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**Correlation between urban configuration and  
gender spatial use:  
A syntactic study, case of Biskra city**

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# Abstract

This research work seeks to identify the factors behind the gender segregation in the urban spatial use as well as the distribution of commercial uses, i.e. shops for each gender in the city centre of Biskra. This segregation has resulted in a gender separation in terms of the activities undertaken in the city spatial use or as well as the activities that occur in the city which led to a disparate density and distinct locations of shops and services for each group within urban spaces; men spaces and women spaces, which could lead to more issues in the city such as insecurity. The theories of ‘*natural movement*’ and ‘*movement economy*’ from space syntax assume that the distribution of commercial uses follows the user’s movement, which is generated by the spatial configuration of the urban grid. This thesis accordingly considers the issue by comparatively evaluating this relationship from men and women land use’s perspective. this research aims to look into the issue quantitatively through a syntactic analysis of the urban spatial configuration analysis. Furthermore, it intends to come out with guidelines and insights that would be fruitful for urban design and urban planning, dealing with genders' space use.

The first part of this thesis provides a large theoretical background in several fields, mainly on urban spaces as an entire system, spatial divisions in the city, movement, environmental perception and psychology, but most precisely on space syntax theory, given that adopting and combining different approaches help explore the topic of this thesis research properly. In order to answer the queries mentioned earlier, this investigation will be conducted by using qualitative (shops surveys and movements observation) and quantitative methods (graph maps and statistical analyses) simultaneously by going through three levels; In-situ observation, syntactic analysis and finally the correlation part, by relying mainly on space syntax analytical method through *Depthmap* software.

The findings showed that men’s use of space and movement are slightly guided by the spatial configuration while for women, they are much more directed by the location pattern of shops. This shows that women unlike men, are limited in their freedom and restricted to the places they daily use. Part of the findings also might be driven by socio-cultural aspect in separating men and women realms in Arab- Islamic society, such as in spatial segregation in houses’ layout.

**Keywords:** Space syntax; Gender; Urban space; Movement; Land use; Spatial configuration.

## ملخص

يهدف هذا البحث إلى تحديد العوامل الكامنة وراء الفصل بين الجنسين في استخدام الفضاء الحضري وكذلك توزيع النشاطات التجارية؛ أي المحلات التجارية لكل جنس في وسط مدينة بسكرة. يؤدي هذا الفصل و التفرقة بين الجنسين من حيث استخدام المدينة و أداء نشاطاتهم اليومية إلى كثافة متفاوتة و مواقع معزولة للمحلات التجارية والخدمات لكل مجموعة داخل المساحات الحضرية ؛ مساحات للرجال و أخرى مخصصة للنساء ، مما قد يؤدي إلى المزيد من المشاكل في المدينة مثل انعدام الأمن في بعض المناطق. تفترض مفاهيم "الحركة الطبيعية" و "حركة الاقتصاد" من نظرية التركيب الفراغي أن توزيع النشاطات التجارية يتبع حركة المستخدم ، والتي يتم إنشاؤها بواسطة التكوين المكاني للشبكة الحضرية. بناءً على ذلك ، تتناول هذه الأطروحة المشكلة من خلال التقييم المقارن لهذه العلاقة من منظور استخدام الفضاءات من طرف الرجال والنساء. يهدف هذا البحث أيضًا إلى العمل كإطار تحليلي ليكون بمثابة دليل للتصاميم الحضرية المستقبلية ، سواء كان لها تأثير سلبي أو إيجابي ، لتجنب أو الحفاظ على هذا الفصل.

يقدم الجزء الأول من هذه الأطروحة خلفية نظرية واسعة في العديد من المجالات ، حول المساحات الحضرية كنظام كامل ، التقسيمات المكانية في المدينة ، الحركة ، الإدراك البيئي و علم النفس ، و بشكل أكثر حول نظرية التركيب الفراغي، باعتبار أن تبني ودمج مناهج مختلفة يساعد على استكشاف موضوع هذه الأطروحة البحثية بشكل صحيح و معمق. للإجابة على الاستفسارات المذكورة أعلاه ، سيتم إجراء هذه الدراسة باستخدام الأساليب النوعية (استطلاعات للمحلات التجارية و مراقبة حركة المستخدمين في المدينة) والأساليب الكمية (خرائط الرسم البياني و التحليلات الإحصائية) في آن واحد من خلال العبور بثلاثة مستويات ؛ المراقبة في الموقع و التحليل الفراغي وأخيرًا جزء الربط بينهما، من خلال الاعتماد بشكل أساسي على الطريقة التحليلية للتركيب الفراغي بواسطة برنامج Depthmap.

أظهرت النتائج أن استخدام الرجال للمساحة الحضرية والحركة إلى حد ما يتم توجيهه من خلال التكوين المكاني بينما بالنسبة للنساء ، يتم توجيههن بشكل أكبر بنمط توزيع المتاجر. وهذا يدل على أن المرأة على عكس الرجل، مقيدة في حريتها و مقيدة في الأماكن التي تستخدمها يوميًا. جزء من النتائج قد يكون أيضًا مرتبطًا بالجانب الاجتماعي والثقافي في الفصل بين مجالات الرجال والنساء في المجتمع العربي الإسلامي ، كما هو الحال في الفصل المكاني في تخطيط المنازل.

**الكلمات المفتاحية:** التركيب الفراغي؛ الجنس ؛ الفضاء الحضري؛ الحركة؛ استخدام الأراضي؛ التكوين المكاني.

# Résumé

Ce travail de recherche vise à identifier les facteurs de la ségrégation entre les genres dans l'utilisation de l'espace urbain ainsi que dans la distribution des activités commerciales, c'est-à-dire boutiques pour chaque genre dans le centre-ville de Biskra. Cette a mené vers une séparation des genres en termes d'activités menées dans l'utilisation de la ville, ce qui a conduit à une densité disparate et à des emplacements distincts de commerces et de services pour chaque groupe au sein des espaces urbains ; des espaces pour hommes et des autres pour femmes, ce qui pourrait causer plus de problèmes dans la ville tels que l'insécurité. Les théories du '*le mouvement naturel*' et de '*le mouvement économique*' de la syntaxe spatiale supposent que la distribution des usages commerciaux suit le mouvement des personnes, qui est généré par la configuration spatiale de la trame urbaine. Cette thèse aborde donc la question en évaluant comparativement cette relation du point de vue des hommes et des femmes sur l'utilisation des espaces. Cette recherche vise également à fonctionner comme un cadre d'analyse pour servir de ligne directrice aux futures conceptions urbaines, qu'elles aient un effet négatif ou positif, pour éviter ou maintenir cette séparation.

La première partie de cette thèse fournit un large bagage théorique dans plusieurs domaines, sur les espaces urbains en tant que système complet, sur les divisions spatiales dans la ville, sur le mouvement, la perception et la psychologie environnementale, mais plus précisément sur la théorie de la syntaxe spatiale, puisque l'adoption et la combinaison de différentes approches aident à explorer correctement le sujet de cette thèse de recherche. Afin de répondre aux questions évoquées ci-dessus, cette étude sera réalisée en utilisant à la fois des méthodes qualitatives (enquêtes et observation des magasins) et quantitatives (cartes graphiques et analyses statistiques) à travers trois niveaux ; Observation in-situ, analyse syntaxique et enfin la partie de corrélation, en s'appuyant principalement sur la méthode d'analyse syntaxique spatiale via le logiciel Depthmap.

