



**Sudan University for Science &  
Technology**

**College of graduate Studies**

**Complementary Research for Master Degree  
In Urban Design**



**Urban Design of Open Common Spaces  
in Khartoum State**

**التصميم الحضري للمساحات العامة في ولاية الخرطوم**

By :

Naser eldin Ali Mohamed Gali

Supervisor: Dr. Saleem Alzain

2017 – 1438H

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

قال تعالى:

{ أَلَمْ نَرِ أَنْ اللّٰهَ أَنْزَلَ مِنَ السَّمَاءِ مَاءً فَأَخْرَجْنَا بِهِ ثَمَرَاتٍ مُّخْتَلِفًا  
أَلْوَانُهَا وَمِنَ الْجِبَالِ جُدَدٌ بَيضٌ وَحُمْرٌ مُّخْتَلِفٌ أَلْوَانُهَا وَغَرَابِيبُ سُودٍ \*  
وَمِنَ النَّاسِ وَالدَّوَابِّ وَأَلْأَنْعَامِ مُخْتَلِفٌ أَلْوَانُهُ كَذٰلِكَ إِنَّمَا يَخْشَى اللّٰهَ  
مِنَ عِبَادِهِ الْعُلَمَاءُ إِنَّ اللّٰهَ عَزِيزٌ غَفُورٌ }

صدق الله العظيم

(سورة سبأ - 27 - 28)

# **Dedication**

To my Father, Mother, Wife  
And my Sons

## List of Content

		<b>Page</b>
	List of contents	I
	List of tables	Ii
	List of figures	Iii
	List of photographs	Iv
	List of diagrams	V
	Acknowledgment	Vi
	Abstract (in English)	Vii
	Abstract (in Arabic)	viii
<b>Chapter One: Introduction</b>		
1-1	Introduction	1
1-1-1	Statement of the problem	1
1-1-2	Objectives of the Research	1
1-1-3	Significance of the Research	1
1-1-4	Research Scope	1
1-1-5	Methodology	1
1-1-6	Research frame work / contend	1
1-2	Definition	2
<b>Chapter Two: Back Ground and Related Work</b>		
2-1	Background	7
2-2	Characteristics of Open Spaces	9
2-3	Creating the urban structure	16
2-4	What is good urban design, and how do perception of urban design differ?	16
2-5	Open spaces. What is it, How to plan for it and Build consensus to protect it.	17
2-6	Open space presersvation Objectives	23
2-7	Balanced preservation and Growth	24
2-8	Criteria for public open space land march 1998	25
2-9	Strategy components Supporting public open space contributions	26
2-10	Related Work	28
<b>Chapter Three: Case Study</b>		
3.1	Population	31
3-2	Natural environment	32
3-3	Economic environment	35
3-4	Social environment	35
3-5	Urban Environment	37
<b>Chapter Four Open spaces</b>		
4-1	Location	
4-2	Description	
4-3	Criticism	
<b>Chapter Five: Results and Recommendations</b>		
5-1	Results	95
5-2	Recommendations	96-98
5-3	Reference	99-100

## List of Tables

	Page
Table No. (1): Open Space Typology	19
Table No. (2): Parks Type	20
Table No. (3): Criteria for public open space	25
Table No. (4): Monthly average during day hours in Khartoum	32
Table No. (5): family monthly income (in SD's), 1998	35
Table No. (6): Permanent Building materials (%) 1998	39
Table No. (7): Number of stories (%) 1998	40
Table No. (8): Spatial expansion of greater Khartoum in mm), 1955-1998	41
Table No. (9): Chronological expansion of residence %	42
Table no. (10): classification of residential area (%) 1989	43

## List of Figures

	Page
Fig. No (2-1): buildings	4
Fig. No (2-2): public space	4
Fig. No (2-3): streets	5
Fig. No (2-4): transport	5
Fig. No (2-5): Landscape	6
Fig. No (2-6) (2-7)	9
Fig. No(2-8)(2-9) (2-10)	10
Fig. No(2-11): social(2-12)	11
Fig. No(2-13): economical(2-14): aesthetic	12
Fig. No(2-15): massing (2-16): scale	13
Fig .No (2-17): articulation(2-18): infill development(2-19) set back	14
Fig. No (2-20): set back	15

## List of Photographs

	Page
Figure .No (4-2): Medan AbouGinzeer (Khartoum)	47
Figure. No (4-3): Medan Almoled (Khartoum ganob)	48
Figure. No (4-4): Medan Alsaafi (Bahri)	49
Figure. No (4-5): AlshohadaPark(Khartoum)	50
Figure .No (4-6): Medan Jackson (Khartoum)	52
Figure .No (4-7): HadiagaAbood (Bahri)	53
Figure .No (4-8): Medan Alazhari (ommdroman)	55
Figure. No (4-9): Medan AlommamAlmotahida (Khartoum)	56
Figure .No (4-10): HadiagaommdromanAlkobra (ommdroman)	57
Figure .No (4-11): AlsahaAlshabia (Khartoum)	59
Figure. No (4-12): AlsahaAlkhadra (Khartoum)	60
Figure. No (4-13): MedianAltiffi (Khartoum)	62
Figure. No (4-14): Medan Agrab (Bahri)	64
Figure .No (4-15): MontazahAlbohira (ommdroman)	65
Figure .No (4-16): Medan Abdallmonam Mohammed (Khartoum)	68
Figure .No (4-17): MontazahAlmogran (Khartoum)	70
Figure. No (4-18): Medan Albostah (ommdroman)	71
Figure .No (4-19): Medan Al-Khalifa (ommdroman)	72
Figure .No (4-20): HadiagaAlgorashi (Khartoum)	73
Figure. No (4-21): MontazahAlriyadh (Khartoum)	75

## List of Diagrams

	Page
Green area A	78-79
Entrance definition B	80-81-82
Shape C	83-84
Degree of enclosure D	85-86
Area in hectare E	87-88
Scale F	89-90-91
Function G	92-93-94



## **ACKNOWLEDGMENT**

The researcher would like to express gratitude and thanks to Dr. Saleem Alzaien, for his close and very helpful supervision and guidance in carrying out this work.

I would like to express my thanks and gratitude to those who helped me in collecting information.

My thanks are extended to my colleague Engineer Abbass Abdel-Ati for his helping me more.

Thanks are also due to all the staff of Department of Architecture in Sudan, University of science and technology those who taught me in master course

I also would Like to Thanks

Dr. Abbass AlKhider - Dr. Awatiaf Ali Sharief For helping me more

My Thanks Are extended to External and Internal Examiner

Dr. Nawal Ibrahim

Prof. Soud Sadig Hassan

## **Abstract**

Open urban spaces in residential areas in Khartoum; suffer from severe neglect and violation because of the obvious infringement and desertion, so it is not used for cultural, social, recreational and environmental purposes which are supposed to achieve as required.

Open urban spaces established in order to gain a unique situation and realize beauty, elegance and glory in urban interfaces and create pleasant, beautiful and comfortable places to perform a range of useful activities that serve the human being (population), but in order to achieve that purpose, there must be a perfect cooperation between the population and users and the competent authorities.

The research deals with analysis and criticism of the current situation of problems and crisis of open urban areas in Khartoum Greater and Omdurman. We have dealt with the matter by scientific entrance to the problems of urban areas in the three cities, and this research calls for a right scientific methodology in establishing, plan and design of these areas according to the function performed.

The research is includes the identification and subject of the research which is the urban design of open space (case study of samples in Khartoum, Khartoum North and Omdurman). The methodology followed in this research is analytical, descriptive, criticism and case study methods.

The statement of the problem of the research there is no urban development in the three cities, and this is clear in the streets, buildings, landscape, open space and transport.

The research concluded the result that most of open space had been partially violated, resulting in change of the purpose.

The research recommends developing laws that protect and take care of open space from violation.

## Abstract (in Arabic)

تعاني الساحات الحضرية المفتوحة في المناطق السكنية في الخرطوم، من الإهمال الشديد وسوء الاستعمال بسبب التعدي الواضح عليها والإهمال الزائد، لذا فإنها لا تستخدم للأغراض الثقافية الاجتماعية، الترفيهية والبيئية التي من المفترض أن تقوم بها بشكل مطلوب.

أنشئت الساحات الحضرية المفتوحة لكي تكسب وضعاً متقدراً وتحقق جمالاً ورونقاً وبهاءً في واجهاتها الحضرية وخلق أماكن لطيفة وجميلة ومريحة لأداء مجموعة من الأنشطة المفيدة التي تخدم الإنسان (السكان)، ولكن لكي تحقق ذلك الغرض لا بد من وجود تعاون كامل بين السكان والمستخدمين والسلطات المختصة.

تناول البحث دراسة وتحليل ونقد أزمة الوضع الحالي للساحات الحضرية المفتوحة ومشاكلها في مناطق الخرطوم. ولقد تناولنا الموضوع بمدخل علمي للمشاكل التي تعاني منها الساحات الحضرية في الخرطوم، ويدعو هذا البحث إلى اتباع منهجية علمية سليمة في تأسيس وتصميم وتخطيط هذه الساحات حسب الوظيفة التي تؤديها.

يشتمل البحث على تعريف البحث وموضوعه وهو التصميم الحضري للساحات المفتوحة (دراسة نماذج في الخرطوم - الخرطوم بحري - أم ردمان). وكان المنهج الذي اتبع في البحث هو التحليلي والوصفي والنقدي ودراسة الحالة.

وتظهر مشكلة البحث في أنه ليس هناك منهجية متبعة في تطور المباني، والساحات المفتوحة والمواقف العامة والمناظر الطبيعية.

وتوصل البحث إلى نتائج وهي أن معظم الفضاءات المفتوحة تم التعدي عليها جزئياً مما نتج عنه تغيير غرض هذه الفضاءات التي أنشئت من أجلها.

وكانت توصيات البحث هي وضع القوانين التي تحمي الفضاءات المفتوحة من التعدي.

# CHAPTER ONE

## INTRODUCTION

### 1-1 Introduction

Urban design is the way of shaping the setting for life in cities, towns and villages. It is a process that involves politicians; a wide range of people with a task in an area; and many different kinds of professional. A successful outcome depends on these people working effectively altogether. Everyday countless decisions are made that have the potential to make a piece of a city, town, or village a little more lively, welcoming and pleasant or a little more hostile, unpleasant or unsafe.

These decisions can enhance a place's distinctive character. Some of these decisions concern major development. But even the overall effect of much small development, such as house extension, shop fronts and in fill schemes, can change a place dramatically for the better or worse over only a few years. By focusing on quality in urban design and architecture, the planning system can make a difference.

Good urban design is a powerful of tool for achieving a higher quality of life, greater economic vitality and more efficient use of resources. It is key to making places where talented people will want to live, and which will nurture economic success .

#### 1-1-1 Statement of the problem

When some body look at Khartoum as a city he finds that there is no development in urban design and we see this clearly in streets, buildings, landscape, open places, transport and so on

Accordingly, there is need to work to improve Khartoum city image according to urban design theories.

#### 1-1-2 Objectives of the Research

This research aims to study the development of urban design focusing on open spaces in Khartoum.

#### 1-1-3 Significance of Research

Open spaces are the living room of the city, a place where people come together to enjoy the city and each other. Open spaces make high quality life in the city possible. They form the stage and back drop to the drama of life. Open spaces range from grand central plazas and squares to small local neighborhood parks.

#### 1-1-4 Research Scope

Scope of this research on open space is in Khartoum state.

- Time scope: 1900 ---2015
- Geographical scope: Khartoum state
- Scientific scope: the study of urban open space

#### 1-1-5 Methodology

The research will use

- Case method
- Analytical method
- Descriptive method

#### 1-1-6 Research frame work / contend

- Chapter One
- Chapter Tow
- Chapter Three
- Chapter F our
- Chapter Five

### 1-2 DEFINITION

### **1-2-1 what is urban design?**

- Urban design is the art of place making; it's about relationships, the arrangement of buildings and the spaces in-between. It is the architecture of the city designed by the citizens
- Good urban design provides the fundamental structure for a safe, healthy and most importantly, a desirable place to live Urban Design addresses the character and quality of the built environment in relation to the human scale. Urban designers are involved with building design (specifically massing, scale, and articulation), streetscape, and open space design.<sup>1</sup>

### **1-2-2 Importance of urban design**

Urban design is about creating a vision for an area and then deploying the skills and resources to realize that vision.

### **1-2-3 Goals of urban design**

The main goals of urban design based on three ones: to design and build urban developments which are both structurally and functionally sound while at the same time giving pleasure to those who see the development, these three qualities of

- Utility for users and who watch them
- Durability
- Ability<sup>2</sup>

### **1-2-4 Principles of urban design**

1. Quality of the public realm: A place with public spaces and routes that are lively and pleasant to use
2. Continuity and Enclosure: A place where public and private space are clearly distinguished
3. Character: Sense of place and history

A place that responds to and reinforces locally distinctive patterns of development and landscape

• Distinctive landscapes

• Natural features

• Locally distinctive buildings

- Streets and street patterns
- Special spaces
- Skylines and roofs capes
- Building materials
- Local culture and traditions
- Avoiding standard solutions

4. Ease of Movement: axes of movement has to be comfortable and specialized for users.
5. Legibility: Ease of understanding A place that has a clear image and is easy to understand
6. Diversity: Ease of choice

A place with variety and mixed uses

7. Adaptability: Ease of change

A place that can change easily.<sup>3</sup>

### **1-2-5 Element of urban design**

Urban Design involves the design and coordination of all that makes up cities and towns:

#### **1-2-5- 1 Buildings**

Buildings (figure 2-1) are the most pronounced elements of urban design - they play a great role in shaping and form space by limit the street walls of the city. Buildings of good design and of good materials and groups of buildings work together to create a sense and aesthetic of place.<sup>4</sup>

(Figure 2-1) .<sup>4</sup>



**Buildings**

#### **1-2-5-2 Public Space**

Great public spaces, (figure 2-2) considered as the living room of the city. It is the place where people come together to enjoy the city and each other. Public spaces of good type and design make high quality life in the city possible - they form the site and background of life. Public spaces range from grand central plazas and squares, to small, local neighborhood parks. In large developments a certain Amount of the site is required to have open space. To help create active, pedestrian friendly communities. open spaces should be safe, useable and easily accessible.<sup>4</sup>

(Figure 2-2)

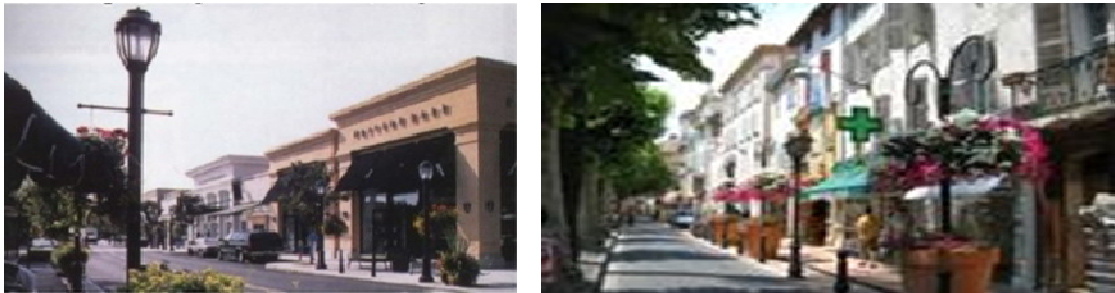


**Public Space**

### 1-2-5-3 Streets

Streets (figure 2-3) are the most important element that connects between spaces and places, as well as being spaces themselves. They are defined by their physical dimension and character as well as the size, scale, and character of the buildings that line them. Streets range from grand avenues such as the small, intimate pedestrian streets. The pattern of the street network is part of what defines a city and what makes each city unique.<sup>4</sup>

(Figure 2-3).<sup>4</sup>



### 1-2-5-4 Transport

Transport systems (figure 2-4) connect the parts of cities together and help shape them, and enable movement throughout the different parts of the city. They include road, rail, bicycle, and pedestrian networks, and together form the total movement system of a city. The balance of these various transport systems is what helps define the quality and character of cities, and makes them either friendly or hostile to pedestrians. The best cities are the ones that elevate the experience of the pedestrian while minimizing the dominance of the private automobile.<sup>4</sup>

(Figure 2-4).<sup>4</sup>



**Transport**



**1-2-5-5 Landscape**

The landscape (figure 2-5) is the green part of the city that weaves throughout - in the different forms of urban parks, street trees, plants, flowers, and water in different forms. The landscape helps define the character and beauty of a city and creates soft, contrasting spaces and elements. Green spaces in cities range from grand parks such as Central Park, to small intimate pocket parks.<sup>4</sup>

(Figure 2-5)<sup>4</sup>



**Landscape**

## CHAPTER TWO

### BACKGROUND AND RELATED WORK

#### 2-1 Background

##### 2-1-1 History of urban design

###### 2-1-1-1 Renaissance

-The art-historical period (14th to 16th century) of cultural revival and rediscovery of the ideals of Ancient Greece and Rome - based on the political development towards individual freedom and the birth of civil society

- independent development influenced by classical antiquity (the rational component) - contact with the rational achievements of the Arab-Islamic world during the Crusades - cities have political advantages because of the conflict between the Pope and the Emperor (Kaiser) - autonomy of urban families that own large tracts of land.<sup>5</sup>

- **Components of urban design in the Renaissance period**

- The straight main street - the grid-iron district (history's oldest urban form regulator) - enclosed space (squares)

###### 2-1-1-2 The Baroque

-Art-historical movement (1575-1770), dominant during the political periods of- the Counter-Reformation and - Absolutism- the Counter-Reformation and -Absolutism?

###### 2-1-1-3 Absolutism

- Form of government defined by an absolute ruler without the participation of corporative institutions in the 17th and 18th century (the Age of Absolutism – 1646- 1789) - Absolutism is served artistically by the predominant forms and means of expression of the Baroque period - process of nationalization: - establishment of regular armies - incorporation of the church into the political system - mercantile economic system- Neuf-Brisach - Nancy – medieval nucleus and Ville-Nerve.<sup>5</sup>

## **Development tendencies from the Renaissance to the Baroque**

The bourgeois culture of the Renaissance creates a geometric urban shape and expresses the idea of a unified urban form - the elements of the urban shape are equal parts of one entity (primus inter pares).

The autonomy of the Renaissance City declines in the period of the Counter- Reformation due to the power of the Church - in the Baroque period the upper classes create urban ensembles to demonstrate their high-ranking social status and stress their uniqueness - the Baroque urban design ideas are enforced by the restriction of the individual artistic freedom - Baroque urbanism is an expression of spectacle and ceremony (the city as a synthesis of the arts).

