



Sudan University of Science  
& Technology  
College of Graduate Studies



**THE IMPACT OF OPEN PUBLIC  
SPACES DESIGN ON HUMAN BEHAVIOUR  
(Case study : Sahat Alhoureya in-Khartoum-Sudan)**

أثر تصميم المناطق العامة المفتوحة على السلوك الإنساني  
( دراسة حالة: ساحة الحرية-الخرطوم -السودان )

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for the Master degree of Architecture  
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*My God I am grateful, for all the countless blessings and your support always and forever*

*I thank all members of my family for helping me  
Special thanks and great gratitude to my masterly  
Prof. Dr. Awad Saad Hassan*

# Abstract

The importance of open public spaces to communities is increasing by the impact of their configuration, location, and design on human behaviour.

This study contributes to this need, and seeks to find out how urban spaces impact of human behavior . To answer this question by the study considers as a case study, the “Freedom Arena”, known locally as ‘Sahat Alhoureya’, in Khartoum, Sudan.

literature review on principles and ,characteristics of open public spaces ,perceptual dimension , morphological dimension , social dimension and , theory of place, also the theories of human behaviour.

The research problem addresses the lack of actual knowledge about human behaviour and their interact with physical elements in the open public spaces.

This conception guided the research methods that are qualitative, and analysis method used included site visits to observations .

The results is about the problems of ‘Sahat Alhoureya’,like sound pollution from neighboring buildings ,visual pollution and lack of trees and sunshades

Recommendations is about to improve the quality of services in it by solve that problems to create a great open public space.

## المستخلص

تتزايد أهمية الأماكن العامة الحضرية المفتوحة للمجتمعات من خلال تأثير تكوينها وموقعها وتصميمها على السلوك البشري.

تساهم هذه الدراسة في تلبية هذه الحاجة ، وتسعى إلى معرفة ما مدى تأثير الفضاءات الحضرية المفتوحة على السلوك البشري. للإجابة على هذا السؤال من خلال دراسة حالة "ساحة الحرية في الخرطوم السودان". الأطار النظري لهذا البحث مستمدة من كتابات عن نظريات السلوك الانساني و نظرية المكان التي تناقش، الأبعاد الاجتماعية و البصرية و المورفولوجية في تصميم المساحات الحضرية العامة. مشكلة البحث تكمن في نقص المعرفة الفعلية عن سلوك الانسان وتفاعله مع العناصر المادية في الأماكن العامة المفتوحة. هذه الدراسة تساهم في معرفة اسباب هذه الفجوة المعرفية . طرق البحث تحليلي نوعي و وصفي. الطرق المستخدمة متضمنة زيارات ميدانية وملاحظات ومقابلات. النتائج حول مشاكل "ساحة الحرية" والتوصيات حول تحسين جودة الخدمات فيه و حل تلك المشكلات التي تخلق مساحة عامة مفتوحة لتكون صالحة للعيش .

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# **CHAPTER 1**

## **General Introduction**

# CHAPTER 1

## General Introduction

### 1.1 Introduction

Urban public spaces have been considered an essential part of cities throughout history. It is obvious that cities and their public spaces have a very close relationship, whereby, over the span of urban life, public spaces have continuously reflected the complexities of their cities' cultural, social, and economic contexts. Public spaces play a particular role in the life of urban areas, whether as memorable, accessible, or meaningful places (Madanipour, 2010). People may feel attached to both the social and physical aspects of public spaces. Therefore, these spaces maybe places for socializing, hosting the greatest number of people's interactions (Tibalds, 2003).

The Urban Form and Human Behavior research within disciplines of the built environment sets out to investigate and discusses issues of urban form and its connection to social life and human behavior to provide insights and frameworks to support sustainable, livable and flourishing cities.

The idea is to revive behavior based urban research, focusing on public space and human well-being arguing for the importance to acknowledging the importance of places over objects, and collaborations between disciplines. There is an intricate link between city structure and the possibilities for public life.

Those responsible for designing, producing and maintaining the form and feel of public spaces are professionals such as planners and designers. Public authorities such as local councils, law enforcers and other decision making bodies also have an important role.

People may feel attached to both the social and physical aspects of public spaces. Therefore, these spaces may be places for socializing, hosting the greatest number of people's interactions.

We need cooperation between the public authorities such as local councils and the professionals such as planners and designers and other decision makers to create an environment that is attractive and to reflect the culture of population and their needs by designing memorable, accessible and meaningful places which is help of improve and organize the human behavior.

## **1.2 Thesis Problem:**

- The thesis problem addresses the lack of actual knowledge about human behaviour and their interaction with physical elements in the open public spaces. And what actually users need in it through a study 'Sahat Alhoureya' in the city of Khartoum.

## **1.3 Significance of this Topic:**

- Considering that people are the most important element of any environment, as a result should professionals built environment are aware of how people respond to the environment. This study is significant in that it provides professionals with practical guide that can be utilized to assist in the design of places that are sensitive to the natural responses of people.

## **1.4 Thesis Methodology:**

- It is a descriptive and analytical method of collecting and analyzing data.

-Methodology tools:

- a- collecting data are from reliable internet websites and local media.

- b- interviews with officers and users of the case study 'Sahat Alhoureya' in Khartoum, Sudan to observations.

- c- libraries for similar research and books.

## **1.5 Thesis Hypothesis :**

- Assume a great design for public spaces gives us a positive behavior from users with each other and the best using for the environment .

So a great public space design its features by focusing on people's activities and various forms of uses. (starting from the stage of data collection)

## **1.6 Thesis Questions**

- What are the physical and ambient features of the built environment of 'Sahat Alhoureya' that shape public spaces?
- How do users of 'Sahat Alhoureya' respond to its physical elements?
- How can the design of 'Sahat Alhoureya' be modified to take into account the natural human responses to the physical and ambient settings?

## **1.7 Scope and Limitations of the Study:**

- It is important to note that this study is not without its limitations. While the study has focused on a Human Behavior , there has been an effort to narrow its scope in 'Sahat Alhoureya' in Khartoum , Sudan from 2021-2022.

## **1.8 Purpose of the Study:**

- To rise a the quality of a daily human life
- To put away in planning for, shaping and designing public spaces by taking into consideration the behavioral sciences
- To explain the human responses to the physical and social setting of public spaces
- To explore the influence of the external features of the human behaviors.

## **1.9 Structure of the Thesis:**

Chapter 1 includes general introduction, Thesis Problem, Hypothesis, Questions , Purpose and Objective ,Scope and Limitations Thesis Methodology . Literature review of this thesis introduces the Public Open Spaces levels and principles Public Open Spaces of Characteristics ,Perceptual Dimension , Morphological Dimension , Social Dimension , Theory of Place and, Theories of Human Behaviour . The methodology is a descriptive and analytical method of collecting and analyzing data of 'Sahat Alhourey a' in Khartoum , Sudan to observations and get a results and recommendations.

# CHAPTER 2

## Literature review

### 2.1 The Introduction

Public spaces including streets are, and must be seen as, multi-functional areas for social interaction, economic exchange and cultural expression among a wide diversity of people . The connective matrix of streets and public spaces forms the skeleton of the city upon which all else rests. It is for urban planning to establish and organize these public spaces, and for urban design to facilitate and encourage their use, in the process enhancing a sense of identity and belonging.

together Safety and security are important dimensions to be considered in any such design, with vital infrastructure (water, energy and communications). Important conditions for such planning to be successful are the contextual existence of good governance and management arrangements, as well as viable mechanisms to redirect part of the value gains into the nurturing of better quality public space

Global Public Space toolkit, Pg 4

Therefore, this chapter focuses on the human behavior on the public open spaces and concepts of urban spaces, with attention to physical and activity dimensions of space relevant the purpose of this research – understanding physical and activity relationships within urban spaces.

By reviewing design dimensions of urban spaces identified by key researchers in the urban design field

## **2.2 levels of Public Open Spaces**

Categorization of public open spaces based on size and coverage area

public open spaces can be categorized into four broad levels, based on their individual sizes and catchment (how far a user might travel to visit them)

**1. Local/pocket open public spaces** – These are small park lets that service the recreation needs of the immediate residential population within a walking distance or 400 meters (5 minutes walk). Their average areas range from 0.03 to 0.04 hectares and are often used for recreation purposes. In some places, these may include small areas of nature space.

**2. Neighbourhood public open spaces** – these are larger spaces which serve the recreational and social needs of a community. Their areas range from 0.04 and 0.4 hectares, and can easily be accessed within 400 meters walking distances from households. They can accommodate a variety of activities, such as recreation, sporting, and natural features conservation.

**3. District/city open spaces or city open spaces** – these spaces are mainly designed to provide for organized formal sport. They include substantial recreation areas and some nature spaces. They serve several neighbourhoods with players and visitors traveling from surrounding districts. The size of the spaces range from 0.4 to 10 hectares, and are designed to serve populations within 800 meters or 10 minute walking distance.