Les résultats ont montré que le mouvement des hommes et l'utilisation de l'espace sont légèrement déterminés par la configuration spatiale, tandis que pour les femmes, ils sont beaucoup plus déterminés par la localisation des magasins. Cela montre que les femmes, contrairement aux hommes, sont limitées dans leur liberté et confinées dans les espaces qu'elles utilisent quotidiennement. Une partie des résultats pourrait également être affectée par l'aspect socioculturel de la séparation des domaines masculin et féminin dans la société arabo-islamique, comme la ségrégation spatiale dans l'aménagement des maisons.

**Mots clés :** La syntaxe spatiale ; Genre ; Espace urbain ; Mouvement ; L'utilisation du territoire; Configuration spatiale.

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# GENERAL INTRODUCTION

---



## **SYNOPSIS**

Since the first human settlements, cities are mainly characterized by their spatial pattern of outdoor spaces that constitute the space for communal life; cultural and social activities, movement, and means of transport.

In the present time public spaces have lost their importance in the city, where the city now offers significantly spaces for movement from a place to another. Thus, we can't find a space for gathering and other activities anymore (Madanipour, 2010, 222). As a result of the absence of public spaces in the city, people's presence has faded away over time. Therefore, there is no more social interactions in the city (Burden and RuediRay, 2008, 216). As a consequence, this would contribute to the segregation of certain spaces from the rest of the city that they would become unsafe and repelling to use by individuals especially for women who fear to use unpopulated areas.

## **PROBLEM STATEMENT**

Urban spaces have been of great interest to many scholars from many fields. Their functioning and use by people constitute the central issue. This goes through the understanding of how people use urban space in term of interacting with it. This was covered by 'man-space', 'person-environment' or "space-action' interaction studies. The goal of these interaction studies was to tackle the issue of the use of space (occupying a space and achieving an activity) in its broader sense, by including affective, cultural and psychological, physical related to man and space factors.

Several researches have linked the use of urban spaces and people's choice and preference to the comfort aspect related to ambience characteristics, perception, aesthetics, environment's visual field, and even to the spatial configuration, where visual properties of the environment were the major determinant of the pattern of activities and of people's behaviour (Marcus, Francis, 1997). Some other studies have correlated the urban spatial use with security aspects, because sometimes insecurity could be an enough reason to avoid using certain spaces which could be a reason coming from feeling of fear, street harassment, aggression, violence and so on, Oscar Newman talked about the importance of natural surveillance from the interior spaces to improve the security against crime incidents in general, that is what he called the 'defensible space' (Newman, 1972). Moreover, the presence of land uses, visibility aspects and other cues

provided by the physical environment contribute the level of security of certain space which could lead to more spatial use by individuals (Koskela and Pain, 2000).

However, only few studies have been raised to deal with the people's behaviour and pattern of activities that are related to gender; men and women's use of space (McDowell, 1983; Garcia-Ramon et al., 2004; Hanson, 2010; Al Ghatam, 2012; Nguyen and Van Nes, 2013; Güney, 2014; Güney and Kubat, 2015; Uteng and Turner, 2019; Greed, 2019; Hidayati et al., 2020), as they showed that the people's spatial use is dependent somehow on either the services and activities provided in the space or on the street's structure solely. In this regard, these factors can affect both genders differently to stimulate them on which spaces they prefer to use and fulfil their needs, and if not well managed, a spatial separation appears, a disparate density of use and distinct locations of facilities for each group within the urban area; men spaces and women spaces, this would also have a multiplied effect on the patterns of movement for both groups, which would be restricted only to some areas of the city.

For a long time, the woman has been seeking for equivalence between her and man, and although she gained some rights in terms of equality, she still doesn't have a full freedom, she can't just wander in the city as she desires, she can't reach some spaces, and sometimes she feels unsecure in particular ones (Nguyen & Van Nes, 2013). Due to their different perception of safety, women's perception and spatial use is different from men, this would also be linked to other factors such as their previous experiences as well as their socio-cultural variables (Ratnayake, 2016). Often the pattern of streets and their type such as dead-ends are associated with insecurity and harassment for women even without prior experiences in that street (Anciaes and Jones, 2018).

In several cultures, men's main role is to be the breadwinners in the family where they are supposed to go to the city and work, while the private interior spaces are identified as spaces for women to stay in it and to take care of their children as their main job. Edward T. Hall in his book *The Hidden Dimension* (1966), talked about the difference in use of space between cultures when he coined the concept of 'proxemics' and the effects that population density has on behaviour, communication, and social interaction, he described four types of human distances that exist between people in interaction and called them 'Interpersonal distance', where he claimed that these distances vary according to cultures and on where the interaction takes place as well (Hall, 1966).

Gender segregation in the city has been always embedded as a part of Muslims culture and tradition, where women have long been confined to the domestic sphere; however, this phenomenon seems to begin changing under the influence of societal developments. Women's access to public spaces is now very noticeable in cities of the Arab world, even in those that are still dominated by patriarchal structures (Le Renard, 2012; Ladier-Fouladi, 2004). In Algeria, the modernization movement that has been initiated since independence and the sociological changes that resulted from it have profoundly affected the traditional structure in the country leading to more adaptation from the western lifestyle (Benzerfa, 1992), even though this phenomenon was not accompanied by a greater presence of women in the labour market, the education and health sectors however are currently 80% female (Katteb, 2011). This social phenomenon in the city was and is still considered as a big problem in the modern period, where urban planning might play a role in ignoring women in public spaces, as they overlook their needs and experience in the city (McDowell, 1983; Garcia-Ramon et al., 2004).

Space syntax is a graph-based theory, initiated and developed in the Bartlett school of Architectural studies, University College London. As many studies have shown, space syntax tends to express the relationship that exists between society and the physical spatial structure, in fact it helped on the interpretations of several socio-spatial phenomena such as; urban movement, crime and social segregation. Hillier and Hanson believed that there are underlying powers that generate movement in the space rather than the ordinary linguistic concepts such as hierarchies and regularized geometries. After they studied the implications of the physical structure of space, they coined the concept of 'natural movement' and explained how movement is generated by the spatial configuration of the urban space (Hillier et al., 1983). Furthermore, space syntax theory suggests that cities are mostly shaped by socio-economic forces, it argues that commercial activities and attractions are also a street network effect that exist to take advantage and profit of the movement generated by the spatial configuration, that has been referred to as 'movement economy' phenomenon (Hillier et al., 1993; Hillier & Iida, 2005). As a matter of fact, 60%-80% of research that correlated movements in urban spaces with the integration value had been accounted (Peponis et al., 1989; Hillier et al., 1993; Hillier and Iida, 2005; Penn et al., 1998), which showed how the urban network alone is capable to be a source for predicting of movement generated while ignoring secondary factors. Other studies however showed that several factors could play a bigger role for movement prediction (Özbil and Peponis, 2007; Lerman and Omer, 2013; Choi and Koch, 2015; Monokrousou and Giannopoulou, 2016).