- The principals of Renaissance urban planning, architectural design and aesthetic theory are directed by identical ideas: - discipline and order, in contrast to the relative irregularity of medieval space - compositional balance - emphasis was placed on the horizontal instead of the vertical - permanence - Baroque urban design is the result of the centralized church and autocratic power - hierarchy of meanings - definite sense of spatial direction.<sup>5</sup>

## 2-2 Characteristics of open spaces <sup>(1)</sup>

### 2-2-1 Social

- Mix of activities and land uses
- Shared rights-of-way for the users and services
- Safety, security and comfort of movement
- Convenient access to goods and services-
- Forms and materials beautifully composed
- Places to interact with fellow citizens
- View the street in easy way
- Make the inside uses visible

(Figure 2-6)<sup>1</sup>



### Social

- View the street.
- Make the inside uses visible

(Figure 2-7)



### Social

- Public places are for gathering, celebration and just sitting and contribute.<sup>1</sup>  
(Figure 2-8)



**Social**

- Beautiful public places encourage creativity, invite use, allow for artistic and personnel expression to the comfort and character of a community<sup>1</sup>.  
(Figure 2-9)



**Social**

- Parking (Figure 2-10) in its place in a systematic and arranged way<sup>1</sup>.
- Trees and parking spaces can be used as a buffer between traffic and sidewalk  
(Figure 2-10)



**Social**

### 2-2-2 Economical

Safe, desirable and healthy places to live<sup>1</sup>

(Figure 2-11)



**Economical**

### 2-2-3 Environmental

#### 2-2-3-a Natural

- Provide weather protection<sup>1</sup>

(Figure 2-12)



**Natural**

### 2-2-3-b Manmade.

Landform, landscape, landmark, (Figure 2-13) focal point and trees are significant elements. They provide shade, color, and texture and delight while they celebrate seasons, absorb pollutants and calm traffic. They can be landmarks and distinguish the public open spaces<sup>1</sup>.

(Figure 2-13)



### Man made.

### 2-2-4 Aesthetic:

#### 2-2-4-1 Human Scale

Human scale (Figure 2-14) can be defined as the proportional relationship of the physical environment (buildings, trees, parking lots, streets, etc.) to human dimensions.<sup>1</sup>

(Figure 2-14)<sup>1</sup>



### Human Scale

### **2-2-4-2 Massing:**

The scale of a building in relation to the:

Arrangement, volume and shape of a building or group of buildings in relation to other buildings and spaces • the size of parts of a building and its details, particularly in relation to the size of a person • the impact on views, vistas and skylines

(Figure 2-15)



**Massing**

### **2-2-4-3 Scale**

Scale (Figure 2-15) is the relationship of a building in terms of size, height, bulk, intensity and aesthetics to its surroundings.

(Figure 2-16)



**Scale**



**2-2-4-4 Articulation**

Articulation (Figure 2-17) refers to the division of a building into meaningful parts. Elements of articulation include treatment to porches, balconies, doors, windows, roofs, materials and other architectural details.

(Figure 2-17)



**Articulation**

**2-2-4-5 Infill Development**

On long-time vacant lots or on pieces of land with dilapidated buildings, or can involve changing the land use of a property from a less to a more intensive one.

(Figure 2-18)



**Infill Development**

**2-2-4-6 Setbacks**

Setback (Figure 2-19) includes the front yard, right of way line and planting strip.

(Figure 2-19)



**Setbacks**

#### 2-2-4-7 Public spaces between and defined by buildings

(Figure 2-20)



**Setbacks**

#### 2-2-4-8 Interior activities exposed to the outside

#### 2-2-4-9 Integration of nature and landscape into the city

#### 2-2-4-10 appreciating the context<sup>(6)</sup>

- Place.
- Natural resource.
- Connections.
- Feasibility.
- Vision.

#### 2-2-4-11 The city image and its elements:<sup>(7)</sup>

There seems to be a public image of any given city which is the overlap of many individual images. Or perhaps there is a series of public images each held by some significant number of citizens.

Such group images are necessary if an individual is to operate successfully within this environment and to cooperate with his fellows.

Each individual picture is unique, with some content that is rarely or never communicated, yet it approximates the public image, which in different environments is more or less compelling, more or less embracing. The contents of the city images so far studied, which are preferable to physical form, can conveniently be classified into five types of elements:

- Paths.
- Edges.
- Districts.
- Nodes.
- Land marks
- **2-3 Creating the urban structure:**<sup>(6)</sup>
- Density, facilities and form.
- Landscape.
- Landmarks, vistas and focal points.
- Mixing uses.
- Blocks.
- **2-4 What is good urban design, and how do perceptions of urban design differ good urban design include:**<sup>(8)</sup>
- Demonstrates design excellence in urban development and architecture.
- Distributes benefits widely in the population.
- Produces environmental benefits.
- Responds to local features and needs.
- Is relevant to the contemporary world.
- leaves open the possibility for continuing adaptation and change
- Forges connections with the past.

## **2-5 Open Space:**

### **2-5-1 Introduction:**

Open spaces are lands specified for various social and recreation activities. That are represented in public squares, trees in front of houses and inside them, courtyards with in houses, private gardens, play grounds, parks and car parking lots. Their purpose, in addition to the above-mentioned role, is to beautify the town or city and preservation of the environment.

Developers are more willing to dedicate land and negotiate design alternatives. They also need to establish a strong plan of action that balances their preservation desires with the need for economic development.<sup>9</sup>

### **2-5-2 Definition of open space:**

Open spaces mean any piece of land, that, has the potential in the future to be set aside primarily for recreation, nature conservation and passive outdoor enjoyment. Includes parks, reserves, gardens, larger urban and civic spaces and forecourts

### **2-5-3 Open Space Functions and Benefits:**

Open space is one of the defining features that establish our city's character, sense of place and quality of life. The balance that urban open space gives to the more intense use of land in cities is needed to support diversity in an urban context and to contribute to the environmental health of a city. Along with such elements as natural geography, transportation, population demographics, density and distribution of land uses; the quality, quantity and type of open space affect the safety and well-being.

Open space provides part of the physical, environmental, visual and social framework for the city.

This policy document focuses on public open space; primarily that portion which is, or expected to be, within the Parks inventory, including sites for recreation facility development. This is the portion of public space for which Parks is primarily responsible and over which it has the greatest degree of influence.

Open space systems include natural environment parks, city-wide and neighborhood parks, pathways, linear parks, school sites, tot lots, built green spaces, and more.

The Open Space Plan will recognize the significant role of privately and institutionally owned open space and, in particular, the opportunities for partnerships and new ways of doing business that these forms of ownership offer.<sup>10</sup>

## **2-5-4 Purpose, principles and aims of the Open Space Strategy:<sup>(9)</sup>**

The purpose of the Open Space Strategy is to provide a strategic direction for the future planning, provision design and management of open space in the City.

The Open Space Strategy has developed the following principles and aims that are applied throughout the Strategy:

- **Equitable:**

Located within easy walking distance of community.

- **Accessible:**

Designed to be easy accessible for people of all ages, abilities, health, gender and cultural background.

- **Adaptable:**

Able to be added to and change over time to adapt to change recreational, social and environmental conditions.

- **Networked:**

A system of spaces that in combination meet the recreational environmental and social needs.

- **Diverse:**

Providing a diversity of character and sizes of open space to maximize accessibility to the community and contribute to sustainability

- **Sustainable:**

Maximize opportunities to mitigate climate change, sustainable design and management practices and meet improved ecological outcomes where feasible.

## 2-5-5 Open Space Typology:

**Table No. (1) Open Space Typology**

<b>Typology</b>	<b>Types</b>	<b>Suggested Frontage On At Least:</b>
Streets	-residential streets - commercial streets - Civic streets boulevards	
Square	-civic square/plaza/place - church square - market square -collegiate square	1 street
park/green corridor/path	-gardens -cemeteries -ornamental park	<b>0 street</b> - <b>1 street</b>
linear system/ green corridor/ path	-paths -bike ways -trails -right of ways	
outdoor sport and recreation facility	-tot lots -play grounds -sports field -school sites -golf courses -skate board parks	- 0street
camp ground and picnic area	-camping area -picnic and day use area	
natural/ semi natural green space	-wood land -grass lands -wet lands -canals -open and running water -ecological reserve	

(11) Be very A. Sandalak and Francisco G. AlanizeUribe, open space typology as frame.

## 2-5-6: Park Types and Descriptions.

**Table No. (2) Park Types and Descriptions**

Classification	General Description	Location Criteria	Size Criteria
Mini-park	Addresses limited and/or unique recreational needs	Less than a ¼ mile distance in residential setting.	Distance in residential setting. Between 2,500 sq. ft. and one acre in size.
Neighborhood Park	Serves as the recreational and social focus of the neighborhood. Focus is on informal active and passive recreation.	¼ to ½ mile distance and uninterrupted by non-residential roads and other physical barriers	5 acres is considered minimum size. 5 to 10 acres is optimal.
School Park	combining parks with school sites can fulfill the space requirements for other classes of park, such as neighborhood, community, sports complex, and special use	Determined by location of school district property	Variable – depends on function
Community Park	Serves broader purpose than neighborhood park.	Determined by the quality and suitability of the site. Usually serves two or more neighborhoods and ½ to 3-mile distance	Usually between 30 and 50 acres.
Large Urban Park	Serves broader purpose than community parks	Determined by quality and suitability of site	Usually a minimum of 50 acres, with 75 or more acres being optimal
Sports complex	Consolidated site catering for organized recreational activities consists of sporting fields and complexes	Strategically located, community-wide facilities	Determined by projected demand. Usually a minimum of 25 acres, with 40 to 80 acres being optimal.
Natural Resource Area	Lands set aside for preservation of significant natural resources, remnant landscapes, open space, and visual aesthetics/ buffering.	Resource availability and opportunity	variable
Special Use	Covers a broad range of parks and recreation facilities oriented toward single-purpose use	Variable, depending upon specific need/use	variable
Greenways	Effectively tie park system components together to form a continuous park environment.	Resource availability and opportunity	Variable
Private Park/Recreation Facility	Private Park/Recreation Facility	Variable – dependent on specific use <sup>12</sup>	Variable.

(12) Juli Wilkerson, Planning for Parks, Recreation, and Open Space in Your Community, February 2005,

## **2-5-7 Parks should be planned and designed to achieve the following specific objectives:**

### **2-5-7-1 Community Needs and Cultural Values**

#### **2-5-7-2 Access and Circulation**

- access to and within the park should be safe and convenient for all visitors;
- provide a hierarchy of pedestrian and bicycle paths within the park and, where appropriate, links to other components of the public open space system;
- ensure vehicular access does not conflict with non-vehicular circulation or impact on the open space values;
- provide entry nodes that highlight safe access points and provide path connections to major activity spaces and facilities;
- Provide features, including signs, to help orientate park visitors and promote easy access to facilities and other components of the public open space system.

#### **2-5-7-3 Character and Visual Amenity:**

- enhance the area's local identity by developing a park that contributes to local landscape character, visual amenity and a sense of place;
- protect and enhance significant views and vistas;
- screen areas of poor visual quality;
- capitalize on significant landmarks such as old figs, rocky outcrops and escarpments;
- Ensure park embellishments, future and facilities contribute to high visual quality and have consistent character.

#### **2-5-7-4 Safety and User Comfort:**

- Maximize visitor safety and minimize vandalism and unintended use. This includes incorporating Crime Prevention Through Environmental Design (CPTED) principles, such as the facilitation of casual community surveillance through layout and design;
- identify features that may provide potential hazards and remove or manage through landscape treatments;
- separate active (e.g. ball games) and passive (eg. picnic node) recreation areas;
- Maximize natural shade, particularly in high use areas and along paths.

#### **2-5-7-5 Natural Values:**

- protect and enhance the site's natural (biodiversity) values and features;
- Protect and enhance potential ecological corridors, eg. along waterways;
- retain and enhance significant areas of local native vegetation;
- Consider fire management needs in conjunction with the maintenance of natural values.

#### **2-5-7-6 Other Design Considerations:**

- minimize the impact of storm water on the use and maintenance of park facilities and activity spaces;
- The level of maintenance required and type of facilities should reflect the Park Type.

### **2-5-8 Value of open space**

Values of open space include the trees and a place to relax and unwind, a place for children to play and to escape the built environment. The quality of the facilities and maintenance of open space is



appreciated by the community, which is reflected in the open space survey results undertaken for this Strategy.

Open space is an essential part of the future planning for our municipality, to ensure we retain and improve the sense of place, community health and wellbeing and natural character and values where feasible.<sup>9</sup>

## **2-5-9 Data Used in the public open space rate calculation:<sup>(9)</sup>**

### **2-5-9-1 Estimate of the land area to redevelop.**

An estimate of the land area likely to be redeveloped due to forecast population growth. The figure used is based on the number of new dwellings forecast to the suburb level (.id forecasts). The average land area per additional forecast dwelling was supplied by Council's planning staff based on historical data and anticipated densities in higher density locations and lower densities in the balance of suburb areas.

### **2-5-9-2 Estimate of the land value.**

An average land value 'per square meter' was calculated for different commercial and residential areas. These figures are based on the unimproved site value as this is the basis for a public open space contribution levy under the Subdivision Act.

### **2-5-9-3 estimated value of land area to redevelop.**

This figure was calculated by multiplying the 'Estimate of the land area to redevelop' by the 'per square meter' value supplied for the relevant location.

### **2-5-9-4 Value of open space projects allocated to new population.**

The Strategy opinions of cost were calculated based on projects contained in the Open Space Strategy. They include the dollar value to obtain land and develop new open space and capital works improvements in existing open space.

Where the need for new open space is identified in the Open Space Strategy, land values were calculated using average 'per square meter' land values for the relevant location. The average proposed size of the new open space and the average land value of the location determined the total dollar value attributed to the project.( City of Glen Eire Open Space Strategy: Prepared by Environment & Land Management Pty Ltd in association with Thompson Beryl Landscape Design Pty Ltd, March 2014).

## **2-6 Open Space Preservation Objectives <sup>(13)</sup>**

2-6-1 Provide sites to protect surface and subsurface water resources - should be the backbone of the open space plan. Protect the water's edge for public access as well as to protect water quality.

2-6-2 Add to existing committed open space - i.e. fill in windows of existing municipal, state or land trust holdings.

2-6-3 Assemble open corridors or greenbelts as opposed to scattered parcels. May be linkages to existing open space or connecting nodes of development, trails, wildlife corridors or riparian buffers.

2-6-4 Protect critical or threatened habitats with emphasis on those areas identified in Connecticut's Natural Diversity Database and Endangered Species List.

2-6-5- Protect ground water within existing or potential public drinking water supply aquifers. Consider both stratified drift deposits and bedrock aquifers.

2-6-6 Protect natural drainage ways.

2-6-7 Protect lands of cultural importance including archeological and historical sites.

2-6-8 Provide sites for active and passive recreation. Requirements will depend upon population and recreation standards.

2-6-9 Protect the municipality's unique and significant natural features including wetlands, floodplains, prime agricultural soils, scenic vistas, trap rock ridges, shorelines, and/or tidal marshes.

2-6-10 Preserve farmlands and productive forestland.

2-6-11 Preserve areas that shape community design and character - i.e. plazas, buffer strips, landscaped yards, street trees and areas visible from roads, sidewalks and community gateways.

2-6-12 Protect steep slopes to control soil erosion and water runoff as well as maintaining scenic views of and from areas such as bluffs, ridges, mountains, etc...

2-6-13 Combine regulatory and land acquisition measures to achieve open space objectives.

2-6-14 Include areas identified as worthy of preservation in subdivision and zoning regulations so applicants know up front what lands the community wishes to preserve.

2-6-15 Provide incentives including clustering, density bonuses, creative design and preferential property taxes to preserve meaningful open space within private development.

2-6-16 Encourage site development sensitive to the areas natural characteristics.

2-6-17 Encourage growth in areas capable of supporting it while at the same time preserving areas unsuitable for development.

## **2-7 Balanced Preservation and Growth<sup>(13)</sup>**

A general goal for those involved in land use decision-making should be to coordinate conservation and growth to insure that each area preserves its unique character and sense of place by providing for sustainable growth and prudent use of scarce natural resources. To achieve this goal some basic policies should be adopted:

2-7-1 New development must be designed and managed to minimize the consumption of natural resources.

2-7-2 Open spaces should be accessible and utilized.

2-7-3 High-density development should be built adjacent to our highways and mass transit lines to provide access to jobs, utilities, transportation and services.

2-7-4 Lower density development should be placed on sites that are capable of supporting on-site utilities and designed in such a way as to preserve key natural resources.

2-7-5 New development should respect the site's natural features, utilize natural drainage patterns and keep site disturbance to a minimum.

2-7-6 Wetlands and riparian corridors should be protected to offset the adverse impacts of development on water resources.

## 2-8 Criteria for public open space land March 1998

Table No. (3)

Criteria	Description
Accessibility	Physical access including the inherent topography, location on natural ground, ability to make the site safe and accessible to people with limited mobility or with a disability (Note – refer also to Transport, Visibility, Condition and Location in this list of Criteria for other access related issues).
Adjoining land use	The influence of adjoining land use on the recreational, ecological, social and cultural value of the open space. This includes consideration of existing and future planned land use and associated urban densities, built form and height.
Amenity	Visual and passive amenity values relate to the influence open space has on the live ability of neighborhoods, providing visual relief from built form, the break open space provides from noise levels associated with traffic and other urban land use activities and adequate levels of sunlight (a minimum of 3 hours of direct sunlight between 9am and 3pm during mid-winter and at least 5 hours of direct sunlight between 9am and 3pm on September 22).
Climate change mitigation	Ability for the site to have long-lived broad spreading canopy trees planted and space to become fully established without encroachment into their canopy. Ability for the site to incorporate sustainable water supply and reuse and 25socialize moisture retention to allow passive cooling of the local microclimate including areas for long-wave radiant cooling at night. Ability for the site to remain as useable and functional open space in the context of sea level rise and larger storm events which are likely to increase in the future.
Condition	The existing physical condition of the land is to be suitable for use as public open space including that there are no inherent issues such as contamination and significant financial or safety implications if the land becomes public open space.
Ecological	Includes the site's existing biodiversity values and the potential to contribute to the protection and enhancement of these values along with a site's contribution to existing or future ecological diversity.
Equity	Community including residents and workers should have reasonable access to public open space.
Financial	The costs in obtaining and improving the land as open space, along with the costs associated with the ongoing maintenance and management of it.
Heritage character	Indigenous and non-Indigenous cultural heritage and historical values that could be enhanced and protected in the open space. These values will influence the future use and design and management of the open space.
Landscape character	Its contribution to the character and attractiveness of the neighborhood.
Location/linkages	The site's contribution to the wider open space network including forming open space corridor links. This includes consideration of the other strategic planning projects in the municipality including linear open space corridors, and links and connections to improve accessibility into existing or proposed future open space.
Ongoing maintenance and management	The ability to re-zone the land for open space purposes, and to effectively maintain and manage the land as open space.
Ownership	Where the land is already in public ownership, potential for conversion to open space should be considered, where it can successfully be rezoned for this purpose. Conversion of public land is preferred where it eliminates the need to purchase land for public open space and this method will likely be used in a range of areas across the municipality as redevelopment progresses. Where land is privately owned, land can be acquired through open space contributions, generally at the time a site is redeveloped. Private land acquisition may be needed in some locations to create a functional open space of the size and configuration required for its intended role.
Recreation	The potential for the site to accommodate a range of structured sport, unstructured recreation and informal uses. These can include field sports, play, walking, jogging, cycling, exercising, informal ball games, 25socializing, picnicking, sitting and dog walking. Services
Services/easements	Extent of other services and easements that would affect the development and use of the land as open space including roadways, overhead structures, water supply, power supply, flood mitigation and drainage.
Size	The minimum size for the site to meet its intended purpose, on its own or in combination with adjoining land. Refer to minimum size parcels for each type of open space as follows: <ul style="list-style-type: none"> <li>• Municipal open space, generally a minimum of 3 ha, subject to the proposed municipal recreation facility located in it.</li> <li>• Neighborhood open space, minimum of 1 ha.</li> <li>• Local open space, minimum 0.26 ha (up to 0.99 ha).</li> <li>• Small Local open space, minimum 0.05 ha (up to 0.25 ha), with a minimum width of 20 m in at least one direction.</li> <li>• Small Local Link space, with a minimum width of 5 m.</li> </ul>
Transport	The range of transport options for residents to easily access the site including proximity to public transport, linear shared trails, major roads and the street network, relevant to the size and anticipated catchment for the proposed open space.
Visibility	The site's visual prominence to maximize its use and contribution to the broader community. Generally, land is preferred which has at least two access points and local roads to at least two sides and is provided on natural ground.

