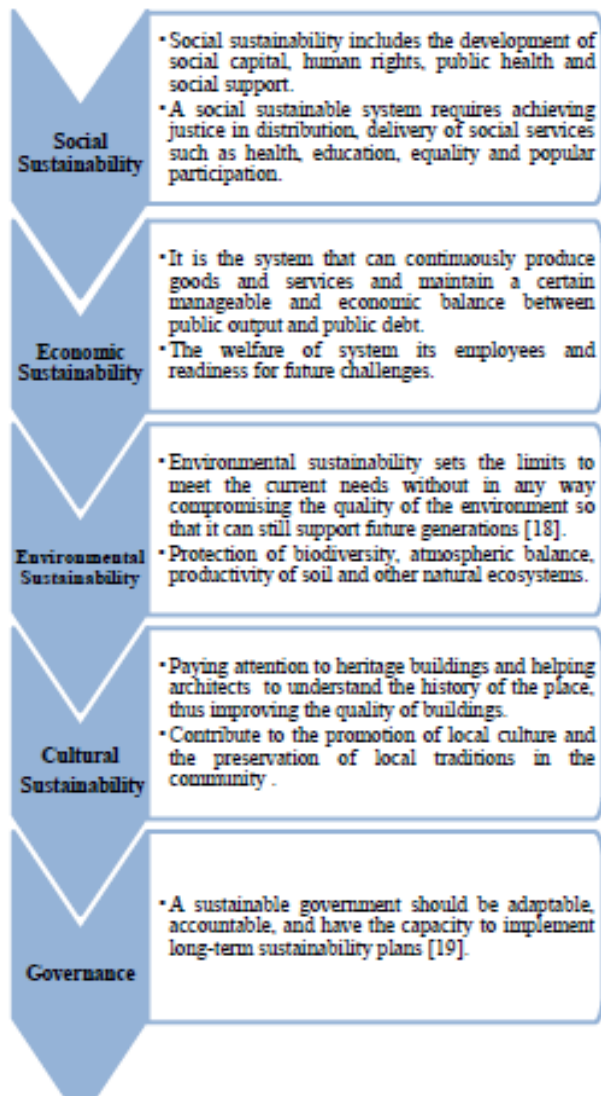


Figure 8: Schematic diagram for sustainability pillars.

4) Preserving and strengthening the stock of social capital in order to increase the trust and cooperation needed for civil institutions support.

5) Paying attention to the equitable distribution of development opportunities in the present and the future

6) Recognizing different cultures of diverse societies.

E. Social Sustainability Principles and Indicators

Based on the literature review, it was found that it is necessary to define principles and indicators of social sustainability to help in deciding the corrective actions and decisions that affect the social issues of society. These principles and indicators can be considered as the most important tools in urban planning and policy development. These principles are summarized in Figure 9.

VII. THE RELATIONSHIP BETWEEN HUMAN NEEDS AND DESIGN CRITERIA FOR URBAN SQUARES

After investigating the literature, it was concluded that

creating meaningful and lively urban spaces that meet the needs of users won't be possible without satisfying the mutual relationship between human needs and the principles of social sustainability. This can be performed through the elements of the urban design of the residential open areas, as concluded in the TABLE I.

A. Case study(People's Park in Singapore)

People's Park acted as a green retreat for Chinatown residents who lived and worked in overcrowded conditions nearby. It was set up in 1922 by the Municipal Authority and was the scene of lots of commercial activities as well as entertainment. Recently, the square is one of the most successful urban spaces in Singapore. It was praised as a successful design and has attracted large numbers of users. One can find elderly people (both residents and non-residents in the surroundings), office workers, and shopkeepers, workers from nearby construction sites, vendors, tourists, housewives, children and teens who use the arena in a variety of ways. Figure 10 illustrates schematic diagram for People's Park which is bounded by People's Park Complex, People's Park Centre, Ocean Group (OG) Building and the Majestic Theatre.

There are a number of human needs that must be met while designing residential open areas together with the goals and principles of social sustainability. Based on the illustration provided in Figure 7 and TABLE I, it was decided to evaluate the extent to which these requirements have been met in people's park.

The effectiveness of the arena was classified into numbers ranging from 1 up to 5. An index of 5 represents the ability of arena to fully fulfill the requirement. While, an index of 4 means that around 80 percentage of the human needs and principles of social sustainability was accomplished in a certain design principle. Regarding an index of 3, it represents satisfaction of 70 percentages. And the design that satisfy a weak correlation of 60 percentages was indexed by 2. Finally, an index of 1 means that only 50 percentages of the desired requirements were met. The assessment was summarized in TABLE II.