In line with the queries of this study, similar topics of researches (on gender issues, movement and land use distribution) has been treated by several studies. An earlier research that has been conducted in four Dutch towns (Nguyen & Van Nes, 2013) showed that there is a correlation between the syntactic graphs and the gate counts of pedestrians, where the more the street was integrated, the more public (both men and women) took it as a destination, but the more the street was segregated the more it was dominated by men. However, it was noteworthy that after the stores and the activities that existed in the street are gone, it became a place only for men, where women have no more reasons to go out. In another research by Güney (2014), a correlation analysis between pedestrian movement observations and visibility graphs has been conducted in order to understand the use of urban space based on gender differences in a small Anatolian city, the results showed that men had always the highest density while women prefer to use only visually integrated spaces and streets that provide shops and other commercial activities. A study in downtown Konya, Turkey, correlated the real estate values with spatial configuration before and after a pedestrianisation process in an important avenue, the results were an increase in all values of commercial areas while, on the other hand, the shops which depend on vehicular traffic have decreased, which meant that the urban design project and the increased integration values brought economic vitality for pedestrians (Topçu et al., 2007). Ortiz-Chao (2008) examined the land use patterns in Mexico City with a plot accessibility model (in the micro scale) in relation with the syntactic attributes: the findings showed that the distribution of land uses responds to the theory of movement economies, where the commercial activities benefits from the streets with high movement, i.e. higher accessibility. Shu-Wei Huang and Hsiu-I Hsieh (2014) studied the relationship between accessibility and mixed land use in the city of Tainan through the comparison of the mixed land use degree in the area with different parameter's values from space syntax method, correlation analysis confirmed that the degree of mixed land-use in Tainan has high positive correlation to global integration and connectivity values. Remarkably, in the city centre of Sharjah, UAE (Güney and Kubat, 2015), when no correlation between the observed movement of men/women and the syntactic values was found, it was suggested that the pattern of movement is related to land-use factors (shopping centres, banks...), as it was dominated by men while women showed the lowest volume. To examine how pedestrian movement is generated in relation to the urban structure alone, an analysis has been conducted with space syntax method by Monokrousou and Giannopoulou (2016): it showed, however, the inefficiency of space syntax method to predict movement in the studied area, given that the attractors play a huge role in the generation of movement in some areas. In another paper, the authors studied the relationship between the

distribution of commercial activities and the spatial configuration in Cairo to see to what extent the commercial activities are affected by the spatial accessibility in both informal and planned areas (Mohamed & Van Nes, 2017), it appeared that the commercial activities in the planned areas tend to spread along the internal routes with a high segregation potential; however, in the spontaneous settlements, retails were orderly distributed along the most accessible streets.

All these studies show the effect of the urban system on people's behaviour and the distribution of attractions as it was affected differently and often other factors played even a bigger role than the spatial configuration. This study, however, will focus on the pattern of distribution from a gender categorising point of view.

In the city of Biskra, the phenomenon of segregation is extremely noticeable, especially in the city centre a part that is majorly used by men (colonial quarter) and a district Zgag Beramdane and El Boukheri that is mostly used by women. This segregation is not only in the use of space a result of the retail distribution and services offered to each gender, but it is also conspicuous in both genders' mobility. To move from place to place within the city centre, women take different itineraries than men avoiding some spaces and streets, and going to the street that caters for their needs only; streets with specific shops and services only for men or for women. In view of this reality, this research takes the city of Biskra as case study to look into the issue of the gendered distribution; relying principally on space syntax method paired with surveys from the areas, based on the assumption that the spatial configuration can affect their distribution.

### **Research questions**

the inquiries to be raised in this thesis can be summed up as:

- Is there a logic behind the spatial use of men and women and the way activities are distributed in such a segregated manner?
- How does some of the interior streets (secondary) have far more density than the main streets?
- Is the movement of men and women affected by the structure of the urban space or by the presence of activities in that location?

## **HYPOTHESES**

The hypotheses of this thesis may be stated as follow:

- According to the movement economy theory of Hiller, the spatial configuration affects the movement flow of men and women, and that in turn affects the dynamicity of that environment, bringing more activities. Here, there is a reverse relation as land uses also could affect the movement behaviour differently and depending on the pattern of the urban grid (streets pattern).
- The less integrated the street is, the more users will find their leisure in doing their activities, the more liveliness the space tend to be.
- The users moving in urban space utilize their prior knowledge and information of that space in the city, rather than the information provided by the environment.

## **OBJECTIVES**

This work seeks to look into the urban spatial use of men and women and to compare that use and the movement patterns. It will investigate what guides the two groups locational patterns, in looking for the determining factors that underlie this pattern and ‘separation’ within the city centre of Biskra. This investigation will try to reveal the ‘logic’ that leads to this phenomenon of gender’ spatial use separation, relating on three features: type and location of economic activity (shops types), spatial configuration and people’s behaviour.

This thesis also seeks to examine space syntax as an analytical framework, that might serve as a guideline for future urban planning and design, whether it has a negative or a positive effect, to avoid or maintain this gender segregation.

## **THESIS STRUCTURE**

In order to achieve the stated objectives, the thesis is composed of six chapters, besides a general introduction and a general conclusion. The first four chapters cover the theoretical background which consist of a literature research work on theories that are linked to the topic of this research; And the last two chapters deal with the investigation process which includes

the case study presentation, the methodology adopted, analyses and results. Therefore, this thesis is presented in a total of six (6) chapters, while the last part will be the general conclusion.

The first chapter: it revolves around understanding urban spaces in their broader sense, it will go through the development of public spaces' structure throughout history and the role they represent for users, it will also go through the pattern of streets and city centres as they represent a huge part of this thesis, as constituents of a network with several characteristics and what they represent for people as a whole, from places to fulfil their daily activities to places for socialisation and different qualities of urban life. The section afterwards will tackle urban land use (different commercial uses) aspect as an important part from the urban space and how they serve as a type of attraction for uses.

The second chapter: its main goal is to explore the factors behind spatial use and people' segregation in the city, given that urban spaces may contribute to the segregation between users to both public/private realms as well as genders. A side from that, there are many factors that could affect urban spatial use such as the lack of security, space affiliation, spatial separation ... and so on, which also could set restrictions to men and women differently. Thus, the first section seeks to understand the segregation in the city with its different aspects. The next section will revolve around the separation of genders in the city since ancient times and how both men and women approach the city. The last part will gather some of the concepts that deal with territoriality behaviour of people and their preference for a better spatial use and interaction.

In chapter three: the focus is on the understanding of the movement and how it affects individuals in the city, given that users of public spaces will experience different facets of the same space, and movement is considered as a one of many means to perceive this environment. Therefore, it starts by exploring the activity of movement along with different concepts that interplay during this activity. Next is some basic psychological processes related to the man-space interaction where it will put a spotlight on the some of the notions of perception of space in relation with the experience of individuals.

The fourth chapter: it presents the theory of space syntax which constitutes the theoretical and methodological background of this study. By adopting a set of tools and theories, together have led to several interpretative models for several socio-spatial phenomena, such as the urban movement, crime, land use and social segregation. Space syntax method however, is not totally efficient by itself but rather requires a combination with other qualitative approaches which

could lead to a better understanding in some cases. Therefore, the first section will gather the basic concepts, measures and analytical tools that are used in space syntax as well as some other developed concepts that are used recently. While the second part will exhibit some of the other qualitative approaches that are used along space syntax such as gate count, snapshot, behaviour mapping... and so on.

The fifth chapter: dived into two parts. The first part is intended to present the context of study of this research which will start by presenting the city of Biskra by addressing many data relating to its location, commercial uses, its historical, geographical, demographic and climatic characteristics. After presenting the city of Biskra in general, it will go through the precise areas where the investigation will take place: the city centre district and El-Alia district. The second part of this chapter is devoted to the presentation of the research methodology, in this part, we will develop the choice of the methodological approach that is suitable for this study. The investigation will be explained step by step throughout the different scales of the case study. It will also present the used investigation tools that are included in the 'in-situ observation' as well as in space syntax.

The sixth chapter: it consists of the application of the investigation methodology that was presented in the previous chapter, it will rely principally on applying space syntax method, by using Depthmap software to study the urban configuration in the city of Biskra. This would be coupled with qualitative methods (surveys and the gate count method). After exhibiting the results from the qualitative and quantitative approaches separately, the next main focus of this chapter will be the correlation part, where several facets of correlations will be conducted between the collected data to understand the common effects that they have with each other by relying on the type and location of economic activities, spatial configuration and people's behaviour. Finally, this part of thesis will reach to the results that could respond to the inquires raised earlier in the study.

This thesis ends with a final chapter that gathers a general conclusion which summarizes the results obtained, main contributions, the outcome of the study, recommendations, limitations of this study and finally some research perspectives.