**4. Regional open space/Larger city parks** – these are substantial facilities for organised sport, play, social interaction, relaxation and enjoyment of nature. They serve one or more geographical or social regions and are likely to attract visitors from outside any one local government area. Their areas range between 10 and 50 hectares.

**5. National/metropolitan open public spaces** – these are large spaces whose areas range from 50 and 200 hectares. They support concurrent uses, and contain such services as recreational, sporting, and basic amenities. UN-Habitat (2018 :10)



## 2.3 Characteristics and Guidelines of Successful Open Public Spaces

According to Car et al. (1992), in terms of use and design, public space characterized in three main categories. Thus, these places as well as being “**meaningful**” – allowing people to make rich linkage and attachments with place, being “**Democratic**” – protecting the right of user groups, being accessible to all groups and providing for freedom of action – should be “**Responsive**” – to address residents’ needs (Carmona, 2010:587).

## 2.4 The principles of Open public space that provide people’s primary needs within:

**a) Safety:** Feeling safe in an open space has been identified in several studies as an important prerequisite for people’s use of a place particularly for women, children and elderly (Copper and Francis, 1998: 89).

**b) Comfort:** This is another theme in urban open space research. Adequate and comfortable seating, solar access, and protection from wind, rain, and other climate elements have been considered as important reasons for open space use and satisfaction (Copper and Francis, 1998: 90). For Carmona (2010) successful public spaces provide comfort environment for the residents which are measured by people’s activity duration as well as considering environmental (sun, wind), physical (seating choices), psychological (space character) situations as sense of comfort. Physical design and/or management strategies can improve the sense of comfort (Carmona, 2010).

**c) Aesthetics:** Public art and Perception: These are important aspects of landscape quality but not understood appropriately. How people perceive a space may contribute to the space use or lack of use. (Copper and Francis, 1998: 91).

**d) Meaning:** There is a growing awareness that use of an open space may not in itself be enough to make a space successful.

The larger meaning of an environment for people is an important dimension of urban quality. AppleCare (1979) has argued that the environment serves as a social

and political symbol filled with meaning. Open spaces can have a larger “connectedness” for people, as seen for example in the national attachment to Times Square in New York City or local attachment of a central park in a small town.

Some researchers have discussed that people do not have to use the space since it has a particular meaning or value to them. The fact that a space is considered as an important symbol or reference may be enough for people to attach meaning to the open space even though they are not using it (Copper and Francis 1998, :91)

**e) Control and participation:** The amount and freedom and control a space offers have been suggested as the basis for people’s use and enjoyment of an open space (Lynch, 1981). User participation in the design and management process can directly contribute to the later satisfaction of nonparticipating users (Copper and Francis, 1998: 91).

**f) Publicans:** Public access is a critical factor to open space quality. Lynch (1981) defines accessibility in terms of open-space rights such as the right of presence, use and action. Lynch’s concept of spatial rights provides a useful measure of the effective “Publicans” of an open space (Copper and Francis, 1998: 92).

.Natural systems and environmental quality: open spaces are part of a larger natural system critical to healthy city life. A growing body of research is focused on the relationship between people and the natural environment (Copper and Francis, 1998: 93).

**g) Economic benefits and impacts:** some research has centered on the economic impacts and benefits of urban open spaces (Copper and Francis, 1998: 94).

## 2.5 Morphological Dimension

According to Conzen (1960) urban areas can be distinguished by several elements, including street patterns, plot/block patterns, and building structures. Conzen (1960) introduced “Urban Morphology” as the study of changing patterns and processes of physical form over time.

The morphological dimension of place is “the configuration of urban form and space, and the spatial patterns of infrastructure that support it” (Carmona, 2010: 214).

### 2.5.1 According to Conzen (1960) morphological elements include (Figure 2.1):

**.a) Street pattern:** Street pattern is the layout of urban blocks and movement networks between those blocks.

**.b) Block/Plot patterns:** Blocks are the result of street connections and are well defined by a group of independent buildings plots. Subdivision of urban blocks results in plots or lots.

**.c) Building structures:** There has often been a recognisable cycle of building development on each plot., this process has been described and explained in terms of the transformation of burg age plots, which started out as long narrow fields laid out perpendicular to a street or circulation route (Conzen 1960).

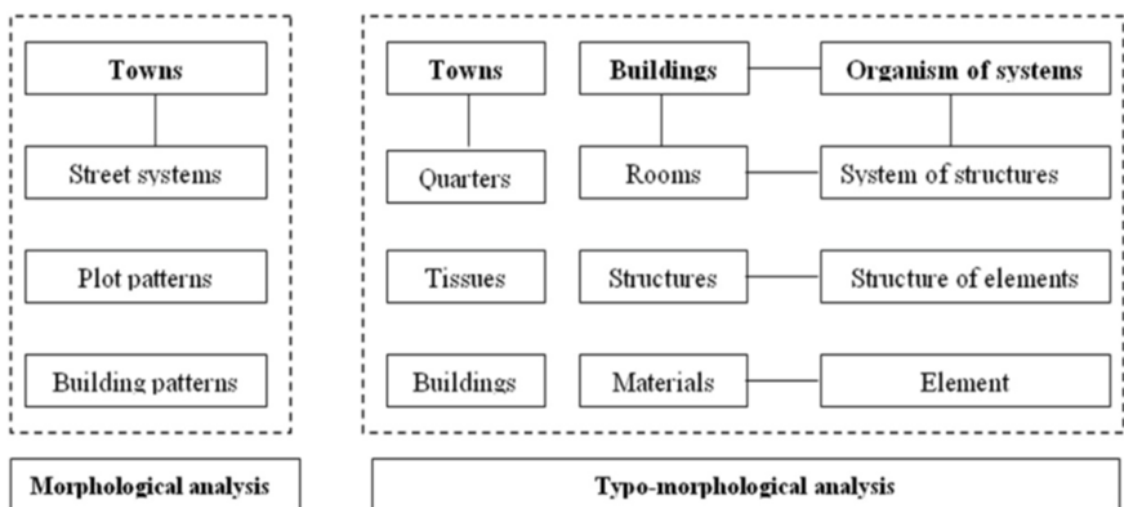


Figure 2.1. Morphological Analysis (Conzen :1960)

## **2.6 Perceptual Dimension**

Lynch and Rodwin (1958) believe that physical form of spaces have obvious effects on people's activities taking place within them: "A city is the characteristic physical and social unit of civilization. It possesses size, density, grain, outline and pattern as the basic aspects of the city's physical form. The people who live in it shape these properties and are Lynch and Rodwin, 1958).

The value of perceptual dimension of urban design is the emphasis placed on people and how they perceive, value and determine particular meaning for the urban spaces.

### **2.6.1 Lynch (1960) identified five key physical elements : Figure 2.3'**

#### **a) Paths:**

paths were often the principle elements in people's image with the other elements such as special uses and features along paths.

#### **b) Nodes:**

nodes are point references. They may be primarily intersections, or simply 'thematic concentrations' of a particular use function or physical significance character.

#### **c) Landmarks:**

As the other types of point references, landmarks are considered as the external element for people. Some landmarks in terms of scale functions are local and some are functional at the greater scale. Lynch argued that a landmark's key physical characteristic is "singularity", and "Uniqueness" .

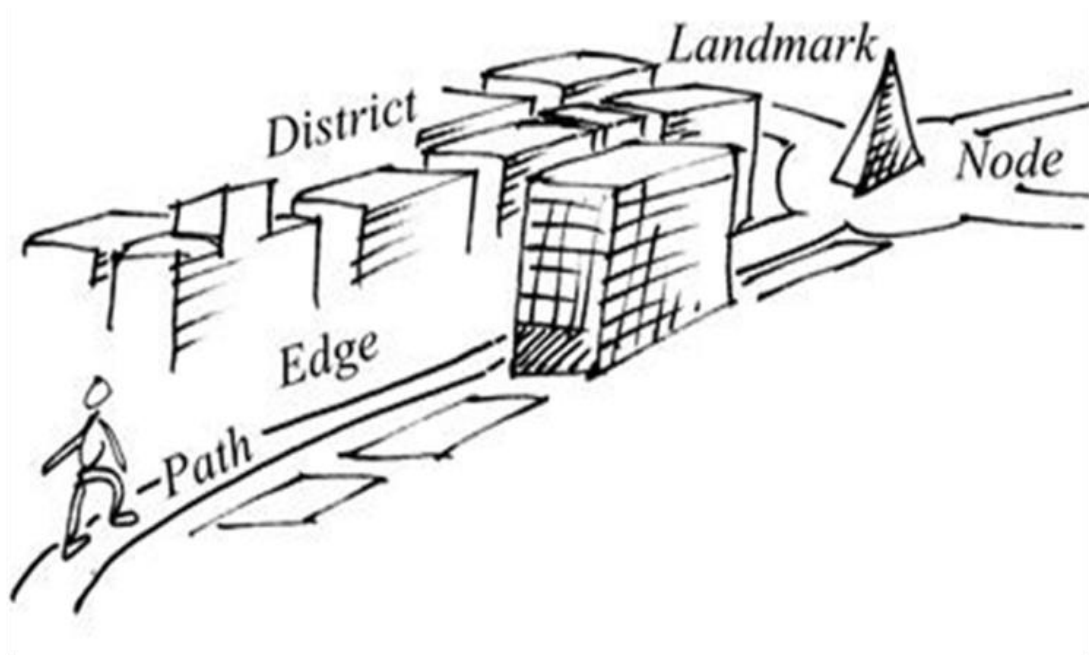
#### **d) Edges:**

As linear elements, edges are different from paths and do not function as paths. They may be more or less penetrable barriers or lines along which two areas are connected and related together.