(9) Environment & Land Management Pty Ltd in association with Thompson Berrill Landscape Design Pty Ltd, City of Glen Eire Open Space Strategy, March 2014

## **2-9 Strategy components supporting public open space contributions:**

The Open Space Strategy supports the use of public open space contributions to fund additions and improvements to the open space network in the following ways:

2-9-1 The Open Space Strategy is based on analysis of the population change anticipated in the City over the life of the Strategy (intensification of residential and non-residential development), including the size, distribution and characteristics of this population. This is linked to well established urban planning framework and policies as set out and reinforcement of this framework through recent residential rezoning. The forecast residential population change.

2-9-2 The location, distribution, standard and size of existing open space and the facilities offered in them has been considered in terms of existing and new populations.

2-9-3 The Open Space Strategy provides a coasted program to add open space (including capital works development) to deliver the distribution of open space adopted in the Strategy, and to upgrade existing areas of open space. The Strategy program is broken down for each suburb within the municipality.

2-9-4 The implications of setting a rate on Council's housing policies and attracting development to preferred development sites or areas has been considered. An averaged municipal rate is used (policy neutral).

2-9-5 The Open Space Strategy provides a strategic framework for open space provision and its recommendations have been prepared to meet the needs of both the existing and future population. A proportion of the value or costs of all projects required to implement the Strategy recommendations will be met by open space contributions (where new open space or capital improvements will serve new population) and the remainder by other sources including Council revenue and conversion of Council land to open space where appropriate.

2-9-6 Public open space contributions cannot be levied to pay for historical open space deficiencies for people already living or working. The funds received must be spent on open space land purchase or capital works related to the needs of the new population on whose behalf they were collected. These limitations and requirements have been considered in preparing the Open Space Strategy.

2-9-7 There is opportunity for a financial contribution from development to open space at the time of subdivision. The contribution is levied at the time land or buildings are subdivided. The contribution levy rate is expressed as a percentage of unimproved land value.

2-9-8 The Open Space Strategy provides the basis for revising the current schedule of open space contribution rates in Clause 52.01 of the Glen Eire Planning Scheme. The Strategy identifies how open space contributions should be collected and spent, including where a land contribution may be sought from development.

2-9-9 Public open space contributions are an important funding source but the Open Space Strategy recognizes there are limitations and requirements in relation to their collection and the way they can be spent .

## 2-10 RELATED WORKS

Many studies have been conducted to improve urban design; this review will focus on major theme, which emerges repeatedly throughout the related work. This theme is open space be done to improve urban design. Open space as an essential component of motivation, this method will primarily focus on that Element to self-motivate.

“Some natural and non-natural elements, which possess great qualities to diminish the negative impacts of isolation in the urban habitats. Opportunities to increase the variability in the open space types should be embraced to enhance the ecological functioning.<sup>14</sup> However, recent studies outlined by HI Ming, Lau suggest a conclusion has been drawn that size of a park is not the major concern of park users but rather its facilities and design. It is believed that a network of connected small public urban open spaces (SPUOS) might serve the local community better due to their locations.<sup>14</sup>

Jon Ellet and Dry Matthew W. Rife in "There is a need to replace conventional urban Design for open space with some high level urban Design. Therefore, adding enhance the quality of life in city.”

“The study aims to investigate the characteristics and the types of open spaces in two cases from a developed and a developing country. It also aims to measure the possible impacts of land use change on the ecological quality of natural open space patches. Even though various conceptual and analytical approaches exist in measuring the ecological quality (Forman).<sup>15</sup>

Therefore, aims to study the design and functions of these SPUOS. It is also hoped that find out whether a network of connected small open spaces can compensate for a large urban park. After reviewing the history of urban parks it is believed that the multitude of SPUOS is the result of poor urban planning and imperfect urban renewal schemes during the early occupation. These SPUOS are usually around 1000 to 1500 m<sup>2</sup> large in size and can be abundantly found along adjacent streets. For the design of the SPUOS, benches are usually the only facility installed and the vegetation is of poor quality. The connectivity of SPUOS located within the study area in the You Tim Mongo District is investigated with the use of graph theory and connectivity indices. The result has shown that these SPUOS in the study area have a high degree of connectivity. They are further compared with a larger urban park located nearby. Based on the comparisons and other prior researches, a conclusion has been drawn that size of a park is not the major concern of park users but rather its facilities and design. It is believed that a network of connected SPUOS might serve the local

community better due to their locations. However, they should not be able to entirely replace large urban parks since they have fewer amenities provided. The SPUOS are found to have rather different functions to the society than what urban parks are commonly expected. Their environment and economic functions are constrained mainly by the poor design and the locations.

An interview with the representative of a non-government organization has been made to further understand their social functions. The interviewee believes that SPUOS now mainly act as social hubs and living rooms for senior citizens. This statement is then verified by the result of a prior survey and some other researches. This is due to the combination of aging population structure, exploding population growth, and expanding poverty gap. Lastly, The SPUGS can attract visitors of different age group from other far neighborhoods. Despite than fact that there is cultural difference and citizens from these two cities have different lifestyles, a better design of the pocket park might be the reason of why it becomes an attractive natural meeting point for all age-groups visitors. Based on all the investigations and findings, suggestions have been made to improve the quality of SPUOS.<sup>14</sup>

Jacobs judges Le Croupier's Radiant City as the most dramatic idea to apply anti-city planning to existing cities, not only planning a completely new physical environment but also a social utopia. Le Croupier's Radiant City was composed of huge skyscrapers in a park-like setting. Jacobs detects great similarities between Howard and Le Corbusier. By adapting Howard's ideas of the Garden City to a modernist metropolis of high-rises, Le Corbusier was able to accommodate much higher densities of people. His vertical Garden City was planned to house 1,200 inhabitants per acre. The skyscrapers of the core area would cover only 5 percent of the ground, leaving 95 percent for open space and parks. Jacobs conceives planning as a combination of the Garden City and the Radiant City, since highway planners, legislators, land use planners and parks and playground planners constantly use these two powerful visions as fixed points of reference (Jacobs, 1961).<sup>16</sup>

“Urban open spaces are invaluable assets in maintaining ecological health in a highly developed urban matrix. Unfortunately, habitat values and ecological quality of these areas are often challenged by consecutive urbanization. The assessment of changing structure and function of an urban open space system is crucial in maintaining livable cities. General characteristics and types of open spaces are investigated in two case studies- one from a developed and another from a developing country. Also, the possible impacts of urban landscape change on the ecological qualities of natural open space patches are explored by using a landscape structure indicator. Even though various conceptual and analytical approaches exist in measuring the ecological integrity of natural systems, this paper specifically deals with isolation issues. Because an isolated open space



system loses its ecological integrity, isolation index yields meaningful results for anticipating the possible threats generated by urban structure. Isolation trends of urban open spaces are displayed. Also, numbers yielded by the isolation index are presented. GIS seems to be an appropriate tool to evaluate the intricate attributes involved in the phenomenon. Black and white aerial photographs of the City of Phoenix, Arizona from 1978, 1988 and 1998 are utilized. Also, black and white aeriols of the City of Aydin, Turkey from 1977 and 1993 and aMikonos2002 image are used for the analysis in ArcGIS 8.3 environment. Comparison of two cases yields some eye-opening facts with regards to the planning and management of urban open spaces, and possible threats to the ecological viability of these precious areas in the future.<sup>14</sup>

## CHAPTER THREE

### CASE STUDY

#### 3-1 Population:

The demographic situation in Sudan (according to official reports):

- Sudan total population is 30326000 people and the growth rate is 2.6%.
- The proportion of women 100 women for every 101 men.
- Population density concentrated in the state of Khartoum with larger rate.
- Working power rate is higher than the rate of population growth.
- High unemployment rate of graduates.
- The low average of age and the short life (the majority of the population are young people).
- Khartoum's population from the total population of Sudan is  $30326000 \times 16.2\% = 4912812^{17}$ .

#### 3-1-a Number of men and women in Greater Khartoum and Omdurman.

Greater than 65-year-old men and women = 167036

Children less than 15 years' males and females = 2112509

- Inner city slums: 6,100 people per km<sup>2</sup>.

- Outer slums: 2,900 people per km<sup>2</sup>.

- Squatter settlements: 4,100 people per km<sup>2</sup> <sup>(9)</sup>

Population density of 162/per capita/km ---10102 per capita/square mile.

Estimation of 2012<sup>17</sup>

As the statistics indicate that the size of Khartoum doubles every 12 years

### 3-2-Natural environment:

#### 3-2- 1 Climate characteristics:

##### Monthly average during day hours in Khartoum

Table (4)

Month	January	February	March	April	May	June
Average during the day hours	10.2	10.5	10.1	10.7	10	9.24
Month	July	august	September	October	November	December
Average during the day hours	8.6	9.11	9.13	10.31	10.5	10.3

#### 3-2-1-a Temperature:

The temperature degree considered the most important element of climate. That depends on the division of climate in addition to great effect on its climate element, on the other hand like barometric pressure and rains.

The amount of Temperature degree rate in Khartoum for the period in 1961 to 1990 is about 39.9 and between 28 up to 31.

#### 3-2-1-b Relative humidity:

The annual rate of relative humidity through the study period in 1961 to 1990 amounts about 28.9% or between 21.1% and 34.6%

The monthly averages of relative humidity in Khartoum between 16.2% and 49.3%

The relative humidity rate increases than annual (rate during July, September, December months and declines in the rest of the year months according to the form 5 page 36

Relative humidity rate in Khartoum

#### 3-2-1-c Atmospheric pressure:

From the study of the monthly averages of air pressure in Khartoum for the period 1961-1990, it is clear that the overall rate of air pressure in Khartoum reached 964 billion ranged from 960 in the month of May for the years 1975, 1984 and 1985, and in January 1983 it was 871 billion.

### **3-2-1-d Wind:**

Wind in Khartoum for the period 1961 –1990 is about 9 miles per hour with arrange between one mile per hour in the month of December 1990 and 20 miles per hour in April 1961(Note there are some monthly averages which SMD could not recorded) the year 1961 was recorded the highest rate of the wind speed amounted to 6.67 miles per hour (Source: meteorology department.)

### **3-2-1-eRains:**

Khartoum is characterized by its rainfall fluctuation and the varying quantities from year to year and from month to month. Total amount of rain that fell for 30 years from 1961 to 1990 was about 4204 mm with an annual average 140.1 mm and ranges between 4-415 mm. Figure 4 shows the large variation in the monthly average of the amount of rainfall on Khartoum, where it does not rain in December and almost stopped in January, February and April, while the amount of rain increases during the autumn in the months of August and June and July and September, reaching 1885 mm, 1278 mm, 5.1 mm and 205 mm, respectively, followed by monthly less rates in May, October and November to be 154-mm, 124-mm and 22 mm respectively.<sup>18</sup>

### **3-2-2 Vegetation cover:**

Vegetation in Khartoum includes the annuals that make up 75% of the total vegetation cover in the region, and long –lived vegetation that make up 25%. Productivity of annuals vegetation is estimated with 35750 kg /acre /year dry weight (pasture and forage report 1991) under optimal conditions.

Harrison and Jackson in 1958 has done an inventory and classification of vegetation in the area to the Tortillas, *Crass folia* and *Minerva*, which are desert vegetation, and asserted that *A. tortillas* is the more prevalent species especially on sides where water collects. They have also indicated that *Minerva Crass folia* distributed with considerable quantities in the region. The *A. Radian* is spread locally in some of the sandy soil plateaus. *Whiteside* and *Tandy* and *B. aegyptiaca* trees in creeks and valleys with clay soil. While *A. Nunica* and *Caltrops* procure speed in intensive grazing areas. The acacia and talk trees are regarded as the most important prevail on the banks of the White and Blue Niles and the main Nile beside other trees such as *Tamari spa* and *Salix sp.*<sup>18</sup>

### **3-2-3 Geological formation for the state Khartoum:**

Khartoum is located in Khartoum basin, which is part of the Blue Nile Basin and consists of igneous metamorphic rocks that belong to the Mozambique Belt and clearly appear at the area of Sabaloga in north of Khartoum.

We can divide the capital region geological into:

- 1-Sand formed by the wind blow and superficial UN natural gravel.
- 2- Sedimentary plains which resulted of sediments.
- 3-Terrify volcanoes in the third geological period.
- 4- Nubian sand stone formation.
- 5- Basement of the fire work rocks.
- 6-basement comply with into metamorplased and igneous rocks.

### **3-2-4 the formation of soil surface in Khartoum divided into:**

- 1- Plain surfaces.
- 2- Clay plains.
- 3- Nile Terries.
- 2- Quell hub duly

### **3-2-5 Topography**

Khartoum is located at altitude of 382 meters (1253.28 feet) above sea level, on plain flat ground surface with a slight slope towards the River Nile, and there are scattered hills and protrusions of rock and sand dunes through it, giving the image a flat terrain with slight ripples, and also this natural landscape permeated by Nile layers and creeks notably Janga Creek in the area of Al-Oshara at west of White Nile that is steeper on the direction of Blue Nile at the east, so the creeks, which lies in the west mostly flowing in the Nile during the rainy season while we find lagoons located in the east irregularly flooding and most of them are only wide grove fail to reach the Nile, especially in the places covered by sand components. The Blue and White Nile constitute the most important natural phenomenon of Khartoum where they meet at the point of Confluence<sup>18</sup>.

### 3-3 Economic environment:

#### 3-3-1 Economic activity in Khartoum

Economic activity in Khartoum varies from agricultural to industrial and tourism. It is concentrated basically in the service sector where is a big number of inhabitants work in the government offices and private sector companies and banks.

Also, there is great section of capital of money invested in trade and some of them in pottery and brick industry.

#### 3-3-2 Family Monthly Income (in SD '000s), 1998

2-5-b Table (5)

Income	< 10	11-20	21 –30	31-40	41-50	51-60	61-80	81-100	>100
Family %	26.5	18.2	16.3	15.2	8.9	7.7	3.0	3.0	1.2

We find that income is small in a big number of families that is the greater the income, the smaller is the families

The income of most families is small

We find from Table No (5) .

That is the percentage of families earning 10,000 = 26.5%<sup>19</sup>.

Followed by families earning between 11000-20000 = 18.2%<sup>19</sup>.

Followed by families earning between 30-21 = 16.3%<sup>19</sup>.

Followed by families earning between 31000-40000 = 18.2%<sup>19</sup>.

Families earning between 41000-50000 = 8.9%<sup>19</sup>.

Families earning between 51000-60000 = 7.7%<sup>19</sup>.

Families earning between 61000-80000 = 3%<sup>19</sup>.

Families with income between 81000-100000 = 3%<sup>19</sup>.

Then families earning more than 100,000 = 1.2%<sup>19</sup>.

Means that families earning high rate are very few.<sup>19</sup>

### **3-4 Social environment:**

#### **3-4-a Average number of family**

The average number of the family members is about 6 persons<sup>20</sup>

#### **3-4-b Customs and traditions**

Sudanese family is a social unit, characterized by multiple habits and characteristics such as cooperation, tolerance, solidarity, extended social relations and the fair relations between generations<sup>21</sup>

#### **3-4-c Age of marriage:**

##### **3-4-c-1 Age of marriage for woman**

The best age of marriage to the woman is 16 to 25, then it lessens lightly till the 30 years

##### **3-4-c-2 Age of marriage for men**

Man enjoys the highest rate of fertility when he is twenty till thirty then fertility lessens till it almost ends in the age of seventy

Low fertility rate in urban areas 4.1 compared to 5.6 in rural areas, the average fertility is 5 children. Whenever the level of education decreased the number of children increased<sup>(1)</sup>

- Where the results of the survey estimates that 48% have never married, rates ranging respectively, 54.9% - 42.2% for males and females and the rate of married people between 42% and 47% for males and females respectively 43% of young people and 3.4% over 65 years.

This rate of young people and the elderly indicates a high rate of people who are still dependent on other for their living.<sup>(22)</sup>

### 3-5 Urban Environment:

#### 3-5-1 Streets in Khartoum:



The streets are considered as an essential component and a vital artery of the city and an important organizer and a compass for population and physical movement in the city. The road is not just a paved line built to service the car, but is used in:

1. Functional link between the parts of the city.
2. Spread networks of buildings whether in surface or need excavations (such as electricity, gas, water and telephones).
3. Provide a space to be exploited in the lightening and ventilation of buildings of the street.
4. Provide a place for beauty elements (Landscape)
5. Considered as an element of entertainment to users of cars and pedestrians as well, especially at gardens and parks.



### **3-5-1-a Types of streets in Khartoum**

#### **3-5-1-a-1 Ring roads**

Linking the three cities with bridges

#### **3-5-1-a-2 Main streets:**

Ranging from 30-60 m<sup>2</sup>

Linked with neighborhoods

Provide entrances and exits and openings next to housing

Designed on the basis of the traffic approach and in extension of lines of public utilities

#### **3-5-1-a-3 Local streets:**

Ranging from 10-12 m

Lines used in public utilities and represent an aesthetically element in construction and urban design.

Local streets types

- Loop streets
- Guide Sac <sup>(9)</sup>
- 

#### **3-5-1-a-4 Passages:**

Ranging from 6-8 m

Up to property

#### **3-5-1-a-5 Cross-roads:**

Street area ranges between 70-100m linking between the countries or state capitals

#### **3-5-1-a-6 Secondary streets:**

Aggregate streets that are the backbone of the neighboring residential preferably be designed in the form of a letter <sup>(23)</sup>.

### 3-5-2 Physical environment:

Construction system:

Bricks and mud constitute the building material for about 73 per cent of all residences, and for 82.5 per cent of peripheral residential areas most of the concrete buildings in the peripheries belong to those working abroad. And former residents of the middle zone or core who sold their houses land and moved outwards making use of land price differential. table (6) shows that about 90 per cent of buildings consist of aground floor only. However, there is a grow in trend for vertical expansion especially in the commercial part and the first and second class residential areas, and main roads.