# CHAPTER I

## URBAN SPACE SYSTEM

---

“Public space is the stage upon which the drama of communal life unfolds. The streets, squares and parks of a city give form to the ebb and flow of human exchange”

- Stephen Carr et al., 1992

## **INTRODUCTION**

Urban space represents the place where all important interactions unfold (people's agglomeration, events and so on), either between individuals and their physical structure, or between individuals themselves. When talking about urban planning, it is important to think of an urban space as various elements rather than a single one, divers between commercial centres, plazas, parks and so on, and all combined in a homogeneous way to generate and affect the social and economic life that exist inside this entire network. In this interdependence, we can say that streets work as connectors between these elements (Monokrousou and Giannopoulou, 2016), therefore, accommodating and designing streets is as important as the elements connected themselves, given that this network affects the human's behaviour differently, i.e. to offer a better accessibility or to deny it from a certain space.

In this regard, this chapter revolves around understanding urban spaces in their broader sense, it will go through the development of public spaces' structure throughout history and the role they represent for users. It will definitely treat the different types of public spaces, mainly streets and city centres as they represent a huge part of this thesis. The section afterwards will tackle the aspect of urban land use as an important part from the urban space.

### **I.1. URBAN SPACES**

#### **I.1.1. Definition of urban space**

To understand the meaning of an urban space and to obtain more of a perception on the socio-spatial part of this environment, it is necessary to consider that this concept is studied by multiple disciplines with different approaches. However, the main focus in this part will revolve around approaches that are more related to urban architecture and geography, as this concept can hold vast meanings from different fields.

Zevi (1957) sees that urban space represents all the enclosed spaces 'voids' such as squares, gardens, streets and parks that are created by the limits of the built environment. He accordingly states that architecture elements such as walls and buildings help on establishing a boundary between a space and another, these limitations create what we call an internal space (inside a closed boundary itself) and an external space -urban space- (defined by multiple boundaries around it) (Figure I.1). For Zevi however, the created space does not only revolve around the separation of space (in terms of privacy), but also in how the pattern space is arranged into a

relevant form for users, as there are several objects that are included in the shaping of urban space and were not often considered as structural elements such as fountains, bridges, trees, buildings' facades and so on. These elements play a unique role in defining space which could provide a whole new experience (Scruton, 1979). Krier (1979) also identified the urban space as morphological elements composed of streets and squares. Other authors argue that urban space is defined in terms of the streets pattern and the physical structure in general, while some others related the urban space to its appearance and the different shapes and heights (skyline) and the image that they express (Lowndes and Murray, 1988).



**Figure I.1.** Internal and External space by Zevi (1957).

Colquhoun (1989) defined the concept of urban space with two basic aspects: a social and a built space. He describes the social space as ‘the spatial implications of social institutions’, he illustrates that the physical attributes of space are considered as a secondary phenomenon that only occur along the social aspect but this is mostly studied by sociologists. The built space however, represents the physical structure of space, it’s aesthetic, how it is perceived, and the functional dimensions that affects users in that space, and this is mostly architects’ domain. Bourne (1982) has also elaborated the meaning of urban space in two dimensions (a spatial and a non-spatial). By adopting the theory of systems, he believes that urban space is a compilation of individual elements arranged together in a special pattern to form a city, with physical elements such as buildings and different land uses, as well as non-physical elements such as social and economic activities. When all these small elements are integrated together through a group of directorial rules they create what it is called an urban spatial structure.

From another perspective, according to Bacon (1975), the city is made up by two principal elements of architecture, stationary architecture and movement architecture. In other words, the patterns of streets as well as squares play a huge role in defining the generated movement in urban space, thus, it is necessary to be accommodated properly. Here, it could be concluded that urban structure’s pattern helps users experience the same space with different perspectives depending on their desire. Moreover, Hillier (1996) also linked the experience of moving users

in the urban space with optional activities that are generated by the structure, as these activities might offer or deny the visual permeability, that's what he called a 'by product' space (Bada, 2012).

An urban space is also called a public space, this term is mostly used to indicate that the space is accessible to the public rather than being strictly private 'common place', in this space, unplanned social encounters are a usual activity and therefore it is necessary to be regulated (Huat and Edwards, 1992). Francis Tibbalds (1992) saw the public space as a necessary component of the urban fabric in order to provide a visual as well as a physical access to public users, he also mentioned that these spaces are an extension from squares, parks, streets of the city and enclosed by buildings as they serve as a limitation for these spaces

Françoise Choay and Pierre Merlin (1996) defined the public space as the non-built part of the city that is assigned for the people of the public domain to use and fulfil their needs. Regardless of people's gender, age, social status, ethnicity or race, public space is considered as an accessible location for all people, it provides people's needs as well as spaces for mobility and sociability (Carmona et al., 2003). Public space is therefore formed by a property and by an allocation of use. Mitrasinovic (2006) however, describe it as a "resistance against the aggressive processes of commercialization and globalization".

All in all, from a physical perspective, urban space is defined as the space resulted from a combination of a set of built units, which could be referred to as blocks, buildings, urban quarters, alongside other complementary elements. However, several scholars put an emphasis on the importance of the social factor in shaping urban space, as it mostly generated to cater with the needs of users in that space. Public space is a "common ground where people carry out the functional and ritual activities that bind a community, whether in the normal routines of daily life or in periodic festivals" (Carr et al., 1992). Thus, the public realm is the place where several events and social interactions unfold in cities. It's a historical product, which created and nurtured by the influence and the difference between society, state and the market.

### **I.1.2. Public spaces throughout history**

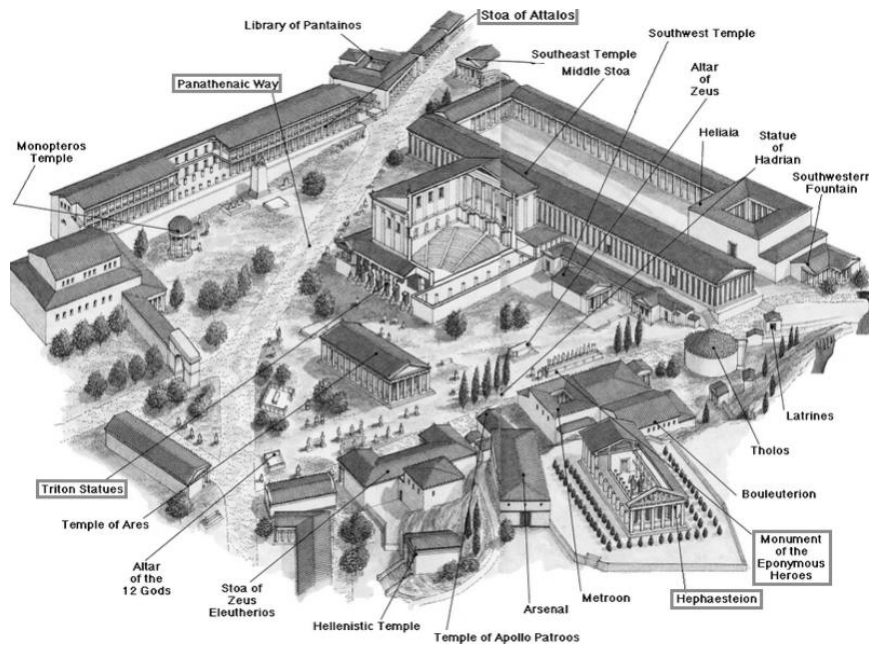
The term of space is considered to be the core essence of architecture throughout history, Sigfried Giedion (1967) defined the creation of space with three different levels. Starting with Greece, Sumer and ancient Egypt periods, space was mostly a combination of meshed together volumes where the interior space was abandoned. In the second level, which was during the

Roman era, they were the first to start paying more attention towards the interior space which was as he called a 'hollowed-out' space. At the beginning of the twentieth century, the third level was about adopting a whole new perspective to space and the elimination of the old one.