#### **e) Districts :**

Lynch identifies different areas of the city with particular and recognizable characters which each person is able to distinguish different districts from each other.

**Image of a city (Lynch:1960)**



**Figure 2.2. image of a city: (Lynch, 1960: 47-49)**



**Figure 2.3 Riyadh in SAU planned on basis of Kevin Lynch theory source( [www.kayak.com](http://www.kayak.com)).**

## **2.7 The Relationship between Public Spaces and Human Behaviour**

Understanding the relationship between people ('society') and their environment ('space') is an essential component of urban design.

Consideration of the relationship between people and their environment starts with architectural or environmental determinism, where the physical environment has a determining influence on human behaviour Carmona(2010:363).

But, by negating the role of human agency and social influences, it assumes

environment–people interaction is a one way process. Similarly, Kashef (2008: 416) describes an attitude within social science that sees space as a neutral container for economic and social activities (i.e. urban space may be configured and reconfigured by societal and cultural changes but not vice versa).

People are not passive, however, and influence and change the environment as it influences and changes them. It is, thus, a continuous two-way process in which people create and modify spaces while at the same time being influenced in various ways by those spaces. Social process happens neither in a vacuum, nor against a 'neutral backdrop', and the built environment is thus both the medium for and the outcome of social process and change Carmona(2010:363).

### **2.7.1 The degrees of environment influences by people's actions and physical determinism**

Franck (1984) identified four major weaknesses and limitations of determinist views of physical design: exaggerating the influence of the physical environment by understating the influence of other factors; assuming the physical environment has only direct effects on human behaviour; ignoring the active role of human choice and goals; and neglecting active processes of creating and modifying

environment's the relationship is thus not deterministic: the creation or modification of environments merely creates potentials; what actually happens depends on the choices are made.

- Gans (1968: 5) drew a valuable distinction between 'potential' and 'effective' environments, whereby a physical setting is a potential environment, providing a range of environmental opportunities regarding what people are able to do. At any moment in time, what people actually do is the 'resultant' or effective environment. Thus, while designers create potential environments, people create effective environments. thus, best conceived as a continuous two-way process in which people create and modify spaces while at the same time being influenced by those spaces.

The choices that individuals make in any particular environment are responsive to the individual's ego, personality, character, goals and values, available resources, past experiences, life stage, etc. Nevertheless, despite the individualistic and complex nature of human values, goals and aspirations, a number of authors have proposed a overarching hierarchy of human needs. Such hierarchies often derive from Maslow's original work on human motivations, which identified

### **2.7.2 Five-stage hierarchy of basic human needs:**

- Physiological needs (for warmth and comfort);
- Safety and security needs (to feel safe from harm);
- Affiliation needs (to belong – to a community);
- Esteem needs (to feel valued by others);
- Self- actualization (for artistic expression and fulfillment)

The most basic human physiological needs have to be satisfied

before progress can be made to the higher order needs. .



**Figure 2.4 (Maslow 1968)**

Human grouping occupying a relatively bounded territory, that interacts in a systematic way and possesses its own culture and institutions.

Culture is probably best understood in an anthropological sense as a ‘particular way of life, which expresses certain meanings and values not only in art and learning, but also in institutions and ordinary behaviour.’ (Williams 1961: 41).

Lawson (2001: 2–3) argues that whenever we find people gathered together collectively inhabiting some part of our world we also tend to find rules governing their use of space.

While designers can manipulate functional and cognitive cues to increase the probability of (more) respectful behaviour in public spaces, what can be achieved through design is inevitably limited.

Many urban design practitioners, nonetheless, remain optimistic about the



probability of particular behaviours in certain environments and advocate good design as a means to achieve certain desirable outcomes.

As Ford (2000: 199) argues, writers such as Jane Jacobs and William H Whyte (supposedly) believed that: ‘Good streets , sidewalks, parks, and other public spaces bring out the best in human nature and provide the settings for a civil and courteous society.

### **2.7.3 Human Behavior On The Public Realm**

‘public realm’ is an often taken-for-granted term and it is important to review what the concept of the public realm and the related concept of ‘public life’ might mean. Frequently reduced to merely the physical public space, it is more than just a physical setting it is also the activity happening within the container.

The public realm has ‘physical’ (space) and ‘social’ (activity) dimensions.

For the purpose of this thesis is to explore the big impact of physical public realm in a daily human life and their behaviour.

The physical public realm means the series of spaces and settings – which may be publicly or privately owned that support or facilitate public life and social interaction. The activities and events occurring there can be termed Carmona(2010:372).

#### **Defining Public Space**

Public space is an integral part of the public realm, and is receiving increased attention across the range of social science and humanities disciplines. Each academic discipline views through a different lens and with particular interests and concerns to the fore. Political scientists, Carmona(2010:373).

**The UK government has adopted the following definition of public space:**

*all the streets, squares and other rights of way, whether predominantly in residential, commercial or community/civic uses; the open spaces and parks; and the “public/private” spaces where public access is unrestricted (at least during daylight*

*hours). It includes the interfaces with key internal and private spaces to which the public normally has free access.*

#### **2.7.4 The qualities of ‘publicness’ on the space Figure 2.5:**

The relative ‘publicness’ of space can be considered in terms of three qualities:

- Ownership whether the space is publicly or privately owned, and whether and in what sense it constitutes ‘neutral’ ground.
- Access whether the public has access to the space. This poses the question of whether a place becomes private when an admission fee is charged: consider, for example, the difference between museums and for which no entry fee is charged: is one public and the other not, or are neither public?
- Use whether the space is actively used and shared by different individuals and groups if the distinction between public and private is clear cut and obvious, then public and private are clearly defined realms and cannot be confused. If it is indistinct and difficult to define, then public/private would be a continuous quality and there are degrees of publicness Carmona(2010:375).



**Figure 2.5 Source: UN-Habitat, City-wide public space strategies: Guide for local governments, draft report (2018 :5)**

## 2.7.5 Public Life

Banerjee (2001: 19–20) observes, it is increasingly ‘flourishing in private places in small businesses such as coffee shops, bookstores and other such third places.

’ Public life occurs in what might be referred to as social space. This is space used for social interaction, regardless of whether it is publicly owned or privately owned space, provided it is accessible to the public. Oldenburg’s ‘third place’ concept provides a useful way of understanding informal public life and its

## 2.7.6 The Public Realm Types

The public realm can be considered to be the sites and settings of formal and informal public life. This definition includes some notion of public space, whether material or virtual. It includes the media, the Internet, etc., though the particular interest here is with physical and material settings rather than virtual settings.

**The concept of physical public realm extends to all the spaces accessible to and used by the public, including:**

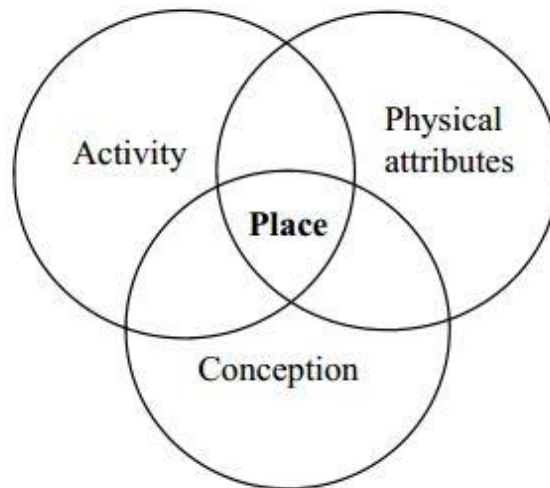
- External public space those pieces of land lying between private landholdings (e.g. public squares, streets, highways, parks, parking lots, stretches of coastline, forests, lakes and rivers). These are all spaces that, in principle, are accessible and available to all. This is public space in its purest form.
- Internal ‘public’ space various public institutions (libraries, museums, town halls, etc.) plus most public transport facilities (train stations, bus stations, airports, etc.).
- External and internal quasi-‘public’ space – although legally private, some public spaces – university campuses, sports grounds, restaurants, cinemas, theatres, nightclubs, shopping malls also form part of the public realm. This category also includes privatized external public spaces. As the owners and operators of all these public spaces retain rights to regulate access and behavior within these spaces, they are only nominally.