**Table (6): Permanent Building Materials (%) 1998**

Materials	Core	Middle	Periphery	Total
Concrete	22	26.7	13	20.8
Bricks	37	42	38.2	38.3
Bricks & mud	5.7	5.7	11.3	6.2
Mud	22.8	13	35	30.2
Others	12.5	13	4.5	6.2

Through this study I found that the buildings are ranging in terms of construction from concrete buildings to buildings with bricks and cement and buildings of adobe and other materials.<sup>19</sup>

#### 1- Buildings concrete are found in:

- Middle 26.7%
- Core 22%
- Periphery 3%

#### 2-Buildings of bricks are found in:

- Middle 42%
- Periphery 38.2%
- Core 37%

#### 3-buildings of bricks and mud are found in:

- periphery 11.3%
- middle and core 5.7%

#### 4-buildings of mud are found in:

- Periphery35%
- Core 22.8%
- Middle13%

## 5- Buildings of others;

- core 12.5%
- middle 13%
- Periphery 4.5%

**Table (7): Number of Story's (%) 1998**

No. of floors	Core	Middle	Periphery	Total
Ground floors	88.3	82.2	95.0	89.0
Two floors	4.7	6.0	2.5	4.3
Three floors	4.0	8.0	1.4	4.5
Four	2.0	3.0	1.1	1.4
Over 4 floors	1.0	1.0	-----	0.3

### Structural density (in terms of number of floors):<sup>(19)</sup>

#### 1-buildings of single-Story:

- Periphery 95%
- Core 88.3%
- Middle 82.2%

#### 2-buildings of two-Story:

- Middle 6%
- Core 4.7%
- Periphery 2.5%

#### 3-buildings of three Story:

- Middle 8%
- Core 4%
- Periphery 1.4%

#### 4- Buildings of four Story:

- Middle 3%
- Core 2%
- Periphery 1.1%

#### 5-buildings over 4 floors:

- Core and middle 1%
- Periphery 0%

Through my study of open spaces, I found that there were spaces which has been violated completely for example Maiden Albostah in Omdurman, madam a grab Khartoum north-madam

Abu Gezer-Medan Alommam Almotahida-Medan abed AlmonemMohammed (in Khartoum), that has been converted to residential, commercial and area of social services. The other has been partially violated like Medan Alma lid,

**Table (8) Spatial Expansion of Greater Khartoum in km<sup>2</sup>, 1955-98**

Town	1955	1970	1980	1998
Khartoum	7.9	13.3	101.3	343.8
Omdurman	5.4	10.4	81.1	253.8
Khartoum North	4.5	6.3	46.0	204.9
Greater Khartoum	16.8	30.0	228.4	802.5

We find that the three cities are Khartoum, Omdurman and Khartoum North. In the years 1955 the area of Khartoum was 7.9 km<sup>2</sup> and in 1970 became a 13.3 km<sup>2</sup>, in 1980 became 101.3 km<sup>2</sup>, in 1998 became 343.8 km<sup>2</sup>. The area of Omdurman in 1955 was 5.4 km<sup>2</sup> and became in 1970 became a 10.4 km<sup>2</sup>, in 1980 became 81.1 km<sup>2</sup>, in 1998 became 253.8 km<sup>2</sup>. The area of Khartoum North in 1955 was 4.5 kkm<sup>2</sup> and in 1970 became 6.3 km<sup>2</sup>, in 1980 became 46 km<sup>2</sup>, in 1998 became 204.9 km<sup>2</sup>.

We find that space had been increased largely. This increase in area followed by a large increase in the population and therefore generates an urgent need in the light of this expansion for the spaces, squares, and recreation parks.

We should pay attention to work and add a lot of parks, squares and gardens to fulfill the role entrusted to them towards population.

Therefore, the situation should be addressed according to steady increase that is according to need to expansion.

Accordingly, in case of lack of interest to increase fields, parks and gardens, this leads to stress on the few number of them, therefore there is a big density of users of these spaces, constitutes a heavy burden on them and this leads to reduce the proportion of individual of recreational area.<sup>19</sup>

**Table (9)Chronological Expansion of Residence (%)**

<b>Period Core</b>	<b>Core</b>	<b>Middle</b>	<b>Periphery</b>	<b>Total</b>
Before 1940	15.1	5.6	-	5.1
1940-50	32.1	1.4	-	7.0
1951-60	9.4	1.3	5.3	4.7
1961-70	5.7	25.0	12.2	14.5
1971-80	9.4	29.2	28.2	24.6
1981-90	13.2	25.0	34.4	27.3
After 1990	15.1	19.8	19.8	16.8

We find that the expansion of the center and heart parties is increasing significantly despite the fact that the percentage is not fixed. We find that the proportion of expansion in the center of the city before 1940 was 15.1%. In 1940-1950 became 32.1%, between 1951 to 1960 became 9.4%, between 1961 to 1970 became 5.7%, between 1971 to 1980 became 9.4%, between 1981-1990 became 13.2 % after 1990 it had become 15.1%.

Also for the expansion of the center of the city before 1940 was 5.6% and in 1940-1950 became 1.4%, from 1951 to 1960 became 1.3%, from 1961 to 1970 became 25%, from 1971-1980 became 29.2%, from 1981 to 1990 became 25% and after 1990 it had become 19.8%.

The expansion of the city on outskirts from 1951 - 1960 was 5.3% and in the years from 1961 to 1970 became 12.2%, in 1971-1980 it became 28%, from 1980 to 1990 became 34.4% and after 1990 it had become 19.8%.

Accordingly, we note that there are significant increases as we move from one year to the following year and significantly in the outskirts of the city, the middle and then the center. Therefore, we should interest in this expansion and these increases to be followed by taking care and increase in squares and parks.<sup>19</sup>

**Table (10) Classification of Residential Area (%) 1989**

<b>Class</b>	<b>Khartoum</b>	<b>Omdurman</b>	<b>Chart. North</b>	<b>Total</b>
1st. & 2nd	4	1.8	0.2	6
Third	17	12	40	40
Newly planned	2	1	7	10
Squatter	10	18	16	44
Total	33	32.8	34.2	100

Percentage of the number of the first and second floors, ranging in varying proportions in Khartoum, the percentage of Khartoum is 4%, in Omdurman is 1.8% and in Khartoum North is 2% that means the percentage of the first and second floors is greater in Khartoum, followed by Khartoum North and then Omdurman. In of number of three-storey buildings, we find that the percentage is greater in

Khartoum North then Khartoum followed by Omdurman by varying percentages of 40%, 17% and 12% respectively.

The greatest percentages of new schemes in Khartoum North are ranging from 7% followed by Khartoum 2% then Omdurman 1%.

In the skirts, we find that the greatest percentage is in Omdurman, where the percentage is 18%, followed by Khartoum North 16% then Khartoum 15%

We find that percentage of Khartoum North is the greatest percentage 34.2% in terms of classification of residential areas followed by Khartoum 33% and then Omdurman 32.8%.<sup>19</sup>.

### **3-3-3 Laws effect on open spaces**

Act of Urban Planning and Lands Arrangement for the year 1994, paragraph 11 / d

Approve of Change of Purpose of Spaces and Public Squares for any Purpose if Necessity Ruled<sup>24</sup>.

## CHAPTER FOUR

### 4- Open Spaces:

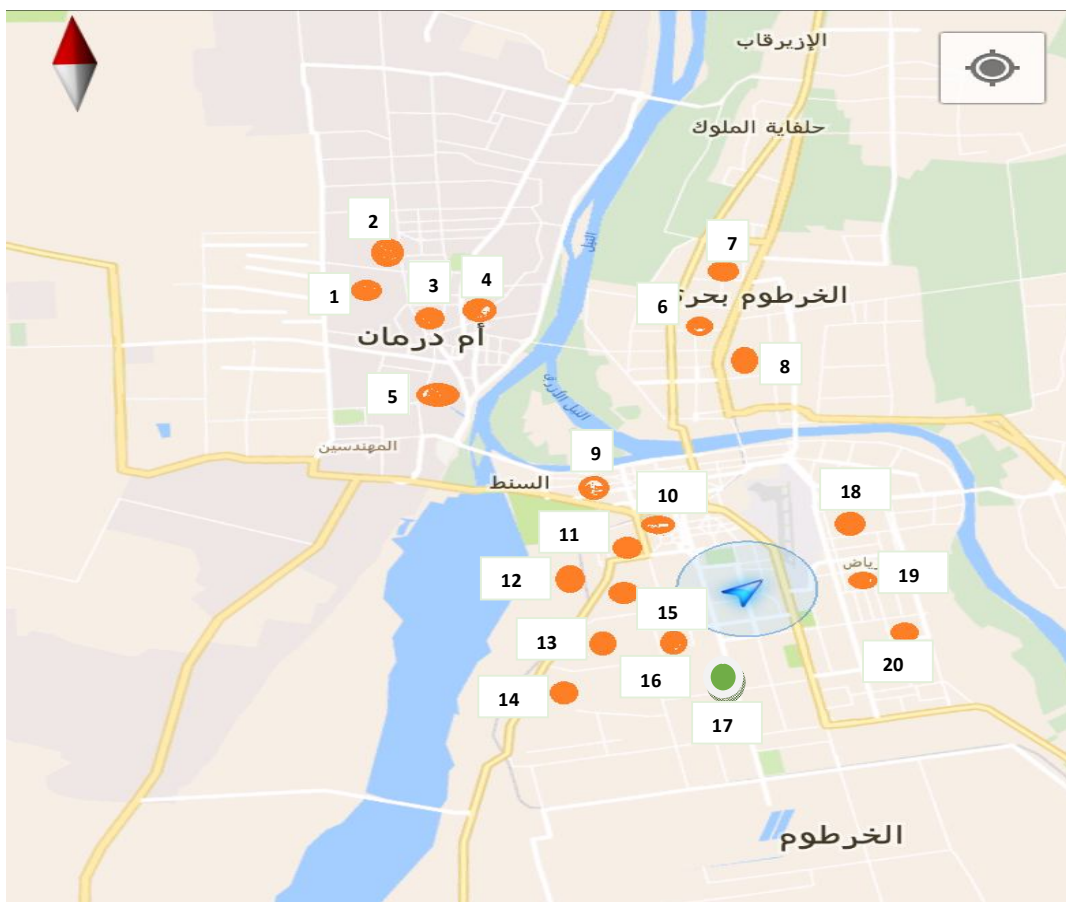
#### 4-1 Location:

Khartoum state borders extend between latitude 10 15 and 30 16 north and between longitude 35 31 and 25 34 east –

- Area about 20,970 km (fodder and pastures report in 1991).

Source (1989) Lehoueror.

Figure (4-1)



1. Medan Alazhari (Omdurman) total area=8,687m<sup>2</sup>.
2. MontazahAlbohira (ommdroman) total area=41,000m<sup>2</sup>
3. Hadiaga ommroman Alkobra (ommdroman)total area=81,567.5m<sup>2</sup>
4. Medan Al-Khalifa (ommdroman) total area=53,650m<sup>2</sup>
5. Medan Albostah (ommdroman) total area=4,522.5m<sup>2</sup>
6. Medan Alsaafi (Bahri) total area=24,663m<sup>2</sup>
7. HadiagaAbood (Bahri) total area=33,835.5
8. Medan Agrab (Bahri) total area=16,305m<sup>2</sup>



9. Medan AbouGinzeer (Khartoum) total area=4,430<sup>m<sup>2</sup></sup>
10. Medan Almoled (Khartoum) ganob total area=33,835<sup>m<sup>2</sup></sup>
11. AlshohadaPark (Khartoum) total area =24,663<sup>m<sup>2</sup></sup>
12. Medan Jackson (Khartoum) total area=36,761<sup>m<sup>2</sup></sup>
13. Medan AlommamAlmotahida (Khartoum) total area=27,393m<sup>2</sup>
14. AlsahaAlshabia (Khartoum) total area=15,120m<sup>2</sup>
15. AlsahaAlkhadra (Khartoum) total area=23,374m<sup>2</sup>
16. MedanAltiffl (Khartoum) total area=135,000m<sup>2</sup>
17. Medan Abdallmonam Mohammed (Khartoum) total area= 61,889m<sup>2</sup>
18. MontazahAlmogran (Khartoum) total area=39,582m<sup>2</sup>
19. HadiagaAlgorashi (Khartoum) total area=43,187m<sup>2</sup>
20. MontazahAlriyadh (Khartoum) total area=79,150m<sup>2</sup>

### **Classification of open spaces:**

- **Square** is the heart of the city, where an important part of its history and identity, represents a human and a vital gathering place of paramount importance. Square is considered an outlet, source of pride; title of progress and spaces dominated by social and cultural atmosphere reflects our heritage, our image and our brilliant appearance.

#### **- Parks:**

Parks are designed to be a green lung and a source of entertainment dedicated to rest and relaxation of people.

#### **- Garden:**

Is area of land which random plants or cultivated plants of various types of flowers to shrubs and long trees.

They are usually of coordinated shape and ready to accept people to any activity they like to practice in the outdoors. Whether for walks, sport or to sit under the shade of the trees for reading and contemplation in many public parks they establish sports venues, theaters, children's play areas, swimming pools, and man-made and natural lakes and in some of them make animal Zoo and the plants are usually protected in these parks. Parks have become an essential part contained in city planning when designing quarters of cities. This is because most city residents live in apartments and therefore there is a considerable need for urgent areas to spend the hours outside these apartments.

## 4-2 Description:

Figure (4-2)<sup>25</sup>



## MEDAN ABUGINZEER

### 1-Discussion:

-The ownership.

Sudan government

-The function

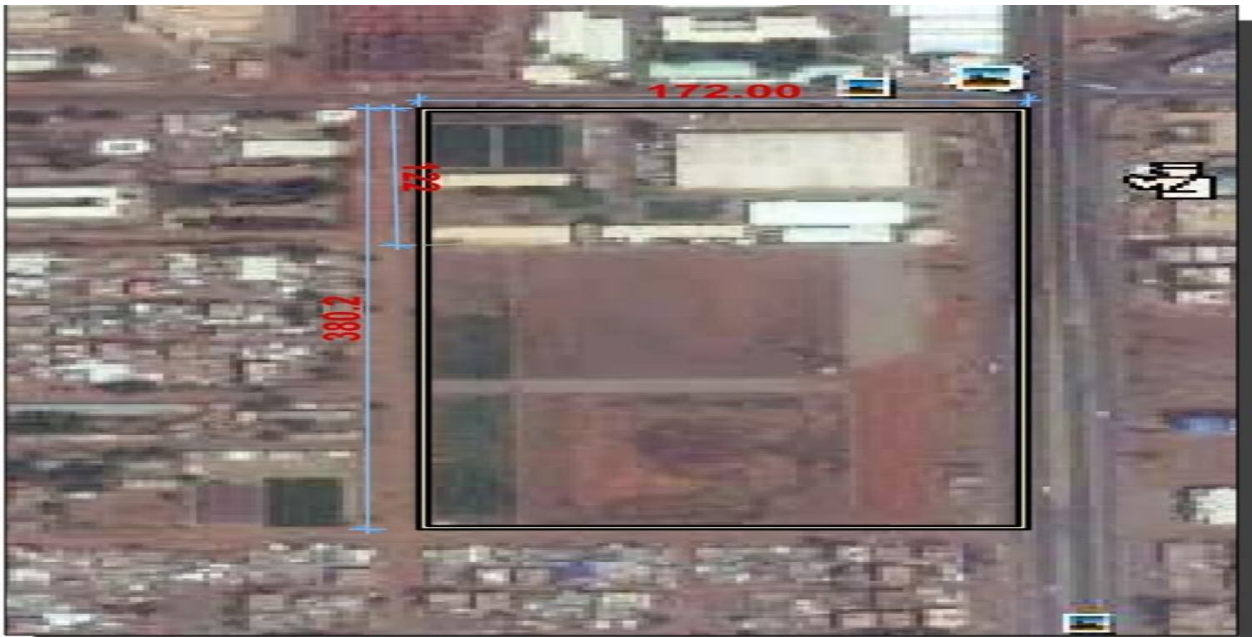
Was converted from a centre of trademark and park to an unknown use.

Total area = 4,430.8 m<sup>2</sup>.

### 2- Violation

The area was violated by 100%

Figure (4-3)<sup>25</sup>



MEDAN ALMOLED (KH)



1-



2-

### 1-Discussion:

- An area had been violated and converted to buildings of Medical Supplies Administration.
- There are many small squares of some grass.
- There are some kiosks to sell sweets on the main street - entrances are not well appointed to.

**Total area=33,835.5**

### 2- Violation

The area was violated by  $20.600\text{m}^2$ , 32%

Figure (4-4)<sup>25</sup>



MEDAN ALSAFIA (bahri)

**1- Discussion:**

The square had been converted to residential houses.

Total area=24,663m<sup>2</sup>

**2- Violation**

The area was violated by 100%

Figure (4-5)<sup>25</sup>



ALSHUHADA PARK (Khartoum)



1-



2-



4-

3-

### 1- Discussion:

- Accessible way is very difficult except few access
- The category of enclosure: semi- a closed type
- Entrances: clearly defined, the width is 3 meters and the entrance of iron pipes.
- Many of the spaces are of dust floor, and Green space is 3,261m<sup>2</sup> by 24%.
- Maintenance: No regular maintenance for a period of more than five years.
- Visits: the number of visitors is between 300-400 visitors (Thursday, Friday and Saturday).  
Regular visiting days, 150-200 visitors.

All visitors are students (master's and doctoral students and students of the equivalence examination and remote learning).

Percentage of visitors of South Sudan is 60%

time of visiting is from 8: 00 am to 6:00 pm.

**Total area=14,000m<sup>2</sup>**

**2- Violation = zero**

Figure (4-6)<sup>25</sup>



MEDAN JACKSON (Khartoum)

**1- Discussion:**

The field had been converted into an investment building.

Total area= 36,761.6 m<sup>2</sup>

**2- Violation**

The area was violated = 100%

Figure (4-7)<sup>25</sup>



HADIGA ABOOD (bahri)



1-



2-



3





4-

### 1- Discussion:

- There are 2 halls for occasions.
- There is a few trees
- Space which is violated is 20,600 m<sup>2</sup> by 61%.
- Entrances: clearly defined
- Green space is 10,319 m<sup>2</sup> by 30.5%.
- Parking for cars are dust floor
- There quintet and semester Squares.
- 8-Category of containment is open type.
- 9. Services are not found.

**Total area =33,835.5 m<sup>2</sup>**

### 2- Violation

The area was violated = 20.600m<sup>2</sup> (60.9%)

Figure (4-8)<sup>25</sup>



MEDAN ALAZHARI

### 1- Discussion:

- It is exploited in the vehicles mornings as an auction.
- in the evening periods also as an auction and a place for women vendors of food and tea.
- Sometimes, cultural activities are conducted in the square.

**total area=8,687**

### 2- Violation

The area was violated = zero

Figure (4-9)<sup>25</sup>



MEDAN ALOMMAM ALMOTAHIDA

**1- Discussion:**

The purpose had been changed to Al-Waha Mall.

Total area= 27,393 m<sup>2</sup>

**2- Violation**

The area was violated = 100%

Figure (4-10)<sup>25</sup>



MAGIC LAND (Omdurman)



1-



2-



3-



4-



5-



6-

### 1- Discussion:

- Renamed Magic Land.
  - Entrance: clearly defined
  - Many of the spaces are of dust floor.
  - Green space is 33952 m<sup>2</sup> by 42%
  - Parking is of dust floor
  - There is a hall for marriage parties from the western side with a separate entrance.
  - Shade trees are not enough, to make it easier to use the park during daylight hours.
  - Services are not available (benches for seating, water coolers, sanitary landfills, wastebaskets, fire extinguishers)
  - Visitors of families and students associations and gatherings.
- On Friday, Saturday and Thursday, the number of visitors is up to 3,000 visitors. In normal days, it is between 700 to 1,000 visitors in the evenings.
- There are sport field for football games, morning and night.

Entrance:

Width 12 meters divided to 2 entrances one for vehicles, of width of 3 meters and the other entrance to the public, width of 1 meter. The entrance is constructed of the buildings of brick and cement mortar and ceiling is of concrete.