Historically, Public spaces have emerged by the influence of many factors, some of them were a result from 'left-over' spaces in urban areas that were later used as public spaces, some others were created to meet the diverse needs of a society, i.e. aesthetic aspects and function needs. And the rest were just the consequence of a regulated formal planning procedures throughout time (Carr et al., 1992).

In the Old Stone Ages (Palaeolithic and Neolithic periods), humans were grouped together in small societies such as bands or tribes where public gatherings were part of their nature, this has resulted in the creation of public spaces, where they existed to help with the gathering between a chief of a tribe and his inhabitant, between chiefs of different tribes or between inhabitants themselves, mostly to the exchange of goods, training, and hunting (Riveline, 1999). In the latest part of the Palaeolithic period caves that acted as houses for early people became as places for different ritual gatherings and religious activities.

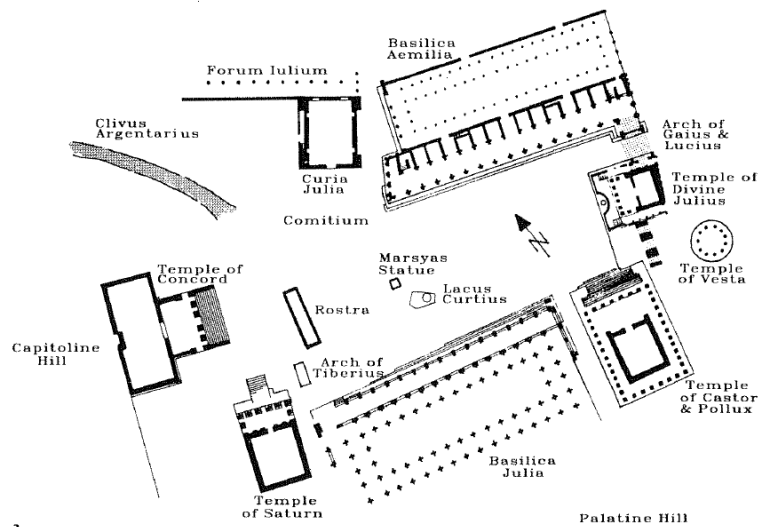
Back in ancient Greek cities, the 'Agora' was the main public space for many kinds of activities; social, political, artistic, spiritual, athletic, and economic life in the city, where the meaning of the word 'agora' actually is 'gathering place'. The Agora first served as place for military purposes, and later on as a marketplace for the exchange of goods and artisans work. The best example to mention here is the Agora of Athens which was situated in the Acropolis, initially it was used as a standard agora, however, it became more as a sacred place which revolved more around religion, this was reflected in its layout as well, it was planned around the Panathenaic route (a path that cut through the city from the main gate in Athens) along with other important temples (Ring et al., 1996). In ancient Athens men had the upper hand over women in every way as the agora was mostly for business and politics, aspects that men strongly dominated while women were seen only as homemakers, even the people with high authority back then preached that public spaces are restricted for women as they remain for male citizens only (Rotroff et al., 2006).



**Figure I.2.** The Athens Agora in the 2<sup>nd</sup> Century.

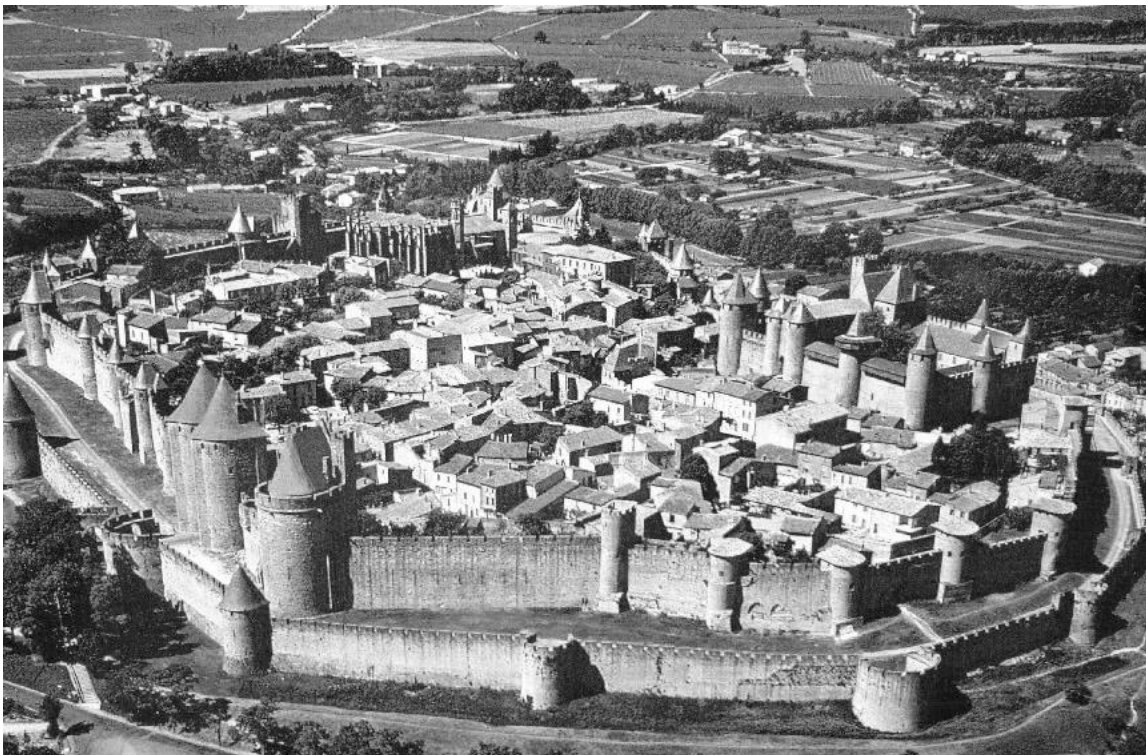
**Source :** <https://romeonrome.com/2018/10/athens-in-the-roman-empire/>

Rome cities also had the 'Forum' which played an important role for outdoor day-to-day activities for citizens during many centuries (which was also affected by the Greek Agora), it was a compilation of open, semi-enclosed and enclosed spaces that served as the centre for all kind of commercial activities, also a place where speeches were given, and where criminal trials were held. Over time, this forum served more as a city square to hold the same activities even in greater numbers (Favro, 1988). The layout is generally a rectangular form (plaza) situated in the intersection of the two most important paths of the city (centre), and surrounded with the most important buildings (temples, shrines...).



**Figure I.3.** Roman Forum in the early empire. **Source:** (Favro, 1988).

With the implosion of the Roman world, it was the time for the medieval city emergence, by gathering the people who fled from the Europe's cities, this city was a compilation of growing settlements encircled by the city's walls which gave a sensation of security and helped with the appearances of commercial activities -the Market Square- (Mumford, 1961). Considering that the medieval city was a city of commerce to begin with, marketplaces served as a public space in which they were the main area for gathering and trade. Back then, the cathedral was an important building and institution in medieval cities, and usually marketplaces would take a close place next to them to take advantage of the high density and activity of people. This period was also the start of the conflict between citizens regarding the estate of spaces as a private property, and since that the city was protected by walls, the limitation of space was becoming a problem over time (Carr et al. 1992).