## 2.8 Theory of Place

Theorists within urban design thought such as Relph (1976), Canter (1977), Punter (1991) then began his theory by addressing these two questions what are the main components which integrate to create places?

and 2) What procedures are available for identifying places and their attributes?

Answering to these questions was possible with reference to the conceptual diagram of the components of places. Therefore, drawing on Relph's work, Canter (1977) introduced places as a function of "activities", "physical attributes" and "conceptions" (Figure 2.6).



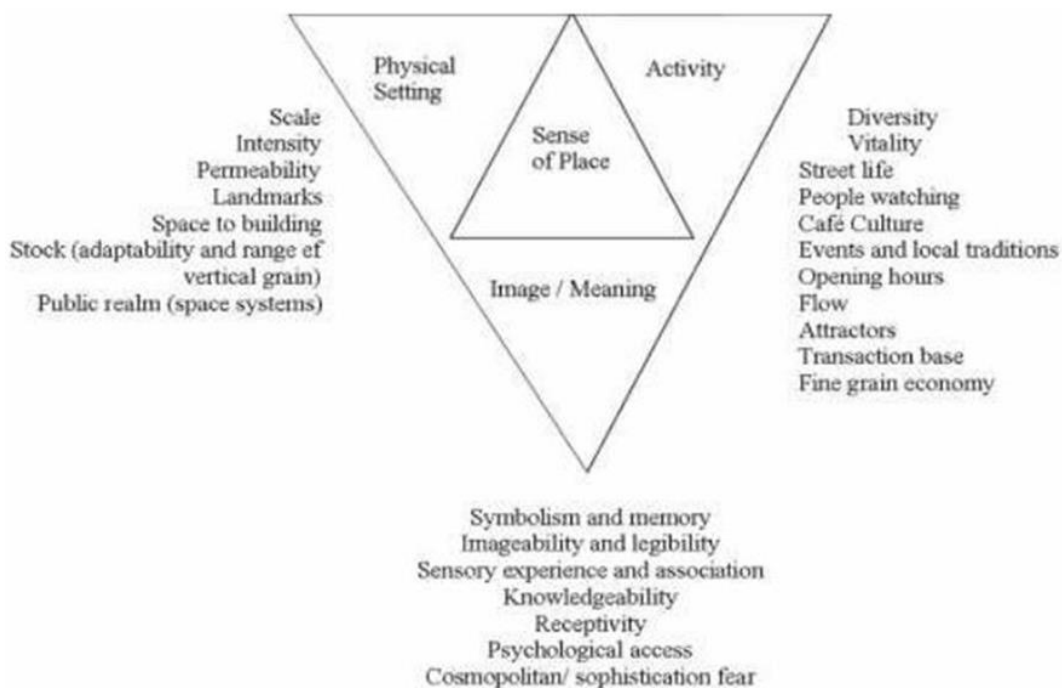
**Figure 2.6. Conceptual Diagram for the Components of Place, Canter (1997)**

This model indicates that the potential relationships among actions, conceptions and physical attributes will lead to creating a place. Canter (1977) introduces the "identification process" of the place starting with any of the main components. Thus, in this process it is important to find out what activity is associated with, or is anticipated to take place within a given place; what the physical features or settings are; and what conceptions people hold of that activity within the physical environments.

This could be followed by finding out how people identify the main components of the places of interest through sketching or by giving a description of a place including the

feeling about the place and how people feel about it, what they do within it. Some places may be more specifically described than others, with specific activity. The other way could be direct observation based on information concerning what “activities” and happens where (Canter, 1977: 31-4 and 160-161).

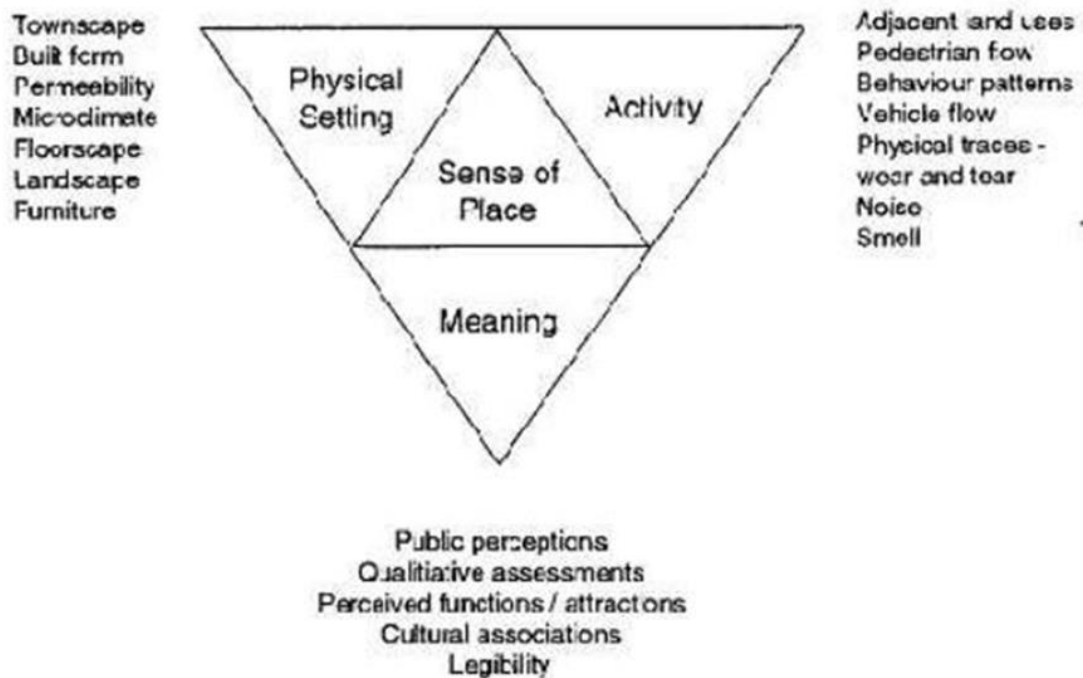
The procedures for identifying and describing places provide a valuable link to design decision making. These procedures have the potential of being used during the design process, to indicate the nature and the characteristic of the places being produced. Thus, Canter (1977) emphasize that to investigate places there are three process or methods that can lead to characterizing places: sketching, which reflects the physical attributes; description such as conceptions; and activity mapping, which is representative of activities and indicates who does what where (Canter, 1977: 160-161). Building on Relph and Canter’s ideas, Punter’s (1991) work provides more detail on components of a place and linked these components with urban design principles (Figure 2.7).



**Figure 2.7. Components of Sense of Place, Punter (1991)**

Very soon after, Montgomery (1998) derived a model including all the components of place; physical setting, activity and image. His model is the most recent reinterpretation of the components of place and indicates the relationships between them (Montgomery, 1998, 96). He emphasized that his model will identify the quality or characteristics of a place more precisely and illustrates how design can contribute to and enhance the potential sense of place (Figure 2.8)

Montgomery (1998) believes that, according to these components and the associated detailed attributes, this opportunity exists to make out a set of design principles for introducing and creating urban spaces (Montgomery, 1998: 97).



**Figure 2.8. Components of Sense of Place, Montgomery (1998)**

## 2.8.1 The Principles of Activities

which will define the range of activities within a place, and also defines several indicators:

**.a) Vitality:** this concept refers to the number of present people within the space during day and night, and is measured based on the number of cultural events taking place and the active street life. Montgomery (1998) believes that vitality distinguishes successful urban spaces from those that are not working. He emphasizes on a transaction base of urban spaces as key element for vitality. Moreover, he states that the urban vitality depends on the possibility for economic, social and cultural transactions taking place within the space over time which will lead to a pattern of diverse associated activities, increase complexity and dynamic quality of the public realm.

**.b) Diversity:** this concept is related to urban vitality however separated from it and includes primary uses and activities. Montgomery (1998) believes that “Combinations of mixtures of activities” is a key to generate diversity in order to create successful urban places. Diversity also depends on population density which will lead to social interactions within the urban spaces (Montgomery, 1998).

In terms of mixed use diversity, Jacobs (1961) distinguishes two types of primary uses and secondary uses. The first type of uses is people attractors such as offices, residences, cafés, restaurant or shops. However, urban diversity is achievable where primary uses are combined with the secondary ones. Jacobs (1961) defined secondary uses to serve primary users. These types of uses can respond to variety needs of people associated with primary uses.

Therefore, these two types of activities depend on the presence of people within the space (Jacobs, 1961). According to the above mentioned concepts of vitality and diversity, Montgomery (1998) defines number of principles to create a successful urban space through promoting pedestrian flows and movement, creating people attractors, considering diversity of primary and secondary uses, developing population density, motivating evening economy and extending opening hours, encouraging street life and people watching and generating a fine-grained economy.