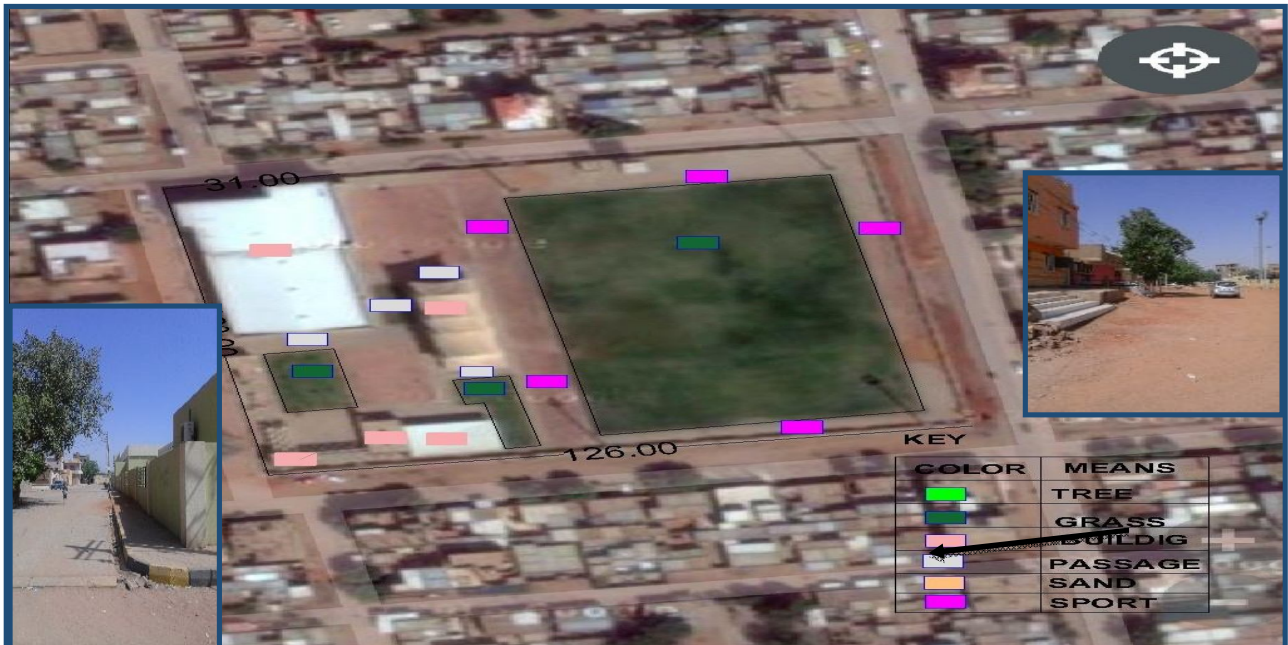
The entrance is common and is not characterized by prestige and distinctness

Total area= 81,567.5 m<sup>2</sup>

### 2- Violation

The area was violated was Partial

Figure (4-11)<sup>25</sup>



ALSAHA ALSHABIA(Khartoum)



**1- Discussion:**

After the change it had become an area of several courts (Basketball - Tennis - Football - Volleyball – Billiards -Gym).

Total area = 15,120 m<sup>2</sup>

**2- Violation**

The area was violated= 100%

Figure (4-12)<sup>25</sup>



ALSAHA AL KHADRA(Khartoum)



1-



2-



3-



4-



5-

### 1- Discussion:

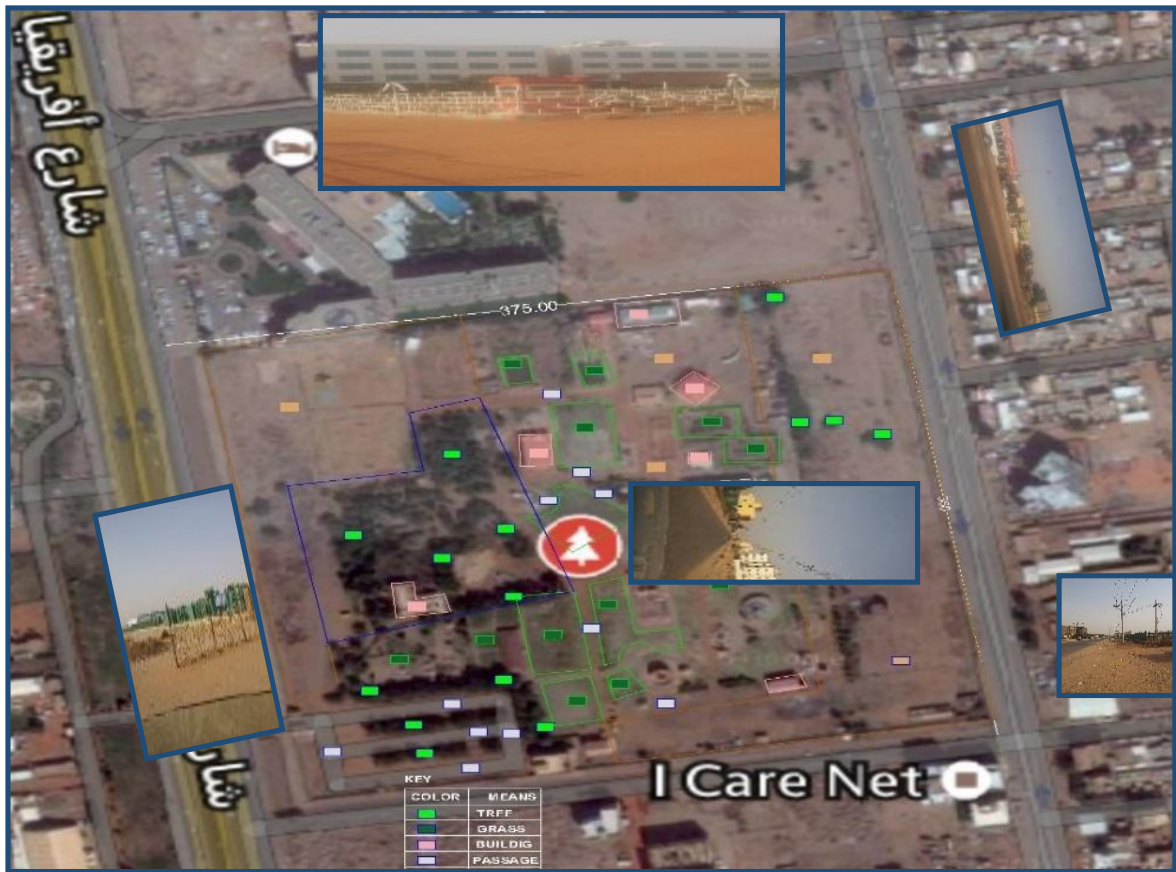
- We find that the proportion of shade trees in the green yard is weak (almost nonexistent) that which prevents the exploitation of official ceremonies and events
- There are some areas which are dust floor that leads to stir dust and high temperature, especially in the summer season.
- The proportion of enclosure for neighboring buildings: the area is an open space. This is a nice feature leads to move the air especially in the summer, but in winter, it is difficult to take advantage, especially regarding to children in the night hours.
- Entrance: clearly defined.
- There is a track for walking and running.
- Services are not found (places to dispose waste - waste baskets - water coolers - seats – firefighting equipment - sewage systems).
- There is a fountain in the center of the Green Yard.
- There is car parking which of dust floor.
- Enter to the Green Yard is by a ticket worth 7 SDG.
- Total area= 23,374 m<sup>2</sup>

### 2- Violation

- The area was violated was Partial



Figure (4-13)<sup>25</sup>



MADINAH ALTIFFL (Khartoum)



1-



2-



3-



4-



5-

### 1- Discussion:

- Entrance: clearly defined.
  - Dust floor area is 35,420 m<sup>2</sup> by 27%.
  - Greenery of turf and trees about 31, 224 m<sup>2</sup> by 24%.
  - Waste is burned inside the garden leading to the pollution of the environment within the garden.
  - Movement axes are dust floor needs a special management in the summer season, when the temperature rises and in the autumn directly deter the use of Children's City.
  - Services are not found (vehicles parking on dust ground - seats - water coolers - littering)
  - The number of visitors in regular days: Sunday - Monday – Wednesday is 400 visitors On Friday - Saturday - Thursday is 700 visitors.
- Visitors are from families and students societies.

Entrance:

Width 4 meters constructed of brick and mortar and cement and steel.

Entrance is simple and there are no any aesthetic aspects or attributes expressing our identity, culture and historical heritage.

**- Total area=135,000 m<sup>2</sup>**

### 2- Violation

- The area was violated was Partial

Figure (4-14)<sup>25</sup>



### MEDAN AGRAB (bahri)

#### 1- Discussion:

- The purpose of the square had been converted to residential houses.

- Total area= 16,305 m<sup>2</sup>

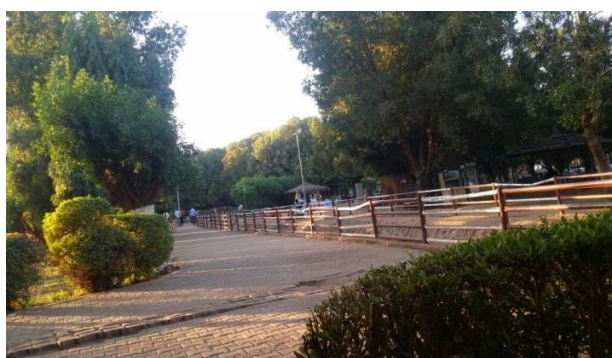
#### 2- Violation

- The area was violated= 100%

Figure (4-15)<sup>25</sup>



MONTAZH ALBOHIRA (OMMDROMAN)





2-

### 1- Discussion

- Entrance: clearly defined.

Built of zinc, iron, and width 2.5 meters. The entrance does not reflect beauty ,prestige and luxury. Green plant and trees about 32, 596 m<sup>2</sup> (79.5 %.)

- Category of enclosure Open.

- Services are not found (places to dispose waste - waste baskets - Water coolers - seats - fountains - cars parking + green space is 32596 m<sup>2</sup> ( 79.5%).

- Total area=41, 000 m<sup>2</sup>

### 2- Violation

- The area partially violated .

It was formerly called Al-Bohaira Square and was an outlet for residents of Al-Molasmian and Beitalmal quarters and anniversary of the birth of the Prophet Mohamed (Alma lid) had been on Al-Bohaira Square. Before that it had been in the Square of Caliph then the festival turned to the Caliph Square again.

Games for children:

1. waterwheel.
2. Birds of Paradise.
3. Orbit.
4. Chains

**Offices:**

There are five offices, including:

1. two offices of the administration.
2. Office of supervision.
3. Office of Security.
4. Office of electricity.

**Visitors:**

Morning periods: university students (studying and discussion of subjects) number of 300-400 students.

There are three visits a week for basic schools and high schools by 150 students for (studying and review with the school administration).

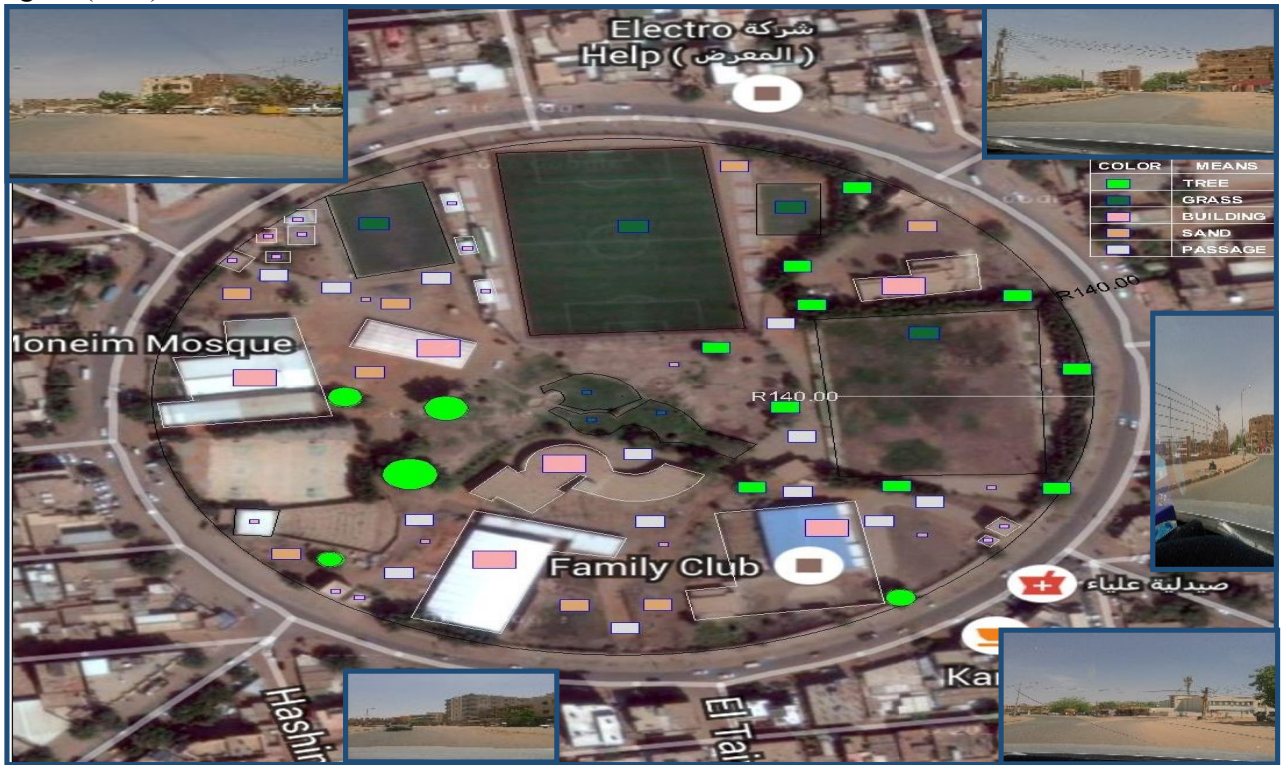
Evening periods: there are 1000-2000 visitors daily in normal days.

On Fridays, Saturdays and Thursdays the number reaches to 2400 visitors of students,

Families and sometimes charity organizations in autumn and winter.

There are 21 tea dealers in umbrellas.

Figure (4-16)<sup>25</sup>



FAMILY CLUB (MEDAN ABDELLMONEM M.)(Khartoum)



1-



2-



3-



4-



5-



6-

### 1- Discussion

- Entrance: clearly defined
- The proportion of green space is about 24% of the total area.
- Some spaces are dust floor need to be managed to avoid dust and temperature in the summer and avoid the mud in the fall.
- The proportion of buildings is big, about 51% of the total area.
- Proportion of enclosure is big; it is considered as closed type.
- Services are nearly not found (sewerage and drainage network - places to dispose waste - littering during the movement of visitors - seats - water Coolers - fire alarm.

Total area= 61,575.2 m<sup>2</sup>

### 2-Violation

- The area was violated was =31,889 m<sup>2</sup> (51.8 %)



Figure (4-17)<sup>25</sup>



MONTAZAH ALMOGRAN (Khartoum)



**1- Discussion:**

- Green space is 2200 m<sup>2</sup> (56.6%).
- Entrance is well defined.
- Buildings represent a big portion of the vacuum.
- Services are not found.
- The degree of enclosure is of open type.

Entrance:

width of entrance is 6 meters  
 it is of iron and pipes  
 it is traditional.

It should express the site and has to be of beauty and prestige and symbolic.

Total area= 39,582 m<sup>2</sup>

**2- Violation**

- The area was violated was Partial

Figure (4-18)<sup>25</sup>



MEDAN ALBOSTAH (OMMDORMAN)

**1- Discussion:**

The purpose was changed to commercial building.

Total area= 4,522.5m<sup>2</sup>

**2- Violation**

- The area was violated by rate of 100%.

Figure (4-19)<sup>25</sup>



MEDAN ALKHALIFA (OMMDROMAN)



### 1-Discussion:

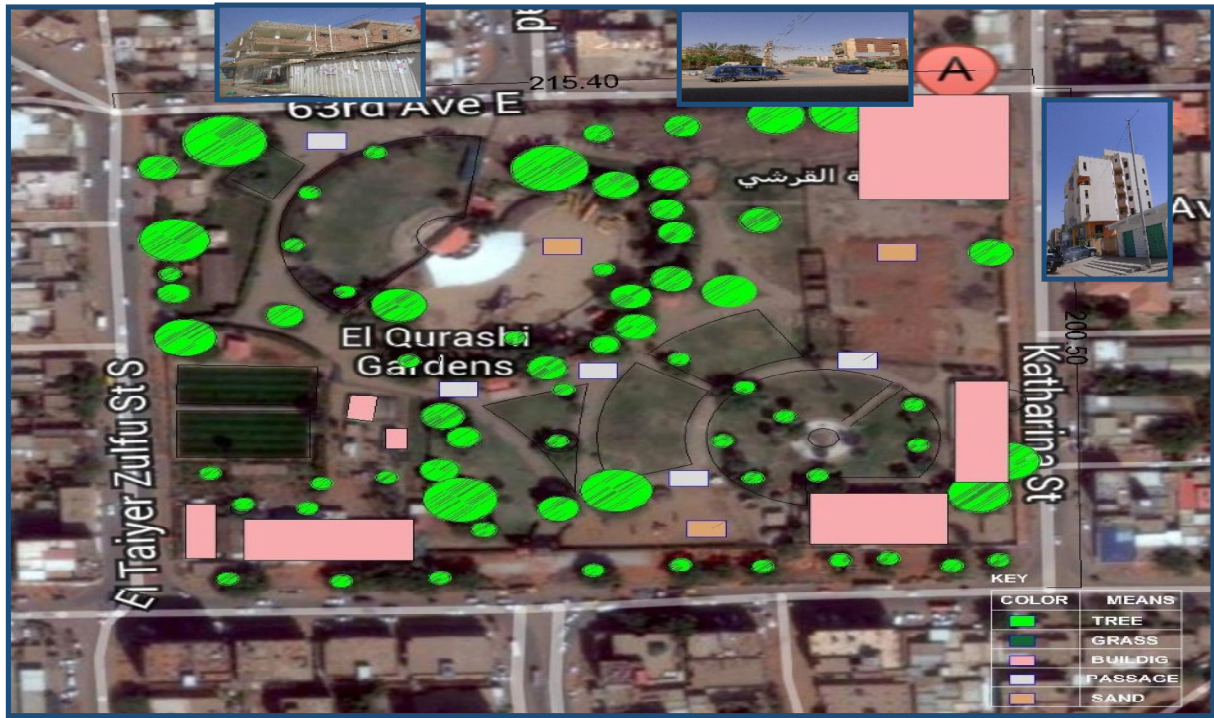
All the area of the square is of dust floor. It is one of the squares which are not invested in the optimal order, but sometimes it is used in religious ceremonies (e.g. AL mawlid festival, and sometimes Lifter and Altaha festivals).

Total area = 53,650 m<sup>2</sup>

### 2- Violation

- The area was violated by zero.

Figure (4-20)<sup>25</sup>



HADIGA ALGORASHI (Khartoum)



1-



2-



3-



4-



5-

### 1- Discussion:

- Proportion of green spaces is near to 26% of the total space.
- Some spaces are dust floor and this leads to stir the dust and prevents the use of the garden especially in autumn
- Proportion of buildings is very big and this is incompatible with the basic purpose (There was a significant encroachment on the garden).
- Entrance is well defined and constructed of brick and cement mortar and iron.  
There is a ticket office
- There is no sewage network in the right manner.
- There are no services (places to dispose waste - waste baskets - Water Coolers – fire alarm – curbstone for axes of movement
- Enclosure proportion is big, it considered as closed type.

The width of entrance is 4.5 meters, 3.5 meters of it is for vehicles, including 1-meter for the entrance of visitors

the entrance does not characterized with any identification or aesthetic or symbolic features, or cultural aspects of Sudanese beautiful legacy.