With further investigation to TABLE II outcomes, it can be observed that the principle of accessibility was highly achieved. Not only because, the availability of public transportation that facilitate the access to the arena but also the availability of several entrances that creates a path for pedestrian movement as shown in Figure 11. Besides the square shape satisfy the individuals' need of subsistence. That is why it was given an index of 5. Moreover, the configuration of the square with the surrounding buildings made it shaded most of the day time. This improved the occupancy of the square throughout the day and made it an active spot. where people are present throughout the day, as some go there for shopping or sightseeing, and others are happy to just sit and watch people or chat or waiting with the street vendors in the plaza to make a living there. This level of comfort is in accordance with the principle of Mixed-Use.

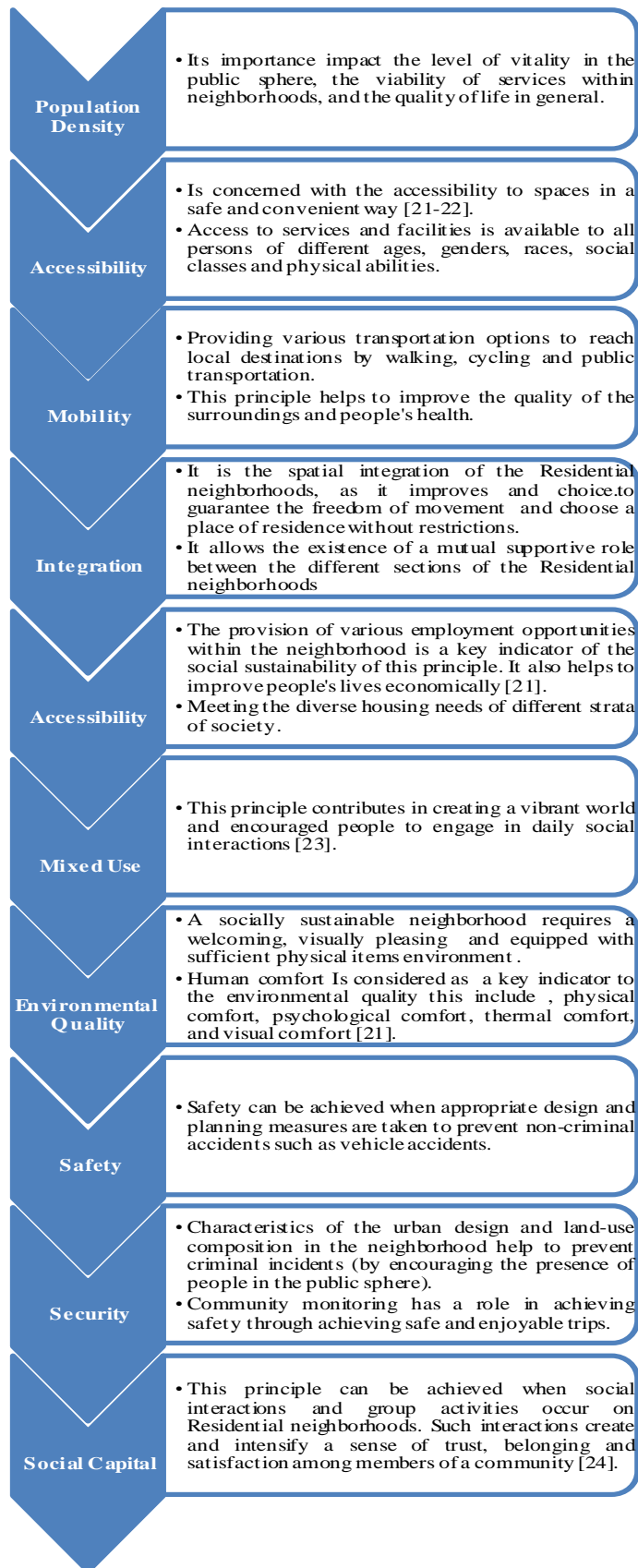


Figure 9: Social Sustainability Principles and Indicators

Regarding the concept of social capital, it shows a satisfactory correlation due to the availability of various seating areas located in the courtyard as well as the edge of the Ocean Group store which provides opportunities for users to sit on it. Also, the organization of furniture and the space created a seamless spatial system that create visual and activities satisfaction as illustrated in Figure 12. However, the social interaction was not satisfied in an appropriate manner due to the lack of gradation in the spaces. As, the space is a single central space with no sub spaces that create and intensify a sense of trust, belonging and satisfaction among members of society. That is why the relation between the participation ant social capital was indexed by 3. This also inefficiency affects the principle of integration and the individuals' sense of subsistence, and this is the reason for giving it an index of 3.