Thereupon, for achieving these principles Montgomery (1998) considers key indicators such as extending variety of uses, coordinating local business, determine opening hours, providing street markets, cinemas, cafes, restaurants and meeting points and considering cultural diversity for the users, availability of public areas such as gardens and squares for offering cultural programs, providing mixed uses and small scale investments, offering different property sizes and prices, providing different , styles and designs for buildings and streetscapes and create active street life. It is worth mentioning that urban vitality and diversity for Holand (2007) is achievable rather through culturally and economically events and programs than space physical settings. In this regard Pugalís (2009) commented that festivals and cultural events are the great experiences for the spaces but for the rest of the time such places appear to be dull. However, such activities create opportunities for people to use the space and as a result will ad to the uniqueness of the space.

## **Physical Elements**

Lynch (1981) offers basic design qualities in place making process: Vitality, Sense, Aces, Control and Fit. Through vitality he believes that a city allows range of diverse activities within the city. For Lynch, sensible city is achieved through from and functions relationships which make it legible. Accessibility for a city allows al different groups of people to use resources and services. Lynch stated that a city with good control is organized in way that citizens have a role in spaces management as they are working and living.

The fifth criterion, fit, refers to creating the relationship between activities and physical form of a place. Considering the physical pattern, fit provides the building, spaces and networks for people who are using them and activities are taking place within them. Thus, this fit is formed by different types of physical settings and the range of various activities (Montgomery, 198).



## 2.8.2 The Principles of Physical Elements

The following section introduces principles of physical pattern that relates to types of activities occurring within the place. For this thesis, the main focus will be on the relationship between physical settings of public spaces and the activities taking place within them. Investigating the physical dimension will lead to understand whether designed spaces are determined by the types of planned activities. (Carmona, 2010).

### **The following are the chosen principles:**

Density, Mixed use, Human Scale, Permeability, Linkage, Landmark, Visual enclosure, Architecture and Green space:

**.a) Density:** refers to the amount of activity found in an area. In the field of design it is defined as population or building square footage per unit of area (Handy et al., 2002: 6).

**.b) Mixed used:** is defined as different land uses within a given area. A mixed-use area consists of residential as well as commercial activities and perhaps other land uses.

**.c) Human Scale:** refers to size, articulation of physical elements such as buildings that matches the proportions of human. There are physical features and elements that contribute the human scale such as trees, space furniture and pavement textures (Ewing and Handy, 2009: 7). Usually the ratio of building height to street width is defined as human scale. Thus, this quality has a close relationship with intensity (Montgomery, 198: 106).

**.d) Permeability:** is an important place quality related to the street and block pattern which allows people a choice of ways through and within the built environment. Permeability is two folded. Visual permeability refers to the ability to see the routes through a space, while physical permeability refers to the ability to move through a space (Carmona, 2010: 81).

**.e) Connectivity:** is defined as the available alternatives ways between spaces or buildings (Handy et al, 202: 6).

**.f) Image ability and Legibility:** Kevin Lynch (1960) defines image ability as a quality of a space that make it recognizable, memorable and distinguishable. Image ability is related to specific physical elements that create the place uniqueness (Ewing et al., 2006). Moreover, image ability is result of the other urban design qualities of a space such as human scale, permeability, connectivity, enclosure (Ewing and Handy, 2009).

When the spatial structure of a space is understandable and recognizable and there is the opportunity to define a coherent pattern for it, that space has legibility (Lynch, 1960). By providing people with sense of orientation and reference points the legibility of space would improve (Ewing et al., 2006).

**.g) Landmarks:** For Lynch (1960) landmark is not specifically a great structure but it can be location or a significant physical feature within the context of the area or the city. Landmarks are main components of image ability since they act as unique visual points, meting places or small scale structures in the urban setting (Ewing and Handy, 209 and Montgomery, 1998).

**.h) Enclosure:** is resulted when lines of sight in outdoor spaces are blocked and the space is defined by buildings, walls, lines of trees and other vertical physical features (Ewing and Handy, 2009).

**.i) Complexity:** refers to verity of physical features and generally “visual richness” of a space. Thus, specifically, it depends on diversity of architectural design of buildings their shape and size, diversity in street furniture, landscape designing which as a result will lead to diversity in people activity (Ewing and Handy, 2009)

**.j) Aesthetic qualities:** refer to architectural style of built environment and will ad to the attractiveness as well as identity of space (Handy et al., 2002). Montgomery (1998) commented that to achieve urbanity and diversity within urban spaces aesthetic architectural styles are needed.

**.k) Green and water space:** is an essential parameter to daily or recreational urban life (Montgomery, 1998).

## **2.9 Theories of Human Behaviour**

In contrast to most other scientific fields that are based on theories and scientific models, the study of environmental psychology lacks a unifying theory that can be applied to all types of environments consistently (Gifford 2002; McAndrew 1993; Bell et al. 1996; Pomeranz 1980). In spite of this, behavioural theorists and psychologists have speculated on various environment-behaviour models. A review of the literature suggests that these can be summarized as six main theoretical perspectives Sangar(2007:19-24) .

**These are as follows:**

1. Arousal theory,
2. Stimulus load theory,
3. Behaviour constraint theory,
4. Adaptation level theory,
5. Environment stress theory,
6. Perception or cognition theory

These theories are relevant to the query of this thesis and will be briefly examined in the following section.

### **2.8.1The Arousal Theory**

The relationship between arousal levels and behaviour and performance has been shown in various studies (Bell et al. 1996). In a study of personal space (the comfortable distance between people) in the men's lavatory, it was found that where personal space invasions occurred, close interpersonal distances caused delays in urinating (Middlemist et al. 1976). This study suggested that arousal associated with personal space invasions produced physiological changes in heart rate, respiration rate, blood pressure and adrenaline secretion (Middlemist et al. 1976; Mehrabian and Russel 1974).

## **2.8.2 The Stimulus Load Theory**

The Stimulus Load Theory conceptualizes the environment as a source of sensory information (referred to as stimulus or stimuli), that provides people with psychological stimulation (Gifford 2002; Veitch and Arkkelin 1995). These stimuli can range from simple ambient features such as light, sound or temperature, to complex physical features such as buildings, streets, land forms and the presence of other people.

## **2.8.3 The Behaviour Constraint Theory**

The focus of behaviour constraint theories is on the real or perceived restrictions that are imposed on people by the environment, and the perceived degree of control that people have, or want to have, on an environment (Gifford 2002; Veitch and Arkkelin 1995).

Where people perceive that they have lost some degree of control over their environment, their first experience is of discomfort, which is then followed by an attempt to reassert their control (Bell et al. 1996).

## **2.8.4 The Adaptation Level Theory**

The adaptation level theory maintains that excessive environmental stimulation, or too little environmental stimulation, can have a detrimental effect on people's emotions and behaviours (Gifford 2002; Bell et al. 1996; Veitch and Arkkelin 1995).

This suggests that a moderate level of environmental stimulation is the most desirable. Adaptation level theorists assert that the relationship between people and their behavioural response to the environment is comprised of two processes – adaptation and adjustment (Veitch and Arkkelin 1995). People either adapt by changing their responses to the environment, or adjust by changing the environment where they are (Veitch and Arkkelin 1995). Either way, the process results in bringing the person back into equilibrium with his or her environment .

## 2.8.5 The Environment Stress Theory

Environmental Stress theorists believe that once environmental features are recognized as threatening, part of the behavioural response is automatic and begins with an alarm reaction. This reaction causes the affected person to experience alterations to their various physiological and psychological processes (Gifford 2002; Veitch and Arkkelin 1995).

The term ‘cognitive appraisal’ refers to how a person assesses the seriousness of the situation. Further, it suggests that behavioural responses to stress vary from person-to-person due to individual perception. This may be an indication of why some people are better able to deal with stress than others.

## 2.8.6 The Perception or Cognition Theory

Cognition theory focuses on people’s perception or cognition, rather than the behaviour that they overtly display (Veitch and Arkkelin 1995; McAndrew 1993; Low 1987; Canter and Stringer 1975).

Gifford explains that cognition is how “we acquire, store, organize, and recall information about locations, distances and arrangements in buildings, streets and the great outdoors” (Gifford 2002:32).



Street as public space © BLINK

### Figure 2.9

Source: UN-Habitat, City-wide public space strategies: Guide for local governments, draft report (2018 :4)

## **2.10 Safety**

### **2.9.1 Sense of safety on the public realm**

Safety and security are vital elements in any urban development. The creation of a sense of personal and community safety in cities is a complex issue; the perception of safety or danger does not always relate directly to actual incidence of crime. We feel comfortable and confident using area where there is good viability and effective lighting, where we feel we can be seen and heard by other people. Thoughtful design is an important instrument in enhancing everyone's sense of well-being and making place more user-friendly, easy to understand and secure.