Visit:

On Sunday, Monday and Wednesday there are 70-80 visiting of students and families.

Visitors on Thursday, Friday and Saturday are 150-200 visitors (visitors from families, students, associations ,what sup groups and associations).

Sometimes there are marriage festivals of Sudanese and Ethiopian families. The number reaches 250-300 participants).

Total area= 43,187.7m<sup>2</sup>

### 2- Violation

- The area was violated was Partial.

Figure (4-21)<sup>25</sup>



RIYADH FAMILY PARK (Khartoum).





5-



6-



7-

### 1- Discussion:

- Entrance is well defined. 2. Dust floor parking.
  - Pedestrian traffic axes are of dust floor.
  - Proportion of green space is about 15,830 m<sup>2</sup>.
  - Shade trees are few.
  - Some spaces are dust floor and this leads to stir the dust and prevents the use of the garden especially in autumn.
  - Proportion of buildings is very big and this is incompatible with the basic purpose (There was a significant encroachment on the garden).
  - Proportion of enclosure the park is of open type.
- Services are not found (seats - water cooler - places to dispose waste - waste baskets).

Total area = 79,150 m<sup>2</sup>

### 2- Violation

- The area was violated was Partial.

**Areas of visit in percentages:**

Riyadh	20%
Arquette, Al-Sahafa and Bahri	60%
East of the Nile and Omdurman and Bahri	20%
Number of visitors on ordinary days between	400-500 visitors

There are also a number of foreign visitors from 200 to 300 visitors per day and there are also family gatherings. The park works with system of shift from 9:00 to 3: 30 am.

Evenings: Friday, Saturday and Thursday are for the visits of families and students of basic and secondary schools, and Khalwa (Quran School). The number is 1500-2000 visitors.

Percentage of the number of the first and second floors, ranging in varying proportions in Khartoum, the percentage of Khartoum is 4%, in Omdurman is 1.8% and in Khartoum North is 2% that means the percentage of the first and second floors is greater in Khartoum, followed by Khartoum North and then Omdurman. In number of three-story buildings, we find that the percentage is greater in Khartoum North than Khartoum followed by Omdurman by varying percentages of 40%, 17% and 12% respectively.

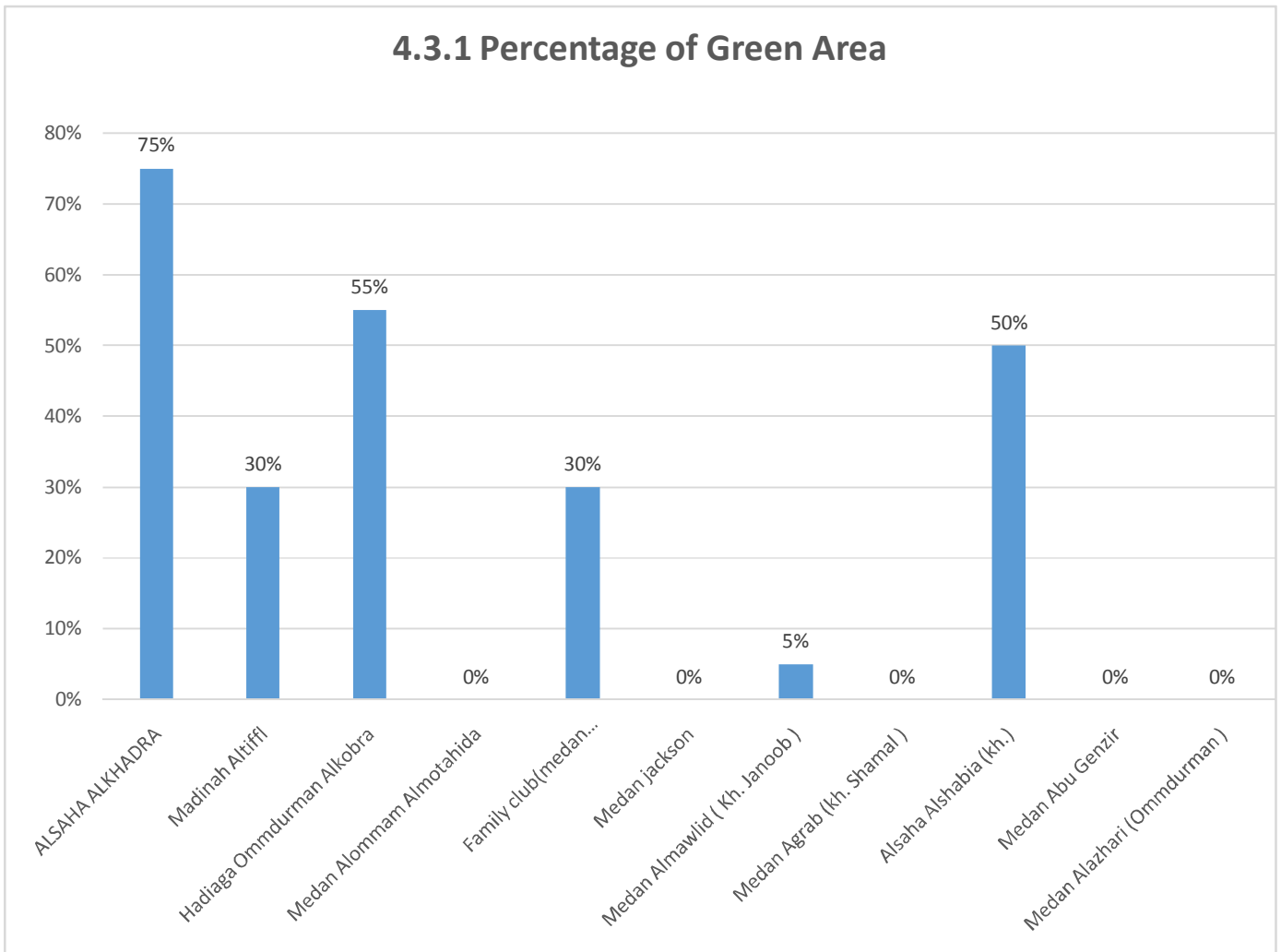
The greatest percentages of new schemes in Khartoum North are ranging from 7% followed by Khartoum 2% then Omdurman 1%.

In the skirts, we find that the greatest percentage is in Omdurman, where the percentage is 18%, followed by Khartoum North 16% then Khartoum 15%.

We find that percentage of Khartoum North is the greatest percentage 34.2% in terms of classification of residential areas followed by Khartoum 33% and then Omdurman 32.8%.



## 4.3 Criticism According to



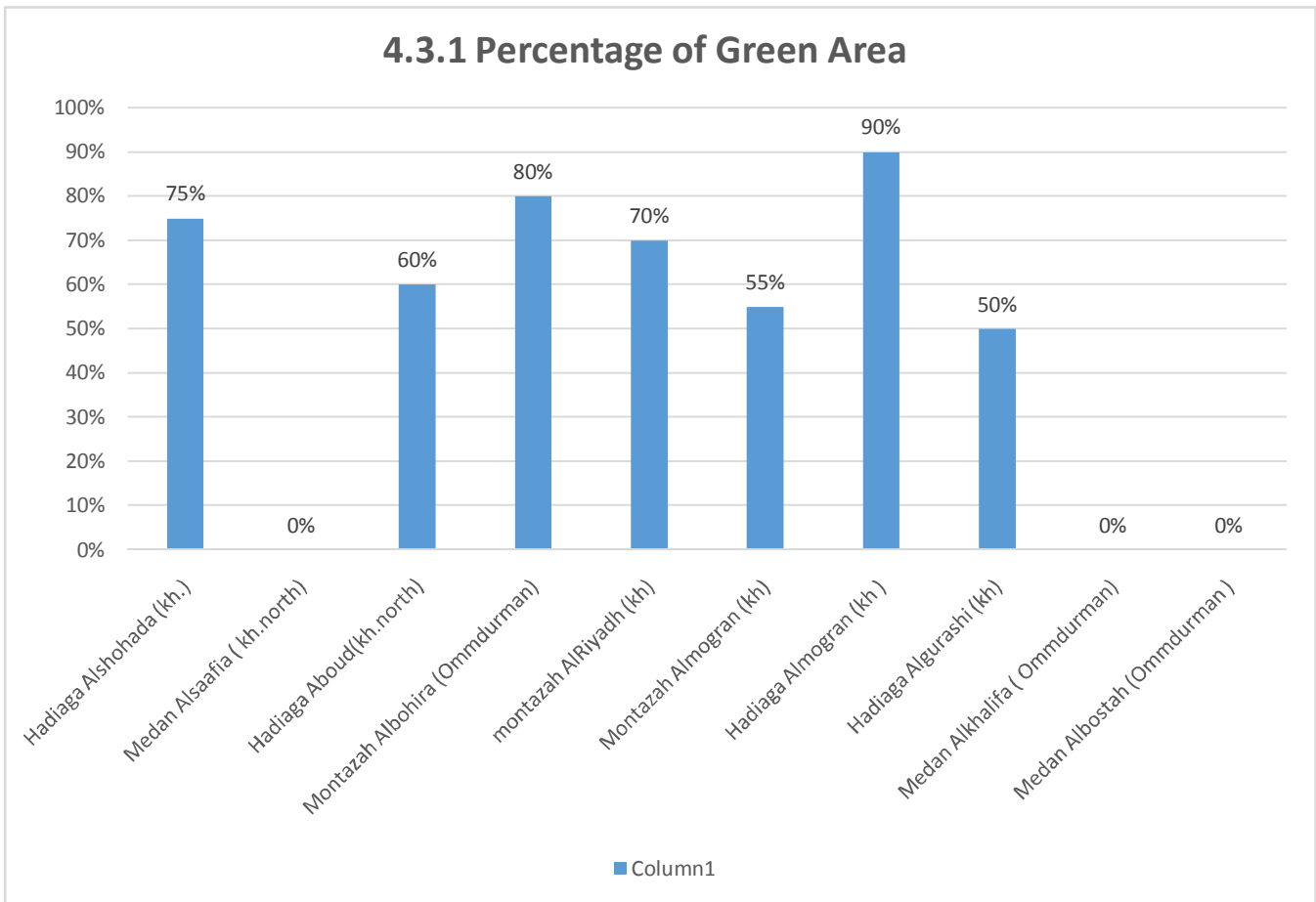


Diagram A : analysis of Open spaces

#### **Analysis**

1. We find that green spaces within the open spaces are of grass and small trees and some green areas had been deducted from some squares to be allocated to a nursery within the park (e.g. Qurashi Garden).

There is an evident negligence in dealing with the green areas within the Garden.

Follow Diagram A :Analysis of Open Spaces

Criticism According to

**4.3.2 Entrance Definition**

	Defined Entrance	Undefined Entrance
1	AlsahaAlkhadraa	Madan Abu Genzir
2	MadenahAltiff	MadanAlommamalmotahida
3	HadiagaOmmromanAlkobra (Magic Land )	Madan Jackson
4	HadiagaAlshohada Khartoum	MadanAlmawlid
5	HadiagaAboud Khartoum north	(Khartoum Ganob)
6	MontazahAlbohira	MadanAgrab Khartoum Shamal
7	MontazahAlRiyadh	MadanAlazhari (Omdurma)
8	MontazahAlmogran	MadanAlsaafia
9	Medan Al Khalifa (Omdroman)	Medan Albostah
10	HadiagaAlgurashi	
11	MadanAbdemonem Mohamed (Family Club )	
12	AlsahaAlshabia(Khartoum)	

Table B: Analysis of Open Spaces

Open space with Defined Entrance



1. entrance of AlsahaAlkhadraa



2. entrance of MadenahAltiff



3. entrance of Hadiaga OmmromanAlkobra(magic land) 4. entrance of HadiagaAlshohada Khartoum



5. entrance of HadiagaAboud Khartoum north 6. entrance of MontazahAlbohira



7. entrance of MontazahAlRiyadh 8. entrance of MontazahAlmogran



9.entrance of Medan Al Khalifa (Omdurman) 10. Entrance of Hadigat Algurashi



11. entrance of Maidan Abdemonem Mohamed



12. entrance of Alsahaalshabia (Khartoum).

### **Analysis**

It is simple place which represents the head and entrance of any site and considered as a title of the site.

The function of the entrance should not be for entrance and exit only (and this process can take place in any form) but must entrances have to be well designated and represent sovereign and prestige and Beauty of the site. The entrance should express the place because it gives architectural and aesthetic value to the space by its beauty and prestige and sovereignty.

### 4.3 Criticism According to

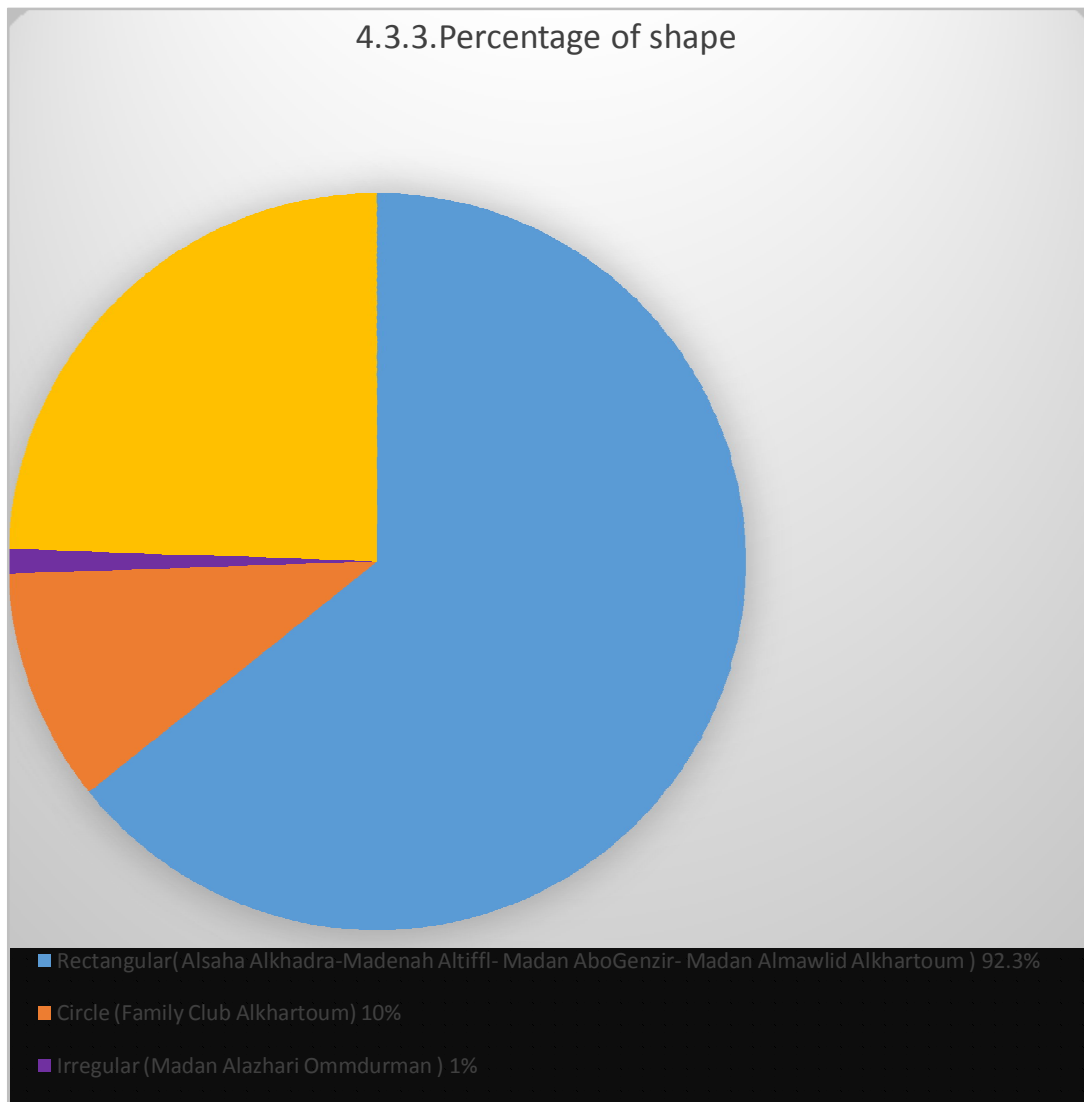
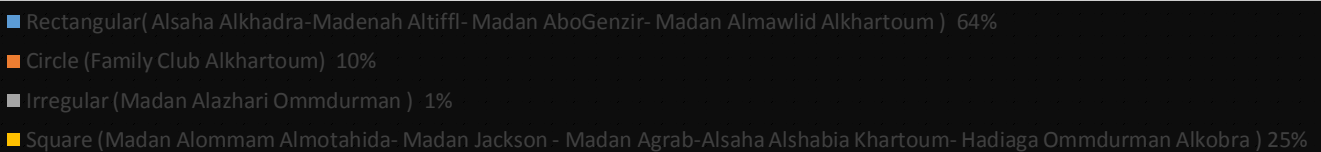
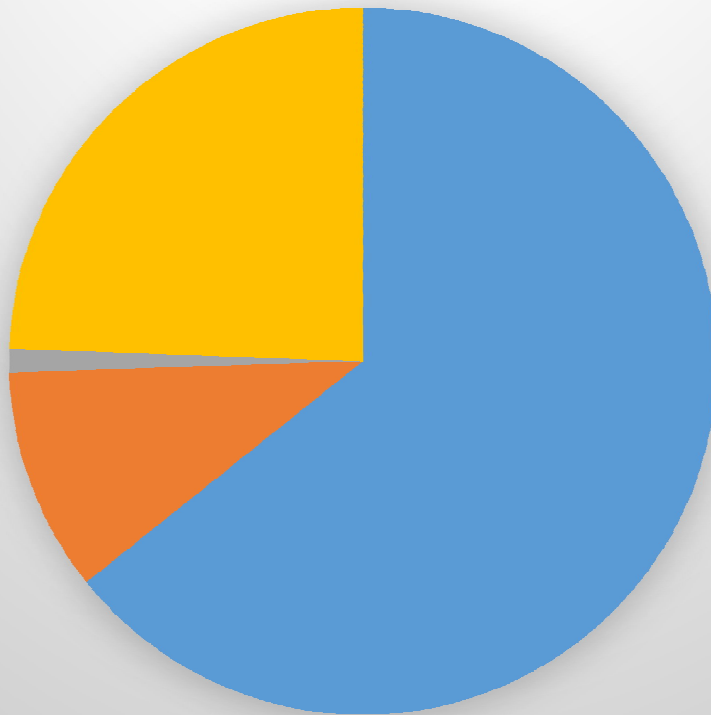


Diagram C: Analysis of open space shape

### 4.3.3.percentage of shape



Follow Diagram C: Analysis of open space shape

#### Analysis:

There are many squares which spaces allocated to buildings and other spaces had been deducted from them reducing the total area and this in turn prevents the optimal use of space.

Through the analysis of the shapes of these open spaces, we find that:-

1. The percentage of square shapes is 33.33%.
2. The percentage of rectangular shapes is 33.33%.
3. The percentage of circular shapes is 9.52%.
4. The percentage of irregular shapes is 23.8%.