**Figure I.4.** A typical Medieval city. **Source:** <https://www.shorthistory.org/middle-ages/how-medieval-european-cities-started-to-develop/>

In the renaissance period, cities knew a shift in their design, where the artistic style took over function. By the help of architects and painters at the time, they start dedicating more intention towards the overall design as well as the art style by the elaboration of concepts such as symmetry, this played an important role in creating a harmonious design in terms of the layout of the city and the elements of which its composed (buildings, public spaces...). In this period,

the design of the public space was on the scale of the whole city. The Renaissance squares were generally symmetrical and carefully planned to maintain that unitary design, where it was perceptible even in the façades of buildings. These public spaces were surrounded by residential buildings (for upper class citizens) which made the space more restricted for public citizens, this might help making this public space more of a popular and a dynamic destination in the city (Carr et al. 1992). One of the most noticeable examples are St. Peter's and the Vatican in Rome (Figure I.5).



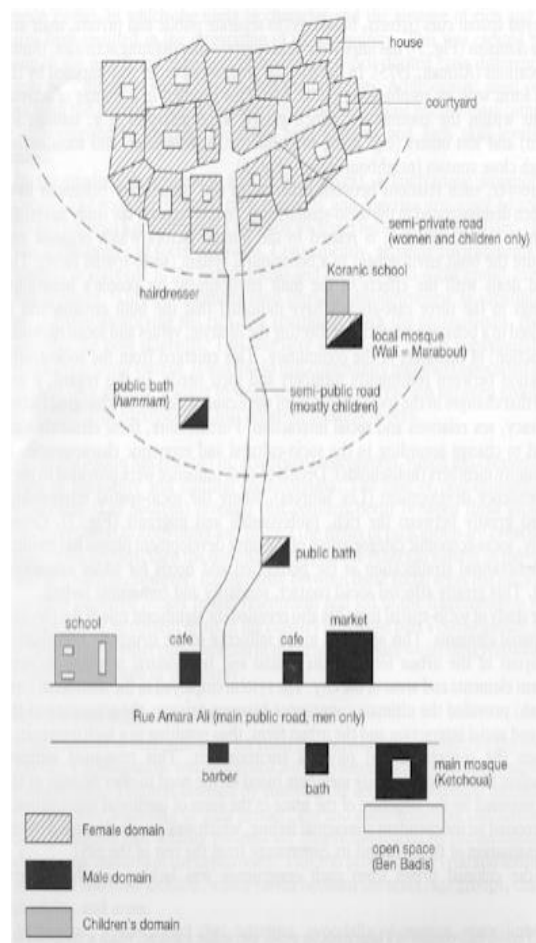
**Figure I.5.** St. Peter's Basilica and square in Vatican City, Rome.

The urban layout of traditional Islamic cities lays on several attributes; economic, social, cultural and most importantly religious aspects, some researchers however, argued that they were actually a continuation from pre-existing cities combined together with other inherited features (Hamdan, 1962). The overall layout in fact, was initially influenced by the natural conditions (topography, climate) as the location of the cities were known for their hot and fickle climate, this was reflected with the streets' pattern and how they were covered as well as the gardens and courtyards inside buildings. Streets in the Islamic city were only used for transitioning from one place to another, which mean that no social interactions occur in the streets, there was no public squares neither a dedicated place for gatherings, instead there was the Market. The Souq (market) is considered the most dynamic place in the city where people can meet and communicate with great density (mainly men), The Souq mainly provides daily economic activities for some people, as well as places for gathering for others such as Pubs (Saoud, 2002).

As mentioned earlier, the religious practise was a core element in shaping Islamic cities, which was exhibited in the Mosque as it usually occupy an important location in the city, it was mostly a destination for men for their weekly Friday prayers. Attached to the mosque, there is an open space as an extension from the mosque (Figure I.6), this place plays a role in the separation between the sacred space (mosque) and the rest of the city (public domain), thus, it is mostly



used by people who are entering or leaving at the daily prayers time periods. The cultural principles in Islamic societies stress the separation between their private and public life, thus, there was a separation of spaces in the city (public/private domains) which also was reflected on how streets were narrow with dead ends when traveling deeply inside their quarters. One of the most dominant rules in Islamic societies is also the separation between genders, especially in the use of space where women were bound to their house and their role as mothers (private space), while man took the city as their daily destination (public space). Furthermore, this was shown in how land uses were distributed inside the city, as commercial activities that involved social interaction took location in public spaces while private spaces remained separated and for residential purposes only (Saoud, 2002). All this had given the Islamic city a unique identity, however, after the modern era, the concepts of private/public spaces were developed and that led to the appearance of shopping centres as an alternative for Souqs and Bazaars, which contributed in more gender mixture, as the city continued its growth (Bazr and Khorrami, 2015).



**Figure I.6.** A map that shows the Socio-Spatial form of Casbah city in Algiers for every domain. **Source:** Saoud (1997)

In the modernism era, cities yet again adopted a huge change in their principal of layout. Under the lead of Le Corbusier, the Athens's Chart (1933) theory has been set to take over and prioritize the function over form, this was based under four concepts; to live, move, work and recreate. The primary design of the city was a compilation of a set of rectangular belts of buildings with unstructured landscape in the centre, this made public spaces become more of a semi-public space and caused more social segregation. The 'Functional City' also focused more on fast movement (cars) in urban space rather than pedestrian's movement, which was the consequence for diminishing the relationship that once existed between buildings and open spaces (Mumford, 2002). Functionalists stated that the relation between public spaces and the city are planned under a single organized system accordingly to the rules that they have already set, and although one of this theory's objectives was to focus on the interests of public in the city, however, modernists abandoned the historic public spaces (Bugarič, 2006).

Scholars such as Newman (1973) and Jacobs (1961) have emphasized the diminishing quality of urban spaces in modern cities and the challenge that they represent in the future managements to reach a social public space. Many public spaces in the modernism urban planning were considered to have no 'character' such as the plazas that exist far from pedestrians in the city or the neglected waterfronts. Trancik (1986) claims that these spaces are 'antispaces' with negative effects to the people and users, he called them a 'lost space'. As a consequence, the city had lost its identity and this urban-planning project received a lot of criticism; high standing buildings and expanded public spaces with no connection with one another but their function, a space without the sociability neither perception.



**Figure I.7.** Plan Voisin for the centre of Paris, 1925. **Source:** Le Corbusier (1925).

Since the 1960s, Jane Jacobs has emphasized the issues that public spaces suffered from, she pointed out to public spaces' privatization, and how suburbanization was the consequence to the hollowness of city centres. Modern cities have become increasingly segregated in terms of their layout and spatial prioritization, which was a consequence to less urban dynamicity in the public realm as it was seen with the modernists and their new ideology of changing the city into a functional one (Smith, 1992; Healey, 1995). With the continuous development of public space and the effects of technological progression, they continued to suffer from big changes in terms of their form and character. For instance, the mechanical transport has dominated the city due to the phenomenon of suburbanisation which introduced more transit roads that also overshadowed the pedestrians' mobility, and was the cause to diminishing the old urban fabric. The diversity of roles that roads once provided has changed and became more about vehicular transportation, these roads also represented a barrier for pedestrians given that the city centre became more separated from other subcentres and districts as cars took over the city and its public spaces and left pedestrians with no destination (Jacobs, 1992). Thus, public spaces have changed from being spaces that facilitate social activities, to only serviceable and functional spaces, which was a consequence to the loss of their historical character where people could mingle (Hall, 2002). Accordingly, they also become segregated from the rest of the city, they lacked the aspect of safety where crimes incidents start increasing and making these separated spaces more repelling for users.

Compared to nowadays, old public spaces played the role of being the stage where most of social interactions happen, most of these places were a place for gathering and commercial activities with great densities of people, even when they were dedicated for certain domains only. In developing countries, public spaces are experiencing fundamental changes during contemporary urbanization, several scholars have summarized these changes on three different aspects; fragmentation, privatization, and the revert to the old character of public spaces (Carmona, 2010; Madanipour, 2019).