It can help open up areas to as many groups of users as possible and create a shared sense of confidence in the use of streets and other facilities.

There is ample evidence that the sensitive combination of good design, good management and community involvement is effective in creating more secure environments and of reducing vandalism and the risk- and fear of crime and violence.

One of most effective measures for community safety and crime prevention is the creation of lively, lived-in urban areas and public spaces which are easy to overlook and oversee Yeang (2000:106) .

### **2.9.2 There are essentially three key principles to building in safety, namely:**

#### **.a) ensuring natural surveillance and human presence.**

- making buildings front onto the public realm.
- putting 'eyes on streets' and minimizing exposed blank facades.
- mixing uses, particularly at ground level, adding vitality at different times of the day and night and over time .
- designing an integrated network of streets, rather than more vulnerable cul-de-sacs

- locating parking in front of buildings on-street or in secure private courtyards.
- being careful not to make planting too high or dense to screen potential assailants in certain locations.

**.b) minimizing conflict**

by providing safe routes for walking and cycling

**.c) designing-in territoriality and community involvement.**

When people view public space as their own, they begin to take responsibility for it. Places can be designed to foster a sense of ownership, mutual protection and belonging.

### **2.9.3 Crime prevention and the public realm**

If there has to be a security fence or grill, design it as a sculpture

Buildings and private space can be made more secure without resorting to the offensive additions of yards of barbed wire, bollards, shutters and other visually intrusive security measures. The creation of fortified territories is an admission of defeat; both public and private security measures frequently undermine civic quality. Integrated streets with informal surveillance will go a long way to promoting security, but if detailed devices are felt necessary, with design ingenuity these can be transformed into works of art.

### **2.9.4 Watch the main entrance closely**

Entry and exit from all buildings should be appropriately and clearly monitored.

In the case of main entrances to workplaces, commercial and public buildings, a combination of appropriate staff and technology should be adopted, together with good lighting, convenient public transport and parking and routes that are overlooked by the main building.

## 2.10 New York central park

Central Park's design was the result of a public competition won by Calvert Vaux and Frederick Law Olmstead, the "father of American landscape architecture" and a then-journalist. The park was marketed as "a park for the people" and meant to be accessible to everyone.

The entranceways, for example, were not designed with grand archways or with significant signage. Instead, wide walking paths invite passersby to enter and walk through without feeling that they were imposing on private property.

Besides this mission of equity, the "Greensward Plan" had another key feature that distinguished it from the rest of the proposals. The park should not blend in or integrate into New York City.

Instead, it would come to a clear end that would bluntly contrast city and nature. It would also not try to meet the rigid grid system of New York but would be full of picturesque meandering paths that would form its own organizational logic Figure 2.10



Figure 2.10 New York central park

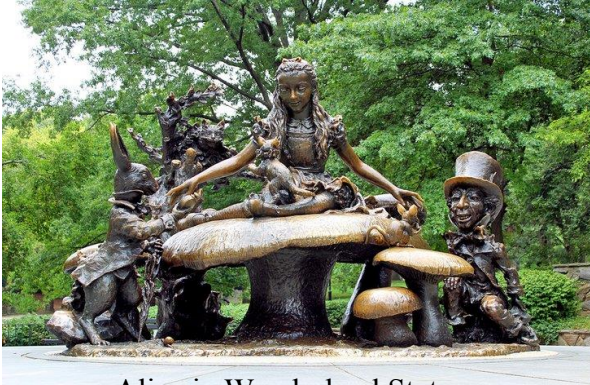


## 2.10.1 Central Park Map



Figure 2.11 Central Park Map (Historical)  
<https://www.planetware.com/new-york-city/new-york-central-park-us-ny-central.htm>

## 2.10.2 Central Park components



Alice in Wonderland Statue



Cherry Tree Blossoms in the Spring



Skating in central park is a great family activity, but couples can also enjoy a romantic skate. This is a seasonal activity, open from late October to April, and if you are visiting New York in the winter, a skate in Central Park on a sunny day is a memorable event.



Conservatory Water, on the east side of the park near 72nd Street, is better known as the Model Boat Pond. People come here from spring until fall, particularly on weekends, to sail and race their model boats.



The Central Park Carousel has enjoyed a long tradition in the park,



A lovely area for walking, the Mall is a straight, wide pathway running beneath

**Figure 2.12 Central Park components**

<https://www.planetware.com/new-york-city/new-york->



On the far eastern shore of The Lake, the beautiful Loeb Boathouse is a restaurant with an indoor dining room and an outdoor seating area, set right on the water's edge. The picturesque setting here is often used for weddings and other formal events.



Conservatory Garden is a peaceful oasis, filled with thousands of trees and shrubs. Known for being the only formal garden in the park, this six-acre area has a much calmer atmosphere than other portions of Central Park, with no cyclists or skateboarders. It is



Bethesda Fountain on Bethesda Terrace stands between the Lake and the Mall, and is one of the architectural highlights of Central Park



Located within Central Park, Strawberry Fields is a memorial to John Lennon, who was tragically murdered in 1980 in front of the Dakota apartments just off the west side of the park. A mosaic is set in the pathway with the word "Imagine" inscribed.

**Figure 2.12 Central Park components**  
<https://www.planetware.com/new-york-city/new->

## 2.11 Sudan is a multicultural country

The Republic of Sudan (also known as North Sudan) is a North African country. The territory of Sudan previously incorporated South Sudan. However, the countries split in 2011 following decades of civil war. The North Sudanese identity is closely associated with Muslim and Arab cultural radiations, as these are factors that differentiate the population from the South Sudanese. The Sudanese population is very culturally diverse, containing highly differentiated lifestyles, livelihoods and ancestral background. There are 19 major ethnic groups and over 597 ethnic subgroups speaking more than 100 languages and dialects.

These multifaceted ethnic divisions make Sudan a very diverse country, with each ethnic group having a unique culture of its own and lifestyle. Arab speaking Muslims are considered the largest single ethnic group at about 70% of the total population, while other ethnicities such as Nubians, Copts and Beja and others make up the remainder. These are the major ethnic groups in Sudan.



**Figure 2.13**  
Members of Sudan's Nuba community perform a traditional dance called the Kambala as they take part in the Nuba Mountains Cultural Heritage Festival, marking the International Day of the World's Indigenous Peoples, on August 15, 2015, in the capital's twin city of Omdurman. AFP PHOTO / ASHRAF SHAZLY



**Figure 2.14**  
<https://www.alkawthartv.ir/news/104884>  
Celebrations of the Prophet's Mohamed birthday for Muslims in Sudan

## **2.12 Conclusion**

Urban designers and planners, both in practical and academic environment have accomplished considerable efforts in the open public spaces.

Designing to developing and improving urban spaces needs the conception of place theories and place components as well as the empirical knowledge of the use of these spaces.

By combining the theoretical concepts of place this research focuses on the relationship between the human behavior and physical setting of a space and how these two affect each other. considering the principles and applying them on a case study. Thus, this research determines the actual concepts and principles of open public spaces use that are currently being undervalued by both designers and people who are using the space. Based on principles of human behavior and physical settings this research applies a proposed methodology to explore the potential relationships between two above mentioned place components. Research methodology and analysis of the case study is introduced in the following chapter.

# CHAPTER 3

## ANALYSIS OF THE CASE STUDY

### 3.1 Introduction

‘Sahat Alhoureya’ in Khartoum , Sudan

‘Sahat Alhoureya’ was known Al saha Al khadra before the Sudanese revolution. It is located in the Arkwit neighborhood near to Khartoum international airport at Africa street. It has been established for official celebration in 1990, but it had turned to Social activities and political meetings .