### 4.3 Criticism According to

#### 4.3.4. Degree of Enclosure

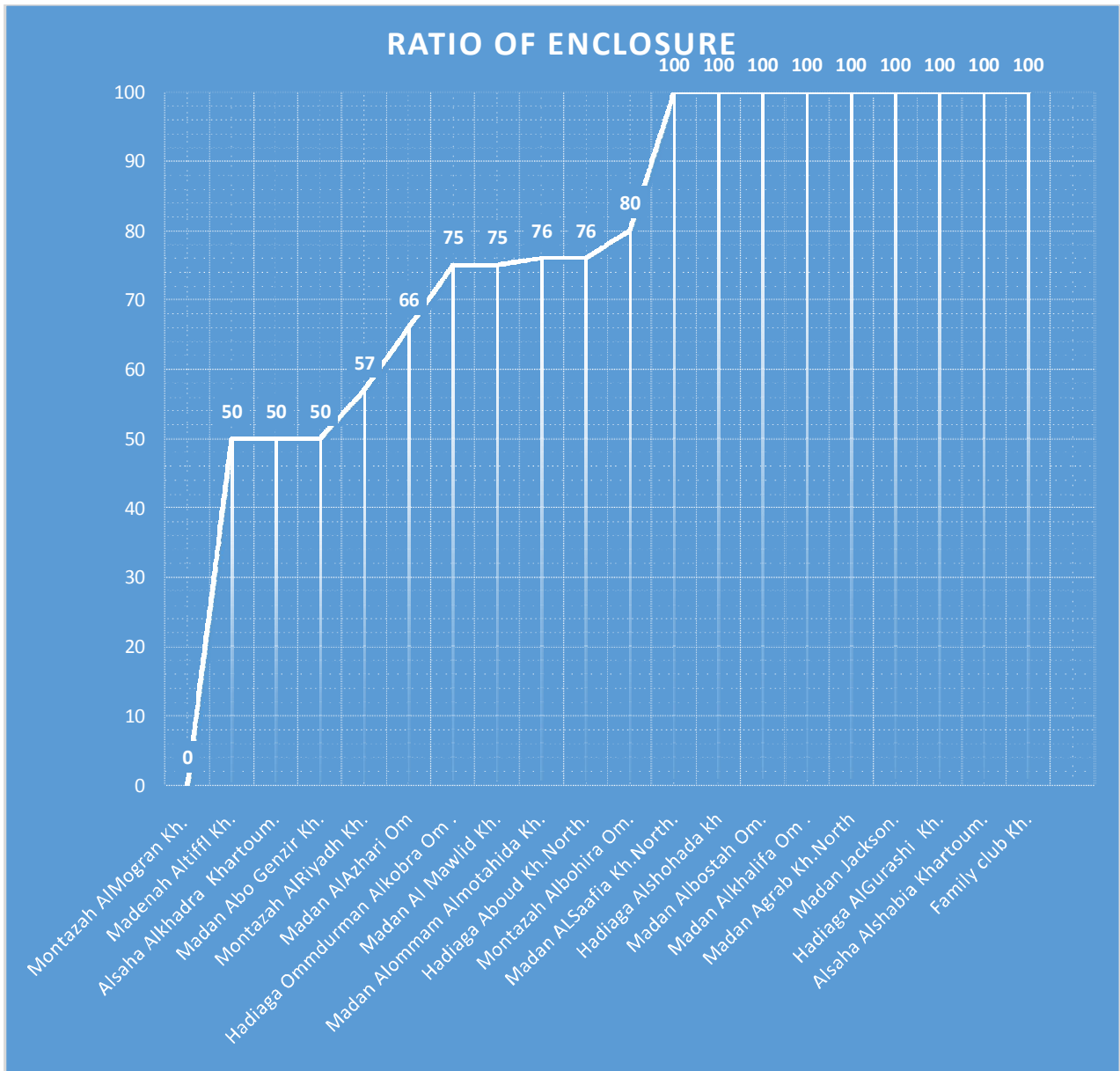


Diagram D: Analysis of open space



## **Advantages of Enclosure**

If space is large and containment is high that is enclosure is high, it makes the space with a large degree of use because the air becomes nice and beautiful and this does not adversely affect the use of space both in the hours of the day or night. Because the space of large area facilitates the movement of air and thus leads to make the atmosphere become better in addition to ease the visibility significantly in all directions.

The large space and high containment lead to optimal and great use of space in both summer and winter, because in summer the great space allows air movement largely and also in the winter high containment reduces the severity of the cold season. And also allows the vision optimally in all directions to many landmarks.

## **Disadvantages**

If the space is large and containment is simple this reduces the use of space, especially in the winter at night because it is more cold.

If the space is small in size and containment is very big also reduces the optimal use especially in summer because the temperature is high and the air movement is limited and also vision for many landmarks is not comprehensive.

## **Analysis:**

Through analysis of enclosure we find that the squares are vary in terms of the degree of enclosure as follows:

From 0 up to 35%(low enclosure)

36 % up to 70 % (middle enclosure)

71% up to 100% (high enclosure)

### 4.3 Criticism According to

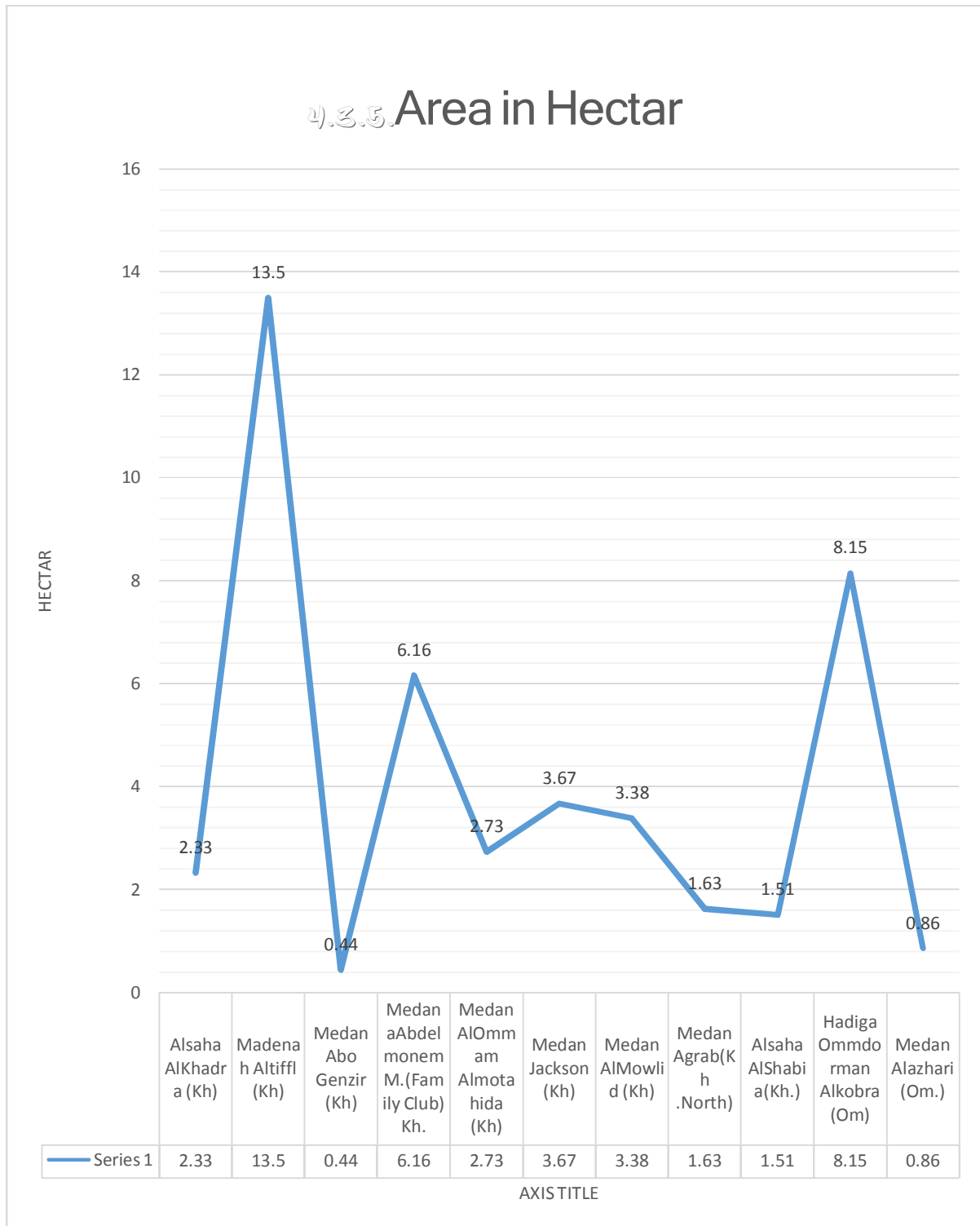
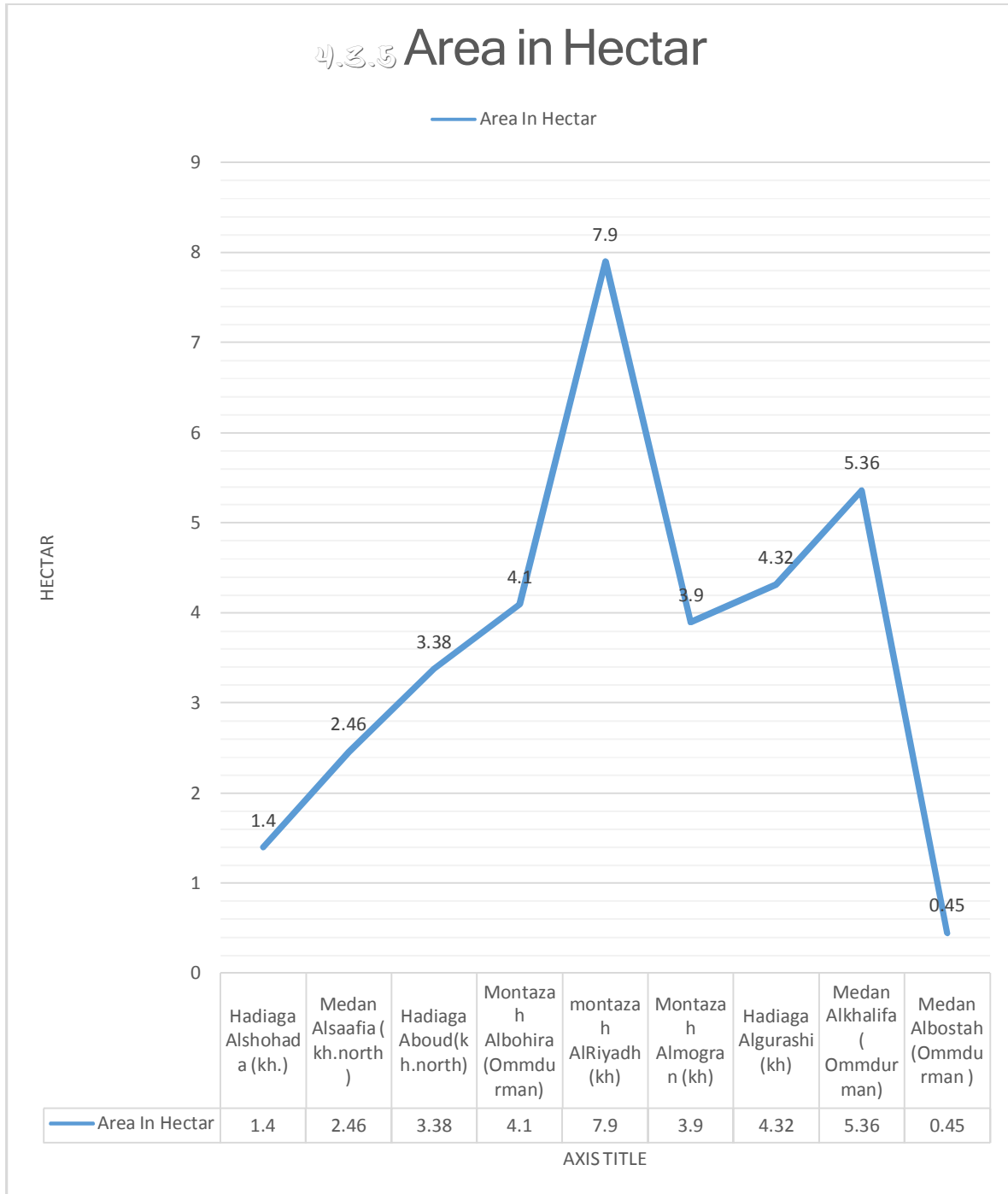


Diagram (E) : Analysis of open spaces

## 4.3 Criticism According to



Analysis:

There are many squares which spaces allocated to buildings and other spaces had been deducted from them so this reducing the total area and this in turn prevents the optimal use of space.

Follow Diagram (E) : Analysis of open spaces

# Criticism According to 4.3

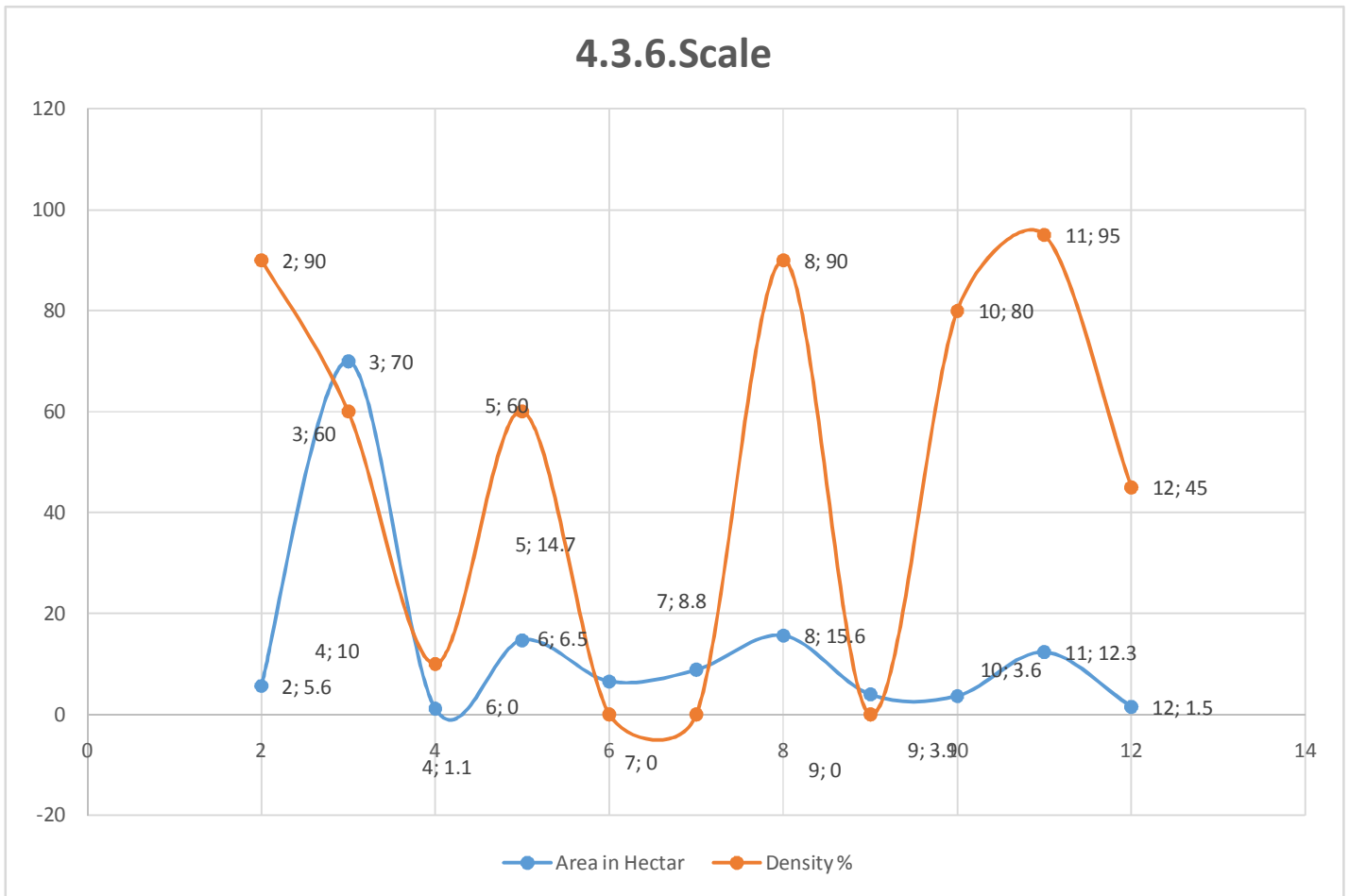
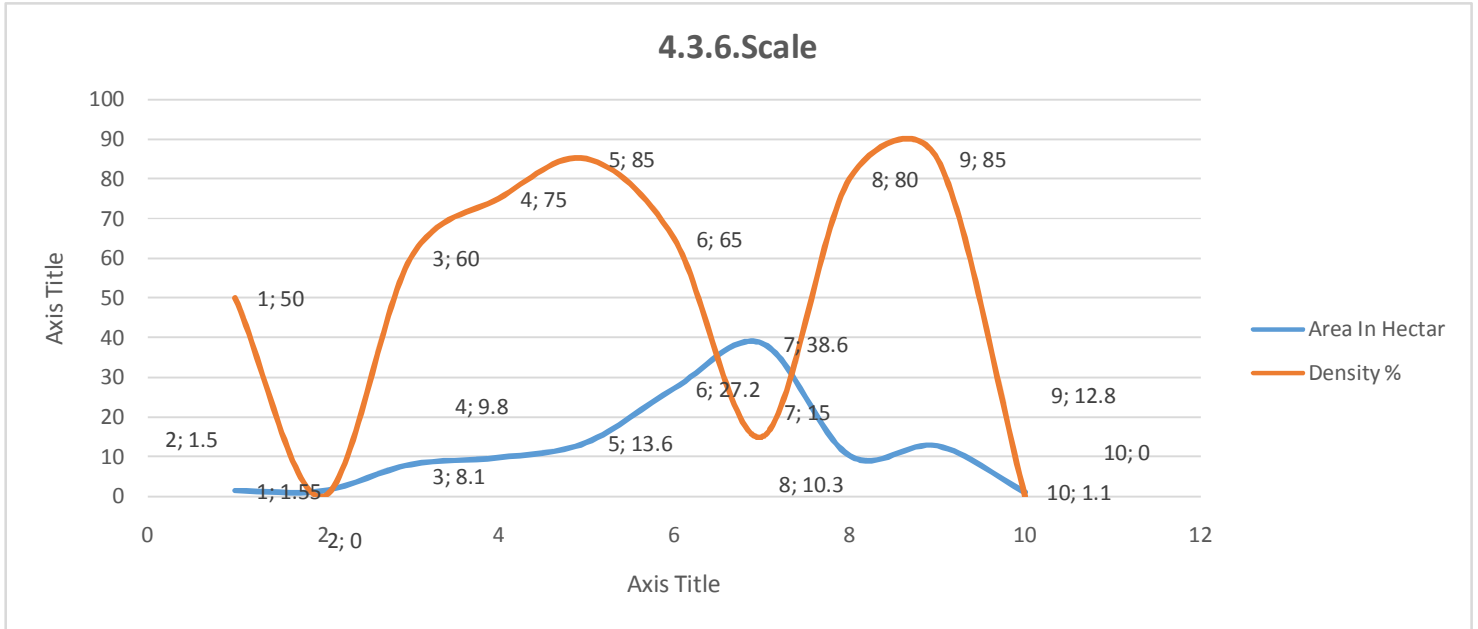