Due to the phenomenon of privatization, contemporary cities are in a continuous process of transformation, this consist of the diminishing of the public domain and the changing of their physical as well as social public spaces, this is also was a consequence for the emergence of a space with hybrid properties, it's the 'in-between space': a space that is located between the public and private realms (to be developed in the next chapter). Thus, with the threat of public spaces and segregation, it is necessary to take it under concern as cities continued on this process of privatisation and abandoning the public spaces.

Postmodernism movement tried to revert back to the characteristics that public spaces represented throughout history which adopted concepts such as local identity, character, and the connection between places of the city (Gyurkovich, 2005). Other movements also aimed for the establishment of sustainable urban spaces with durable city's structures and liveable spaces for people. One of the major movements that looked to respond to people and their spatial use is New Urbanism. This approach is set to limit environmental impacts by changing the built environment and provide more of a sustainable transport. Because those who live in the suburbs (that are caused by urban sprawling) are more exposed to environmental effects and have more travel distances than those who live in urban neighbourhoods (Ewing and Dumbaugh, 2009).

Contemporary public spaces are considered as a big issue in terms of management in cities. Several studies on the design of contemporary urban spaces have proved that the presence of retail as well as tourism and other leisure activities helps increasing the social qualities in public spaces (Binnie et al., 2006; Miller, 2001). Scholars from other fields outside of architecture and urban planning believe that contemporary cities do not necessarily need the characteristics of ancient public spaces neither the modern ones, as they actually need to adopt with the need of the contemporary city and its society. Moreover, there are several spaces that adopted the properties from different periods of history but proved to be a failure especially in terms of the spatial use, due to the lack of taking into consideration people's behaviour and needs and looking only into the architectural part (Bada, 2012).

## **I.2. STREETS AS PUBLIC PLACES**

### **I.2.1. Streets Between the past and the present**

During the development of urban space throughout history, it was indisputable what streets represented for the whole city, they were considered to be the link that connect the whole system together (between every space and another). Streets were the centre for social gatherings, mobility, and all sort of activities, they eased commercial exchange as well as connecting buyers and sellers together (Wahba et al., 2017). In cities, streets represent the image and the symbol for the urban realm as a whole, they are considered to be the larger part of public spaces especially in the unplanned areas. Many studies indicated that when people think of the urban space they mostly envisage streets, thus any attempt to reanimate the public

domain is usually an effort to revive the street instead (to make them more dynamic and vital with users) (Jacobs 1961; Jacobs, 1993; Southworth and Ben-Joseph, 1996; Dane, 1997).

Back in the medieval period, streets were known for their narrow structure, they were crowded by citizens and shopkeepers that tried to trespass their domain and wanted to take advantage of streets, this was a reason to create large conflict between them and government to prevent this kind of encroachment. Other scholars even stated that high class citizens rejected the fact that streets, marketplaces and cathedrals were used by lower class people. Starting from the sixteenth century and most precisely in the nineteenth century (Hausmann's renovation of Paris), streets adopted a formal pattern of organisation (straight and wide avenues) that looked as it was inspired from Romans which changed the overall layout of several cities such as in Italy. This was the consequence of architects trying to adopt a new design and perspective while facilitating the military movement as well as the movement of commercial vehicles inside compact cities (Girouard, 1985; Mumford, 1961). Eventually these streets have become a huge destination for gathering and social interaction for all society classes throughout Europe. In many places however, the segregation between people prevailed still, as high-class citizens were wandering in the main boulevards using their carriages as their primary mean of transport, while lower class citizens were neglected to the sidewalks and other parts of the city. Later on, there was an attempt to transplant European streets in America through L'Enfant plan (1790) starting with Washington D.C, L'Enfant's vision was 'dynamic and vital' crowded streets with people wandering back and forth especially with the existence of the mall, however, these streets didn't serve as was expected (social places), because during the time, Washington's commerce and population didn't have the fastest growth (Carr et al. 1992). In the recent years, architects aimed to fully reattract people to streets once more (with all sort of communities' engagement) by transforming them into public spaces, however, this transformation will only take place when a street is able to provide a variety of activities for people to engage and share between one another. (Madanipour, 1996).

### **I.2.2. Role of streets**

Many researchers claim that the relation between the street and the city is a complementary relationship and implementing the correct features into streets will reflect even to the inhabitants, which make the streets as important as the other parts of the city (Jacobs, 1993, p. 314).

Long ago, the main purpose of streets in cities was to be the place that provide mostly important and needs for inhabitations and the town in general, such as being a place for announcements, religious events, commercial activities and all necessary needs for survival and social interactions (gatherings and communications) (Rudofsky, 1969). In modern societies, these functions became more related to the private space as the public realm continue on shrinking (Brill, 1989; Rybczynski, 1993; Banerjee, 2001). Nevertheless, there are a minority of people who still depend of the activities provided in urban space, mainly in the mixed-use streets and centres that provide primary function that is hard to reach from a distance, like shopping, gatherings, meetings, movement, and all kind of social interactions (Jacobs, 1961; Gehl, 1987; Carr et al., 1992; Jacobs, 1993; Southworth and Ben-Joseph, 1996; Carmona et al., 2003).

Streets along with their sidewalks and bordering paths are considered as public spaces in nature, and they are important as the rest of city's spaces which contain the diverse public-private activities (Mehta 2009; Carmona et al. 2010). Jacobs (1961) stresses the role of streets as being the most contributor to the phenomenon of civilization, where people in sidewalks and streets themselves are considered to be the 'vital organ' in the urban space. In order for the street to provide many functions, it is necessary to focus on its different characteristics that create a sense of place, the physical attributes of streets for example not only that they offer a better accessibility to a certain space, but also, they can be the decisive factor that makes people feel safe and comfortable while wandering, and its all related to the visibility and how oriented is the path of the street (Shamsuddin, 1997; Ja'afar, Sulaiman, & Shamsuddin, 2012). Madanipour (1996) in the other hand, claimed that in order for the street to play the same role as public spaces does, it is necessary to take the social aspects under consideration rather than the physical attributes only.

Every street has its own character, and could be various characteristics at the same time which make it considered a street with 'multiple personalities'. Any street tends to have an official designation adding to that additional and possible functions for distinction. In London, the Institution of Civil Engineers has classified roads and streets depending on their 'intended' function (ICE, 1994). A hierarchy of function has been mentioned in table I.1.

**Table I.1.** The hierarchy of roads depending on their function. **Source:** (IHT, 1997)

| <b>Road time</b>     | <b>Predominant activities</b>   |
|----------------------|---|
| Primary distributor  | Fast movement with long travel distances, no frontage neither pedestrian access                               |
| District distributor | Medium travel distances between different part of an urban area, could be dedicated for public transportation |
| Local distributor    | All vehicular movements   |
| Access road          | Could be used by slow traveling vehicles, walking and it is accessible  |
| Pedestrian street    | Walking, meeting, interaction.  |
| Pedestrian route     | Mainly walking but other times shared for cycling   |
| Cycle route          | Dedicated for cycling only  |

### **I.2.3. Streets characteristics**

Street's properties along with their role is what offer the street its identity, these characteristics is what make a street recognizable, legible and distinguished in terms of character from others. Physical characteristics plays the role in defining the city and are the most associated attributes to generate a 'sense of place' inside city streets (Shinbira and Sulaiman, 2010). When we feel the action of 'arrival' to a certain place or being 'somewhere', that's what it is referred to as the sense of place (to be developed in the next chapter). Architectural attributes, buildings, materials, functions, history..., all these characteristics plays their unique role in materializing a character for a certain place (Anonymous, 2013). Streets characteristics can be summarized in three aspects; location, accessibility and design.