VIII. CONCLUSION

In this study, the basic concepts of urban design were identified and the meaning of urban spaces and their types were defined. The study was performed with a prime focus on urban squares in residential areas. They were recognized and their design standards were investigated. Besides, the human behavior and needs were analyzed in parallel with the principles of social sustainability. Then the mutual relationship between these disciplines was produced. In order to implement the basic principles from which a successful and sustainable design of public spaces can be assessed. Those principles were applied to People's Park Square as a case study.

The reason for selecting this square is that it was considered as one of the effectively designed squares. Based on these principles the square achieved a large percentage of correlation with the implemented principles.

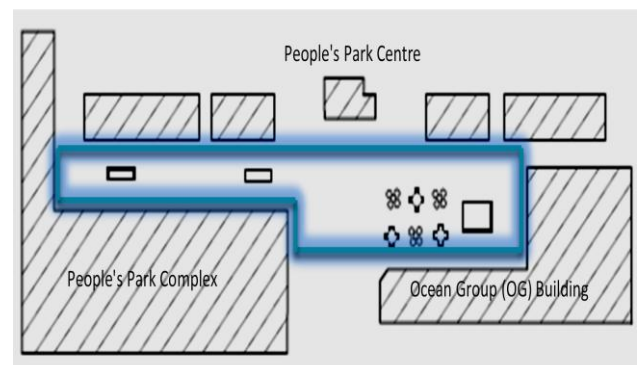


Figure 10: Schematic diagram for People's Park as modified per [25].

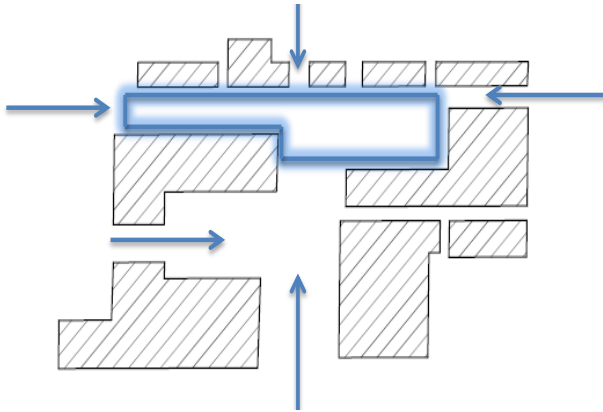


Figure 11: Schematic diagram for several entrances as modified per [25].



Figure 12: A photograph to furniture and visual appearance of arena.

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TABLE I. PRINCIPLES OF SOCIAL SUSTAINABILITY CORRELATED TO HUMAN NEEDS THROUGH THE COMPONENTS OF THE SQUARES

Sustainability Principles Human Needs	Population Density	Accessibility	Mobility	Integration	Choice and Diversity	Mixed-Use	Environmental Quality	Safety	Security	Social Capital
Subsistence	-	Geographical Aspects: (Location-Accessibility) Physical Aspects: (Form of a Square)	Physical Aspects: (Behavioral and psychological aspects[sitting - furniture-spaces])	Geographical Aspects: (Location) Physical Aspects: (Form of a Square –Behavioral and psychological aspects[sitting-furniture])	Physical Aspects: (Form of a Square- Behavioral and psychological aspects [sitting-furniture]). Managerial Aspects: (Uses and Activities – Vending)	Physical Aspects: (Form of a Square – Behavioral and psychological aspects[sitting-furniture-spaces])	-	-	-	-
Protection	-	Geographical Aspects: (Location-Accessibility-Catchment Area) Physical Aspects: (Form of a Square-Behavioral and psychological aspects[Shelter and protection]) Behavioral and Psychological Aspects: (Safety and Security).	Physical Aspects: (Behavioral and psychological aspects [Shelter and protection-lighting])	-	-	-	Physical Aspects: (Behavioral and psychological aspects[Shelter and protection-lighting]) Behavioral and Psychological Aspects: (Safety and Security).	Physical Aspects: (Behavioral and psychological aspects[Shelter and protection-lighting]) Psychological Aspects: (Safety and Security). MANAGERIAL ASPECTS: (Maintenance)	Physical Aspects: (Behavioral and psychological aspects[Shelter and protection-lighting]) Psychological Aspects: (Safety and Security). MANAGERIAL ASPECTS: (Maintenance)	Physical Aspects: (Behavioral and psychological aspects[Shelter and protection- lighting]) Psychological Aspects: (Safety and Security).
Comfort	Geographical Aspects: (Location - Catchment Area)	Geographical Aspects: (Accessibility)	Physical Aspects: (Form of a Square-Behavioral and psychological aspects[sitting - furniture-Shelter and protection])	-	Physical Aspects: Behavioral and psychological aspects[sitting-furniture -spaces])	Physical Aspects: (Behavioral and psychological aspects[sitting-furniture-spaces]) Managerial Aspects: (Uses and Activities)	Physical Aspects: (Behavioral and psychological aspects[sitting-furniture-spaces - human scale]) Behavioral and Psychological Aspects: (Comfort -Relaxation)	Geographical Aspects: (Location-Accessibility) Physical Aspects: (Behavioral and psychological aspects[sitting-furniture-spaces -Shelter and protection-lighting])	Geographical Aspects: (Location-Accessibility) Physical Aspects: (Behavioral and psychological aspects[sitting-furniture-spaces - Shelter and protection-lighting])	Physical Aspects: (Behavioral and psychological aspects[sitting-furniture-spaces - Shelter and protection- lighting]) Behavioral and Psychological Aspects: (Comfort -Relaxation)