Diagram (F) : Analysis of open spaces

# Criticism According to 4.3



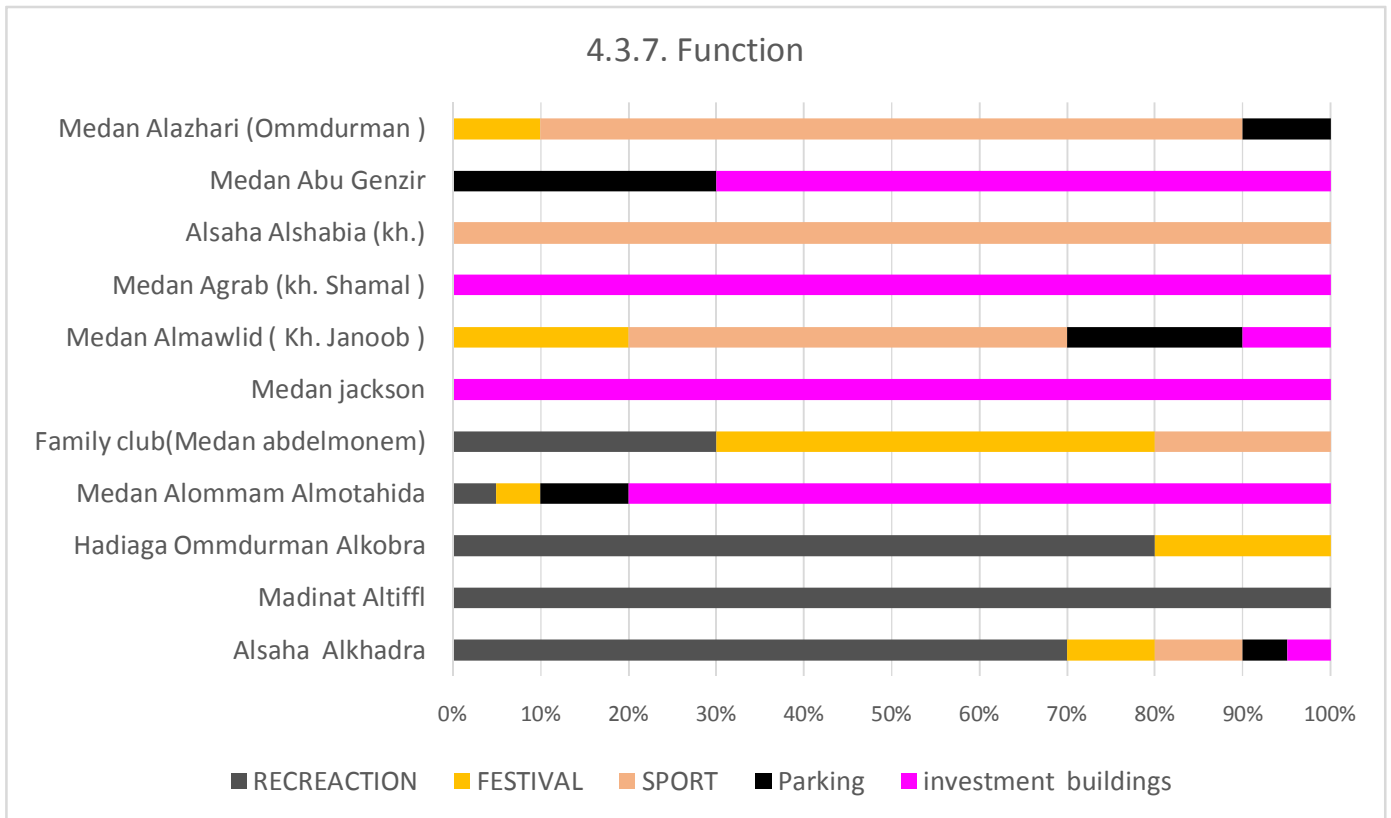
Follow Diagram (F) : Analysis of open spaces

## **Analysis**

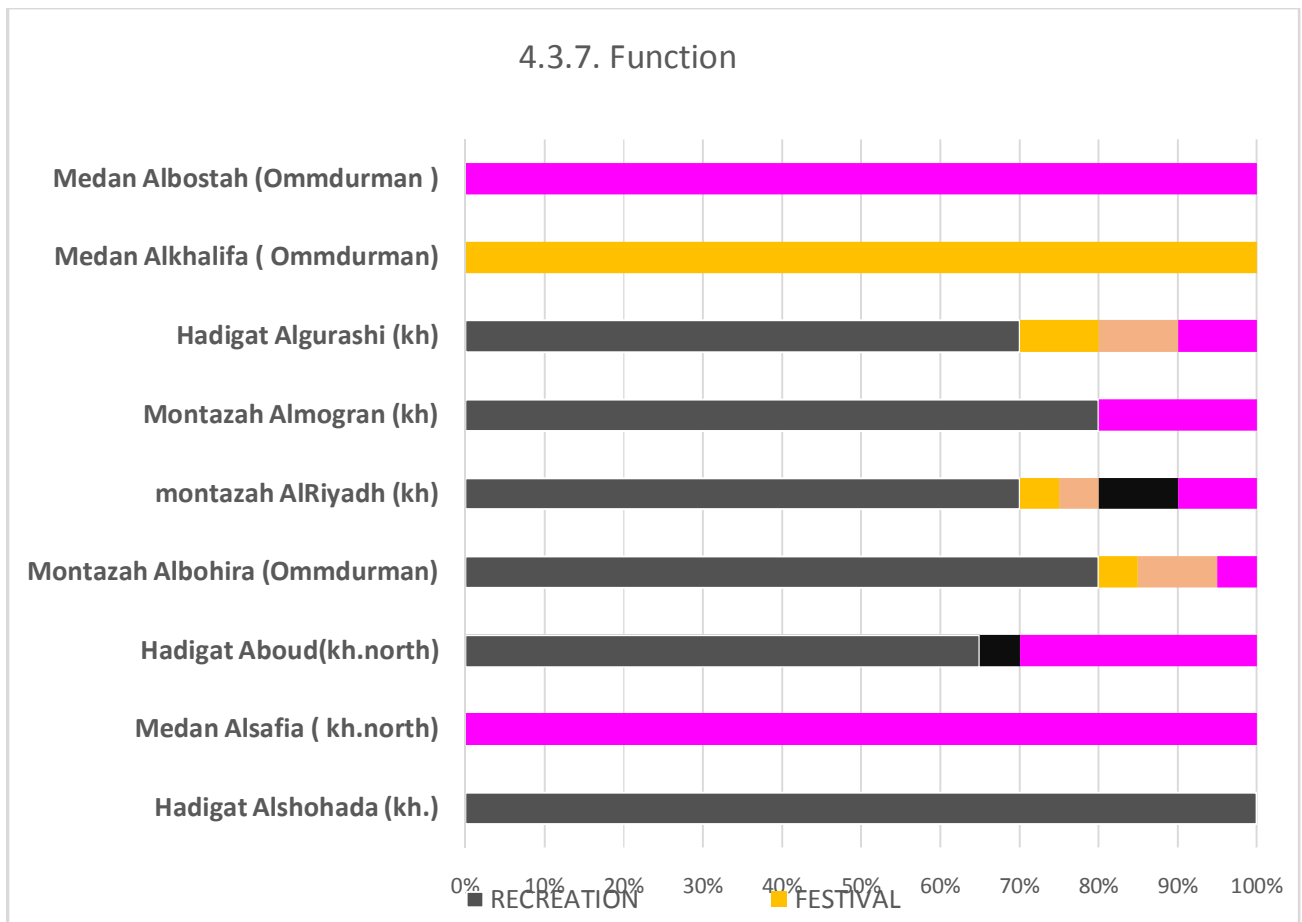
The area of spaces allocated to recreation devoted to individual should be related to the number of users but after the developments in the city (Khartoum) by the expansion of the buildings, both on the horizontal or vertical level and displacement that hit (the capital) or migration from the rural areas to the Capital, population has doubled or increased more than that and this leads to an increase in the population and therefore, in turn lead to an increase of the number of users although the area of space remains as it is, as well as deduction, by reducing the area allocated to the space. In addition to lack of areas allocated to expansion in future.

### 4.3 Criticism According to

Diagram (G) : Analysis of open Spaces



### 4.3 Criticism According to



Follow Diagram (G) : Analysis of open Spaces



## Analysis

1. These open spaces are designed for the purpose of entertainment and recreation but after had been violated and parts of them had been cut, that make them to lose their basic function and make them to assume multiple and different functions like sports by preparing some sport courts inside them, e.g. Albohaira Square, Family Club, Riyadh Garden), and some of them are converted to service sector like restaurants and cafeterias (Child Garden, Albohaira Square, Omdurman Great Garden, Qurashi) and also by building mosques inside these gardens e.g. (Qurashi, Omdurman Great Garden, Child Garden, Riyadh Garden).
2. Some of them are converted to Sports Clubs for example Family Club which a great part of it had been converted to the Square of Khartoum National Sport Club and there are terraces and also the Popular Yard. These are many and varied functions, which make spaces to lose their primary function and reduce their required role.

## Chapter Five

### Results and Recommendations

#### 5-1 Results:

**5-1-a** Many of the open spaces are not easily accessible and occupy large areas of land. Moreover many of them cannot be treated economically.

**5-1-b** There is no specific body or agency responsible for caring for these public open spaces.

**5-1-c** In some of them there is no fence or specific or defined lines that protect them from street misuse.

**5-1-d** Some of the open spaces are completely empty of any plant cover or shadow trees. This leads to the rise of temperature in the area and causing dusty winds.

**5-1-e** There is no open furniture in most of open spaces.

**5-1-f** Some of them lack garbage pans; which make them a source of pollution, ugly sights and nasty smell.

**5-1-g** Some of open spaces are full of the remains of building materials, ponds for rain water and other different activities practiced on it.

**5-1-h** Most of these public open spaces have become parts of street.

**5-1-i** Most of these public open spaces have only grasses and trees on it, no different flowers and different plants and also different types of trees so that to attract people to come to the open spaces.

**5-1-j** In Khartoum most of these various open spaces are not playing their full role in the urban residential areas. In fact common roads and streets inside the residential area performed the function of open spaces for social, sports and cultural activities. The open spaces, which were specifically designed for purpose are neglected, not attended to and left without maintenance. They have become places for the accumulation of garbage home for stray animals, pollution of the environment and parking lots for cars of the inhabitants who live in the neighborhood. This was a result of mistakes and weaknesses in planning and lay out of residential areas and open spaces, as well as, on-effective follow-up during implementation of plans. Added to this; is the lack of understanding and awareness of inhabitants of the roles and aims of the open spaces and the optimal way to benefit from them.

**5-1-k** A lot of open spaces have been partially or totally violated resulting in change of their primary purpose to another purpose.

**5-1-l** There are buildings at all open spaces and this is contradicted with the basic purpose they were created for.

**5-1-m** Many of the open spaces in Khartoum distributed disproportionately and they are placed close to each other, resulting that some areas lack open spaces.

**5-1-n** Most forms of open spaces are irregular shapes.

**5-1-o** Through the study of population density, we find that the population density increases as we move away from the center of the city, in the same time, the immigration to the capital makes the population increased in outskirts of cities.

**5-1-p** Through visits and field observation, it is found that all the problems are similar and identical in terms of space design and some services and lack of basic and essential services.

There is inequality in the distribution of spaces where Child City and Green Yard and Riyadh Family Park, all of them are in a nearby area, as well as in the center of Khartoum where there are Qureshi Garden and Family Club in a place close to each other.

**5-1-s** entrances in these spaces give the function of entry and exit, but many of them lack the prestige and beauty and personal uniqueness and distinct architecture.

**5-1-t** Through my studies to these spaces in Khartoum I found that these spaces are typical and traditional where all signs of beauty and creativity and mental image of beauty and innovation disappear and overcome by spirit of random design in all which related to space in both engineering and urban areas aspects.

**5.1-u** Entrance is a small space where the spirit of creativity and beauty is lessens totally and do not carry any meaning or symbol reflects our culture , heritage and identity.

- Also the entrances are made of materials in a very random ,traditional way ,lack any identity , do not telling the story of a nation with a historical origin , civilization and ancient heritage stems from the inherent roots.

## **5-2 Recommendation**

### **5-2-a General Recommendation:**

**5-2-a-1** Open spaces must be planned and set for specific purposes; such as social, sports, cultural and recreational activities. Hence, they absorb daily and seasonal occasions.

**5-2-a-2** Open spaces should be distributed in a systematic way in residential areas, according to the needs and requirement of living environment.

**5-2-a-3** Care for the plant cover, especially flowers and grass so as to lessen the effect of sun –rays and beautify the scene and smell of the area.

**5-2-a-4** The construction of fences to encircle the open spaces, so that they do not become pedestrian passages, traffic roads or suitable places for stray animals.

**5-2-a-5** The improvement of the basic services in the open spaces; such as, electricity, water supply, lavatories and rain water drainage.

**5-2-a-6** Public open spaces must have pedestrian paths (passages) these passages are important for making pedestrian walking easy with in the area and provide access to reach services and emergency cars. These passages may not be straight as not many cars usually use them. Even more, they may be

provided with trees both sides, so they provide Avery comfortable sphere for pedestrian during the day and furnished with benches.

**5-2-a-7** The width of the pedestrian passage could be between 2.5—5 meters;

**5-2-a-8** Open spaces are supposed to be planned, designed and implemented in a way that suits the nature of the area in question and the customs and tradition of the society in it.

**5-2-a-9** Responsibility of maintaining open spaces should be joint between the community and the local authorities, delegation of responsibilities should be clear enough to guarantee continued up-keep of open spaces.

**5-2-a-10** For the purpose of obtaining more practical and efficient open spaces. Certain considerations must be fulfilled this will allow open spaces to be fully utilized and meet the requirement for which they were constructed, these considerations may be summarized as follows.

- a- The determination of the type and size of the activities that are going to be performed.
- b-The determination of the method of organizing these activities.
- c- The ease of reach and access to these open spaces.
- d- The climate consideration (the partial treatment of the open spaces for improving the local climate in them. Through the provision of green areas, vegetables and trees.
- e- To consider the other factors (a social, cultural, religious and political etc.)

**5-2-a-11** improving the basic services in the open spaces, such as, electricity, water supply, lavatories and rain water drainage.

**5-2-a-12** When design and plan of open spaces, we should give priority to outskirts of the city that are crowded by a big number of residents and displaced people.

**5-2-a-13** Interest in providing shade trees that help make the best use of space

Work on the provision of essential services (such as places to dispose waste - waste baskets - Water fountains - seats - parking - movement axes).

**5-2-a-14.**Entrances should be of manifest designation and show sovereignty, prestige and beauty.

Entrances should represent the meaning and uniqueness of the space and gives architectural value and indicates to the cultural and heritage value and the title of the space clearly.

**5-2-a-15** Spaces should be equipped with chairs, lighting, clean roads, continuous watering and full care by brilliant engineering and original basis.

**5-2-a-16** Serve as title of Sudanese people for foreign visitors and be of original Sudanese style in the near future and bear legacy, contents, values and meanings.

**5-2-a-16** To serve as places for gathering, rest and recreation and to express our brilliant history, sophistication, familiarity, tolerance, generosity and extent of civilian awareness of the Sudanese people instead of the existing crude image of spaces.

**5-2-a-17** Entrances should carry historical and symbolic visual, aesthetic and cultural symbolic of identity and to be of deep national connotation and implication.

**5-2-a-18** Attention should be paid to the large and expanding recreational spaces, parks and public squares according to necessity of people and to significant expansion of buildings resulted in increasing number of users and population.

**5-2-a-19** Make continuous periodical field studies to achieve requests and desires of the users.

### **5-2-b Special Recommendations:**

**5-2-b-1** Open spaces in neighborhood should be positioned where individuals will not have to travel long distances to reach them.

**5-2-b-2** The shape of open spaces could be square, rectangular or any suitable geometrical shape .the rectangular shape is preferable because it allow as many houses as possible to open on it. This will help in circulation of air and movement of inhabitants ultimately, the shape of open space depends on the idea of general layout of residential area.

**5-2-b-3** Open spaces can be used by different age-group of people. It is area should not be all green, but part of which can be used as path for walking, or for pedestrian uses. Its location should be near public buildings.

**5-2-b-4** When planning and design, the open spaces have to be put in parallel so that each quarter have spaces suitable to its population.

**5-2-b-5** A comprehensible law has to be developed, prevents violation of spaces, whether in whole or in part and also prevents construct buildings inside spaces specified to entertain, that is open space means space which is not including buildings.

**5-2-b-6** Increase and interest in the number and quality of open spaces because the population density increased significantly disproportionate to the number and size of open spaces to play their role in sports, social, cultural and recreational activities.

**5-2-b-7** Treeing the circumference of open spaces with tree belt, to act as breaker and shadow for residents for various purposes.

**5-2-b-8** The locations of open spaces should be in the middle of residential areas, in creating health environment and attractive sight.

## **Reference:**

- 1- D' Ambrosia architecture + urbanism with LANDECA, The Value of Good Urban Design, July 2011,
- 2- (Cliff Moughtin, Rafael Cuesta, URBAN DESIGN: METHOD AND TECHNIQUES, 1999, Christine Sarris and Paola Signoretta.
- 3- Sir Stuart Lipton, Chairman, CABE, THE COUNCILLOR'S GUIDE TO URBAN DESIGN, November 2003
- 4- file:///I:/IMPORTANTE%203/Elements%20of%20Urban%20Design.mht
- 5- Grigor Doytchinov, Urban Design History, Institute of Urbanism.
- 6- Llewellyn Davies Yeang, Urban design compendium, This third edition, in August 2000.
- 7- Kevin Lynch, the city image and its elements, (1960), from the image of the city [www.sethspielman.org/courses/geog3612/reading](http://www.sethspielman.org/courses/geog3612/reading).
- 8- Dr Ralph Chapman, Maarama Consulting, Wellington, The Value of Urban Design, in June 2005, Published by the Ministry for the Environment.
- 9- Environment & Land Management Pty Ltd in association with Thompson Berrill Landscape Design Pty Ltd, City of Glen Eira Open Space Strategy, March 2014,.
- 10- Philippa Fairbairn, Open Space Plan.
- 11- Beverly A. Sandalak and Francisco G. Alanize Uribe, open space typology as frame.
- 12- Juli Wilkerson, , Planning for Parks, Recreation, and Open Space in Your Community, February 2005.
- 13- Jim Gibbon, OPEN SPACE Planning, March 3, 2003, [nemo.uconn.edu](http://nemo.uconn.edu)> publications. March 1998.
- 14- Hiu Ming, La, 2014, Investigating the Small Public Urban Open Spaces at High-density Cities.

15-Hayriyesbah,bulentdeniz@yahoo.com),(edward.cook@asu.edu), ISOLATIONTRENDS OF URBAN OPEN SPACES .

16- Jane Jacobs,The Importance of Death and Life of Great American Cities,1961, New Visions for Public Affairs – Volume 1, Spring 2009.

17- Official site: Google, www.krtloc.pov.sd

18- Mohammed Abu al-Hasan al-Qasim,,The phenomenon of dust storms in arid environments(Case Study of Khartoum area), 1996,Sudan Library - University of Khartoum..

19- Ali, SA (1999) Greater Khartoum the Horizontal Expansion and its Impact on the Development of settlement (in Arabic) Un published MA thesis, Geography Department,University of Khartoum.

20- Google: css.escwg.org.ib.sudan.

21- Ministry of Social Welfarei.

22- Dr. BushraAltayebBabiker, Fertility Studies Institute - University of Khartoum..

23- <https://ar.m.m.wikipedia.org>) wiki .

24- Town planner - Zakie Abu BashirTijani, Planning between Theory and Concept,2014.