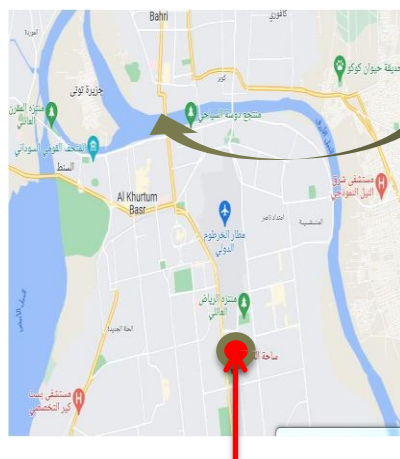
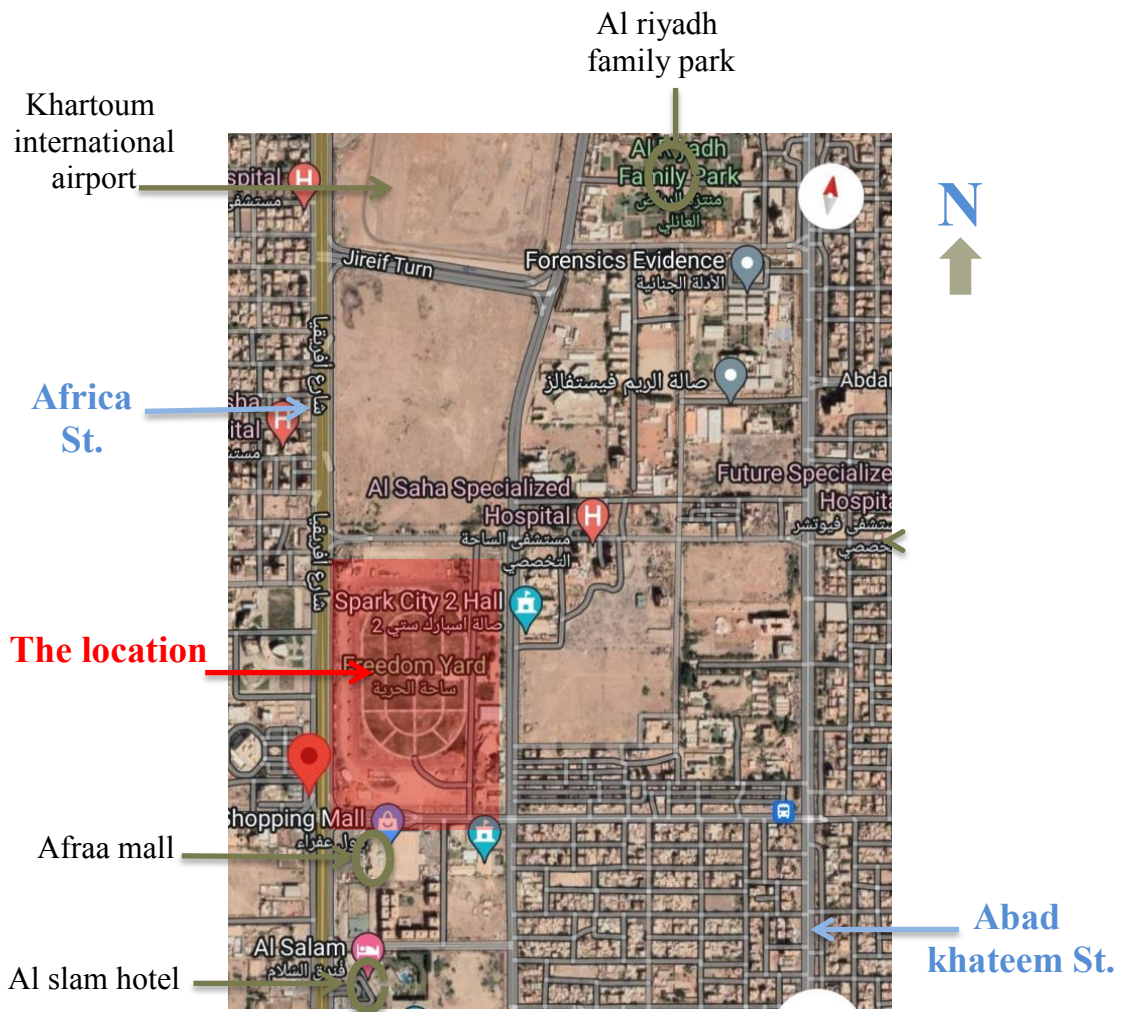
The total area for it is 185000 m<sub>2</sub> has been added 25000 m<sub>2</sub> to become 210000 m<sub>2</sub>

‘Sahat Alhoureya’ is the largest natural outlet in the state of Khartoum and is considered the first direction for all families, organizations and bodies to reverse their activities.



Figure 3.1 ‘Sahat Alhoureya’ <https://www.sudaninet.net/10824>

### 3.2 The location and Access



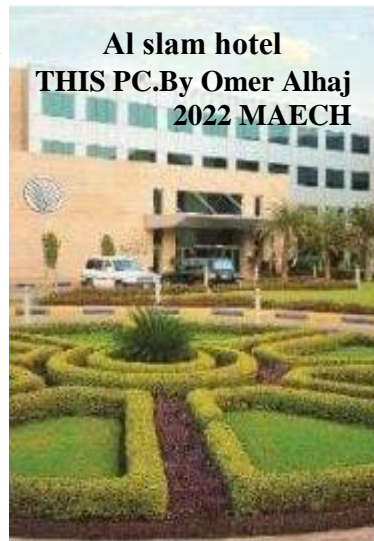
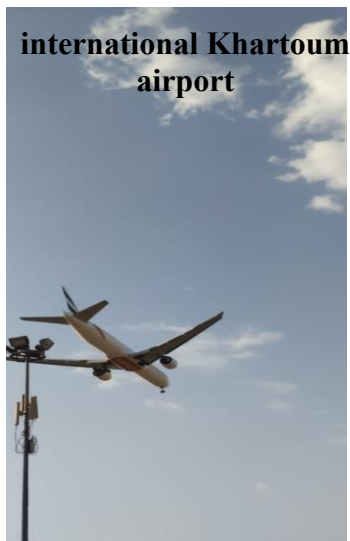
Almak Nimer bridge

**The location**

Figure 3.2 ‘Sahat Alhoureya’ map  
5 Al horia Square map source (www.google.com/maps)

### 3.3 The most important neighboring buildings

Figure 3.3 The source is researcher 26 September





### **3.4 Causes of choice ‘Sahat Alhoureya’ :**

1. It is a landmark in Khartoum
2. It has a unique location
3. To getting rid of bad social habits and unconscious behavior that has become dominant in Sudanese society
4. To stop the horizontal expansion of the capital and
5. It contains many entertainments activities that attract citizens and official event
6. Show the national identity on it.

### **3.5 Land uses of ‘Sahat Alhoureya’ :**

**Walls :** It is the physical components façades of ‘Sahat Alhoureya

**The sky line.** Formed by different surrounding building heights like Afraa male in the South And Egyptian & Sudanese bank and the Foundation Of Sudan Oil in the West . And the international Khartoum airport at North .Also Alsaha Hospital in the East

**The floor:** It is the walking paths , green areas



Figure 3.1 'Sahat' Alhoureyah

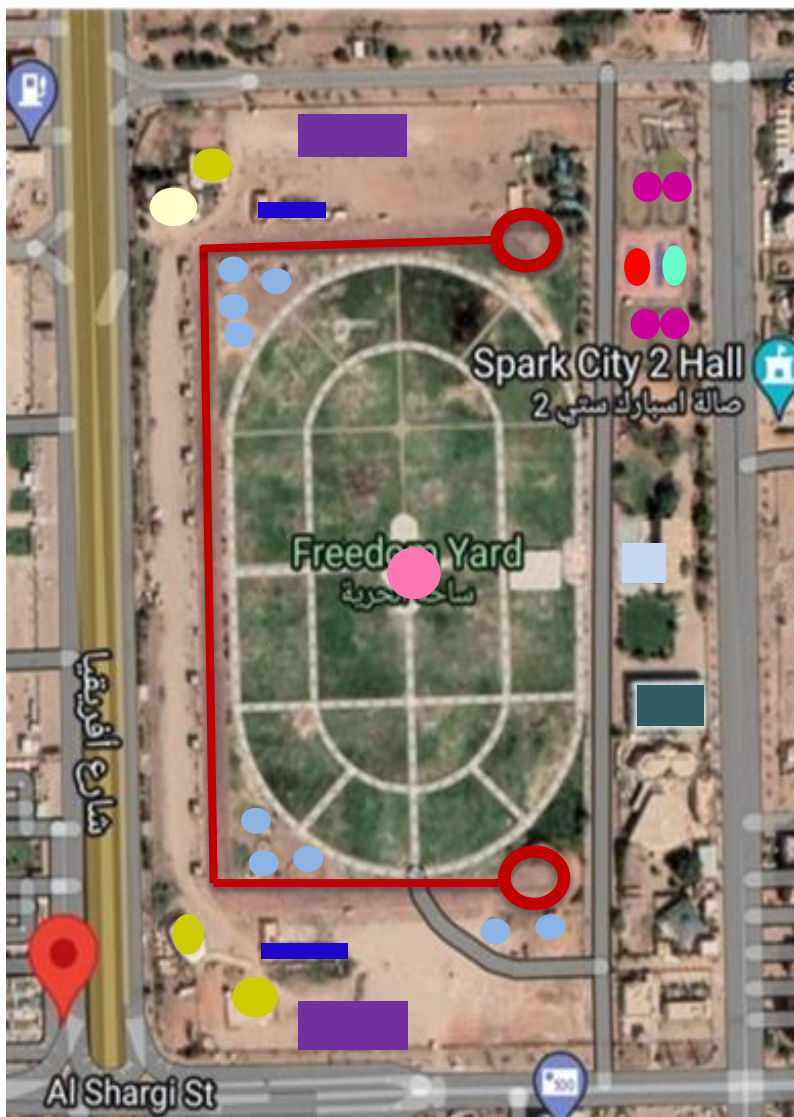


Figure 3.4 Al horia Square land uses

source is researcher

legend	
Restaurant	Yellow square
Mosque	Light yellow square
Basketball	Cyan square
Football Courts	Magenta square
Karate Courts	Red square
Playgrounds	Light blue square
Public bathrooms	Dark blue square
Cars parking	Purple square
Green areas	Green square
Fountain	Pink square
Platform	Light blue square
walking paths 3-7m	Grey square
Running track	Red square
Booths	Yellow square
Multi -uses Hall	Dark grey square