Affection	-	-	<u>Physical Aspects:</u> Behavioral and psychological aspects[spaces] <u>Behavioral and Psychological Aspects :</u> (Engagement with the Environment).	<u>Behavioral and Psychological Aspects :</u> (Engagement with the Environment).	-	-	<u>Physical Aspects:</u> (Behavioral and psychological aspects[sitting-furniture-spaces - human scale]) <u>Psychological Aspects :</u> (Engagement with the Environment)	-	-	<u>Physical Aspects:</u> (Behavioral and psychological aspects[sitting-furniture-spaces - human scale]) <u>Psychological Aspects:</u> (Engagement with the Environment).
Understanding	-	<u>Geographical Aspects:</u> (Location- Accessibility- Catchment Area)	<u>Physical Aspects:</u> Behavioral and psychological aspects[furniture-public art])	<u>Geographical Aspects:</u> (Accessibility) <u>Physical Aspects:</u> (Form of a Square- Behavioral and psychological aspects[sitting-furniture]) <u>Behavioral and Psychological Aspects :</u> (Engagement with the Environment)	<u>Physical Aspects:</u> (Form of a Square)	<u>Physical Aspects:</u> (Behavioral and psychological aspects[sitting-furniture-spaces])	<u>Physical Aspects:</u> (Behavioral and psychological aspects[furniture]) <u>Psychological Aspects:</u> (Engagement with the Environment).	-	-	-
Participation	-	-	-	<u>Physical Aspects:</u> (Behavioral and psychological aspects[landscapes] <u>Behavioral and Psychological Aspects:</u> (Engagement with the Environment) <u>Managerial Aspects :</u> (Uses and Activities)	<u>Physical Aspects:</u> (Form of a Square- Behavioral and psychological aspects[sitting-furniture-spaces]) <u>Managerial Aspects:</u> (Uses and Activities)	<u>Physical Aspects:</u> (Behavioral and psychological aspects[sitting-furniture])	<u>Physical Aspects:</u> (Behavioral and psychological aspects[sitting-furniture-spaces - human scale])	-	-	<u>Physical Aspects:</u> (Form of a Square- Behavioral and psychological aspects[sitting-furniture-spaces])

Identity	-	-	-	Physical Aspects: (Behavioral and psychological aspects[sitting-furniture])	-	Physical Aspects: (Behavioral and psychological aspects[sitting-furniture])	-	-	-	Physical Aspects: (Behavioral and psychological aspects[sitting-furniture-spaces])
Creation	-	-	-	-	Physical Aspects: (Behavioral and psychological aspects[sitting-furniture-spaces])	Physical Aspects: (Behavioral and psychological aspects[sitting-furniture-spaces])	-	-	-	-

TABLE II. IMPLEMENTED PRINCIPALS FOR PEOPLE'S PARK

Sustainability Principles Human Needs	Population Density	Accessibility	Mobility	Integration	Choice and Diversity	Mixed-Use	Environmental Quality	Safety	Security	Social Capital
Subsistence	-	5	5	3	4	5	-	-	-	-
Protection	-	4	4	-	-	-	4	5	4	4
Comfort	3	5	5	-	4	5	4	4	4	4
Affection	-	-	4	3	-	-	3	-	-	3
Understanding	-	5	4	3	4	5	4	-	-	-
Participation	-	-	-	4	4	4	4	-	-	3
Identity	-	-	-	5	-	4	-	-	-	4
Creation	-	-	-	-	3	4	-	-	-	-

Excellent (5) - very good (4) - good (2-3) – weak (1)