### 3.6 Physical components of 'Sahat Alhoureya



Booths



exercising



Green areas



Figure 3.5 Physical components of 'Sahat Alhoureya  
source: <https://suna-sd.net/read?id=281962>



Fountain



The main gate

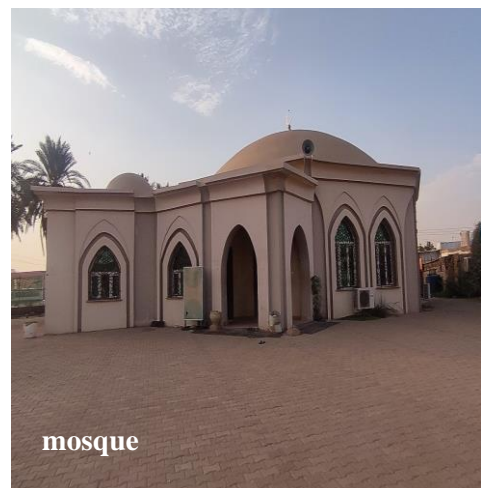


platform

### 3.6 Physical components of 'Sahat Alhoureya'



Figure 3.6 The source is researcher 26 September



### 3.7 Users activities and behaviours

The square is an outlet for all residents of the capital of Khartoum .

It has multi users ,they are children ,youth and elderly .

The number of young people and families ranging from 2000 on Thursdays and Fridays , raise to 6000

and in the month of Ramadan and holidays the number ranges from 8000 to 6000.

In Ramadan it increase.

Now a days due to political situation in the Sudan since Sudanese revelation in 2019 the gathering families in the public areas are decrease because of mess and not safety and a lot of demonstrations.



**Festivals & Exhibition**



**Eftar Ramadan**



**Political events**



**Economic benefits**



**children playgrounds**

**Figure 3.7. 'Sahat Alhoureya' activities**



**Sports**



**Running**

source:<https://ara.alrakoba.net/news-action-show-id-155570.htm>

### 3.7 .1 Children activities of ‘Sahat Alhoureya’



**Figure 3.8 children playgrounds**

**The source is researcher26  
September**



### 3.7 .2 Activities time of ‘Sahat Alhoureya’

Activities			
place	Activity type	Activity time	Activity
Sahat Alhoureya	sport	4-12 pm	Football
	sport	5.30-12 pm	Karate
	Entertainment	4-12 pm	Playgrounds
	Entertainment	4-12 pm	Setting
	sport	5-8 am 4-12 pm	Running
	Sport	Wed Tues. 4-12 pm	Cycling
	commercial	Irregular	Exhibition
	Entertainment	Irregular	Festivals
	commercial	4-12 pm	Eating
	Multi -uses	Irregular	Hall

**Table 3.1 the source is researcher**

### 3.7 .3 The frequency of users of the green square:

The days of the week	average number of visitors during a week	Rate the number of visitors 5.30-8am	Rate the number of visitors 4-7pm	Rate the number of visitors 7-12pm
Saturday	4000	10%	23%	67%
Sunday	1500	11%	23%	61%
Monday	2000	11%	23%	66%
Tuesday	2000	11%	28%	61%
Wednesday	2000	11%	20%	69%
Thursday	3000	16%	24%	60%
Holidays & Friday	6000	33%	33%	34%

**Table(3.2) the source is researcher**

#### **We deduce from the above table the following:**

Peak hours and overcrowding on official holidays, and in the evenings at afternoons due to the lack of shading in the square

the highest peak times in the ‘Sahat Alhoureya’s during the days of the week. delicious

Most of the time, the use of the yard is limited to nighttime, and it is not used during the daylight hours, except for necessity.

Maximum such as setting up shaded exhibitions with temporary shading with tents.



## **3.8 The design**

### **3.9 .1 Advantages of the design:**

**Simplicity , Image ability and Legibility** ;The square has great visual impact and the main entrance is very clear by paths which is lead to the central area that is dominant by The fountain .

**Flexibility** , It contains many activities entertainment and official events area for multi users.

**.Permeability**, clear paths lead users to directions

### **3.9.2 The positive impact of ‘Sahat Alhoureya’s design on human behavior:**

It contains many entertainments activities and sports that attract citizens and official events from different ages and different economic and culture levels so we find users who come to the running track in the morning have high income.

People come for entertainments and take a photos with their families and friends

Also some students come for purpose of discuss academic matters.

Green open areas encourage social meeting especially in holidays and Ramadan.

Restaurant , shops and exhibition encouraged the commerce activities.

## **3.9 The problems in ‘Sahat Alhoureya’**

### **3.9.1 Visual pollution**

The lack of maintenance led to poor services like throwing garbage on the ground and the grass is very dry also inability to use the public bathrooms due to It is does not clean enough .In addition the fountain doesn't work for along time when the plaza is opened

### **3.9.2 Lack of trees and sunshades**

That led to inability to use the plaza in the morning and make it uncomfortable place to use.

### **3.9. 3 Sound pollution from neighboring buildings**

Due to its proximity to the airport and busy street.

### 3.9 The problems in 'Sahat Alhoureya'



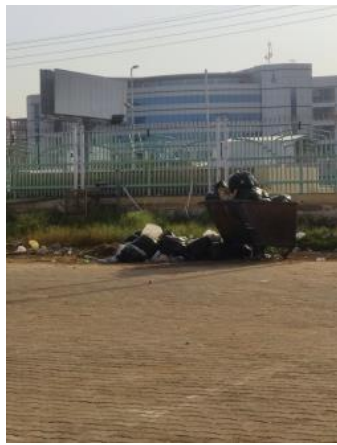
Figure 3.9 Visual pollution

The source is researcher 26 September

public bathrooms  
It does not clean enough .



Dry grass



throwing garbage on the  
ground due to poor services



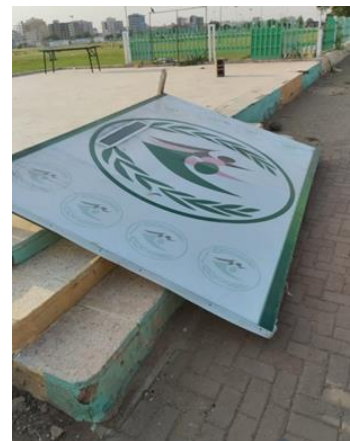
Fountain is not worked  
for a while



The baskets are full



running track has a lot of  
cracks



Signboard falls on the  
ground



There are playgrounds isn't  
work

### **3.10 The problems in ‘Sahat Alhoureya’**



**Figure 3.10 The source is researcher**

**2-Lack of trees and sunshades**

**3-Sound pollution from neighboring buildings**

# CHAPTER 4

## Results

1. Neglecting maintenance of running track is not safe for the users
2. Neglecting maintenance for playgrounds is very danger for kids
3. Lack of shades cause inability to use it in the morning.
4. We find that the low quality of services.
5. Neglecting maintenance causing don't using bathrooms thus spending less time in the square.
6. Pollution cause negative behavior and effect for users .
7. Sound pollution from plans and cars
8. Sky line is boring
9. No diversity and surprise element like ,memorial ,falls and unique benches.
10. The area is small compared to users of all over the capital.
11. Visual pollution because neglecting maintenance that is make negative human behavior like throwing the garbage on the ground.
12. Don't reflect the Sudanese identity
13. There are no control of hawker outside the square
14. The number of users is affected by the country security situation
15. No eternal security point in case kids lost
16. Ignore the users who have special needs
17. Lack of trees, plants and water elements
18. Ignore sustainable energy system

## Recommendations

1. Layout elements must encourage social connections by adding interesting activities
2. Adding more activities and supports the existing.
3. Integrate the unique characteristics of the community to meaningful place.
4. Reflect the Sudanese identity in the design by allocating place for Kambala dancing and use the Nopian style in the design.
5. Maximize the accessibility of the place.
6. Make 'Sahat Alhoureya' adaptable to change.
7. Involve the public users at an early stage of improve the design and decision making.
8. Urban designers and planers must be focusing on the relationships between place and the users
9. Regular maintenance
10. Add eternal security point with speaker
11. Use smart sunshades and sustainable energy system
12. Expansion to increase the area.
13. Add trees, plants and water elements for more aesthetics, and to decreases the effect of pollution and for cool air.
14. Add elements for diversity and surprise
15. Make the sky line more interesting by adding physical components have a different heights.
16. Consider the users who have special needs in the design .
17. Add eternal security point in case kids lost.
18. Control of hawker outside the square

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