#### **I.2.3.1. Location**

One of the important physical properties of a streets is its location which becomes related to the street as a description to be recognizable from other places, this is also important whenever the street is located in a distinguishable environment that is known from the surrounding buildings that also hold a special identity, for example the locations that are known for their diversity of activities for users, which tend to offer more opportunities in the city. Another example are streets and sidewalks with large dimensions to adapt with the higher density of users (Shamsuddin, 1997; Jacobs, 1961; Jacobs; 1993). Location also helps on providing a better accessibility to a certain location or to deny it completely, that is why it is important look

into this aspect especially when a street is really connected with the rest of the city, with several entrances and a diverse means of movement (pedestrians, cars...) (Ujang, 2008), which lead us to the next point which is accessibility.

### **I.2.3.2. Accessibility**

Street is the ground for peoples' activities, its degree of accessibility through the rest of the city is what makes people take it either as a destination or only as a route to travel. There are two types of accessibility, one is the physical accessibility, it is shown in the spatial structure and its functions which control the accessibility to the street. Visual accessibility in the other hand is the information provided for people before engaging or entering a street (Jalaladdini and Oktay, 2012). As being accessible to all its surroundings, street represents the public space with its finest characteristics (Carmona et al., 2003, p. 111).

### **I.2.3.3. Design**

One of the important and easily recalled physical characteristics by perceivers in a certain street or building is its appearance and shape. This is can be noticeable by texture, colours, size, materials, height and even smaller details which could make an element play the role of a landmark for the user (Appleyard, 1969; Shinbira and Sulaiman, 2010). Not only that physical characteristics play the role of landmarks, an art work and style, but also, they can be used as a compass to help finding a certain location or to determinate the path to take for a certain location (Lynch, 1981). Non-built elements such as streets furniture and equipment also give it its own character where it changes how the street would generally appear to the eye (Shamsuddin, 1997), Telford (2007) states that these additional elements need to be taken into consideration when designing a street, as people in some cases are more charmed by these secondary elements rather than the actual physical properties. Landscape characteristics also have its own impact on the street and the overall appearance which is usually shown with the natural elements (Abbaszadeh, 2011). Soft landscape is the compilation of natural physical elements such as topography, plant and water, while hard landscape (street's furniture) in the other hand work as a complementary element to the natural characteristics (London Borough of Croydon, 2009; Mehta, 2007).

### **I.2.4. Streets patterns**

Contrary to others, many scholars throughout history have seen the development of cities to be related to a 'form-series' rather than a 'time-series'. Rob Krier in his book *Urban Space*



mentioned that all the potential urban forms are already known. Thus, the history of cities can be explored by their typology and pattern of urban form, and how particular typologies had the same function or not, or maybe they had the same form but at other time periods had unique variable functions. It can be concluded that, urban space is related to both its physical form and function (Hall, 1998).

In literature, the classification of streets pattern of urban space has been conducted by several approaches. Marshall (2004) for instance has developed an approach where he classified them based on the concepts of microscopic and macroscopic street networks (Figure I.8). The city level network (macro-level) consists of the streets that take long distances and also that serve as travelling routes from one area to another inside the city and often even from one city to another. In the other hand, the network of a neighbourhood or a district (micro-level) are generally the streets that linked to residential neighbourhoods, they serve the movement in neighbourhood streets given that they don't involve in a big portion of city's routes. He then combines the types of macro-level street network (grid, linear, radial, tributary) along with the types from the micro-level streets network (grid and tree) to identify the street pattern in a city (Marshall and Garrick, 2010, 2011).

| Macro: | Linear | Tree      |        | Grid |
|--------|--------|-----------|--------|------|
| Micro: |        | Tributary | Radial |      |
| Tree   |        |           |        |      |
| Grid   |        |           |        |      |

**Figure I.8.** Hybrid patterns as permutations of macro and micro scale structures. **Source:** Marshall (2004)

The most common approach however, consists of reading the overall pattern of streets rather than focusing on their type by scale and then combining them. In a comparative analysis of suburban street patterns, Southworth and Ben-Joseph (2003) have classified the pattern of

streets into five types: gridiron, fragmented parallel, wrapped parallel, loops and lollipops, and lollipops on a stick (Figure I.9).

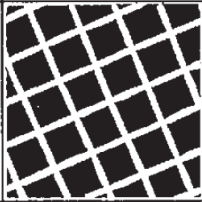




The gridiron pattern is considered the simplest type of street's network, it's a compilation of two groups of streets arranged in a parallel manner and crossed together to form a shape of rectangular blocks. This pattern of composition offers more points of accessibility, more surface for the streets and even more blocks in comparison to other patterns of streets. Although this type offers more route choices and opportunities for pedestrians with a short trip distance (walkable neighbourhood), however they are generally cost more in terms of the infrastructure management (Southworth and Owens, 1993).

The second pattern which is the fragmented parallel type is partially similar to the first one in terms of the aggregate street length, however, the blocks are reconfigured which results in the formation of L-shaped, narrow and long rectangles. Contrary to the gridiron pattern, this type offers less accessibility and also has less connectivity between the streets. With transformation from the grid pattern into the fragmented pattern of streets, it is easy to assume that by then pedestrian movement was becoming more and more overshadowed by the growth of vehicular movement (Southworth and Owens, 1993).

The warped parallel pattern of streets characterizes by streets with curvy shapes, L corners, T intersections and narrow-long blocks. Similar to the fragmented parallel pattern, this type also limits the street's visual length. With the reduced street lengths, intersections and points of access, this pattern emphasizes yet further the focus towards vehicular movement (Southworth and Owens, 1993).

The loops and lollipops pattern of streets is mainly known by the presence of several cul-de-sacs and loops which form a non-directional pattern of streets that curve and curl back to themselves. In this pattern also, the interconnection between streets is weak compared with the gridiron pattern, the insufficient access points and route choices form restrained safe spaces for children's use for instance (Southworth & Owens, 1993).

Finally, the pattern of the lollipop on a stick street is created from the dead ends as a branch. Although this pattern provides the most privacy, however it minimizes access points and route choices drastically and diminishes intersections between streets. It also greatly obstructs pedestrian movements by increasing the amount of house lots in dead-end streets (Southworth & Owens, 1993).

|                    | Gridiron<br>(c. 1900)   | Fragmented<br>Parallel<br>(c. 1950)   | Warped<br>Parallel<br>(c. 1960)   | Loops and<br>Lollipops<br>(c. 1970)  | Lollipops<br>on a Stick<br>(c. 1980)  |
|--------------------|---|---|---|--|---|
| Street<br>Patterns |  |  |  |  |  |

**Figure I.9.** The classification of streets pattern. **Source:** Southworth & Ben-Joseph (2003).

### I.2.5. The concept of ‘main street’

The term of ‘Main street’ or ‘High street’ in Britain, is referred to the street that prioritize pedestrian experience over vehicular traffic, it is considered as the main corridor for shopping and commercial activities, this street also provides other services such as offices, institutions and civic buildings, moreover, main streets also are used as a public space to host important events and community festivals as well as to give speeches. This street is usually designated in villages and small towns and topped by not higher than three stories buildings, while focusing on the aesthetic aspect more than the other normal streets. It is important however to know that these characteristics are only a general description found in the main streets throughout history and not all streets share the same attributes (Clemente, 2005; Francaviglia, 1996).

When talking about urban planning, Lockwood (1997) believes that the main street plays a huge role in establishing a sense of community in a neighbourhood. Main streets are characterized by their local identity and are often dedicated for small towns or neighbourhoods (neighbourhood centres), they work as communal hub and they are particularly a solution for urban planners when it comes to increasing the sociability between local residents, where they are in close walking distance from their houses and may facilitate pedestrian accessibility when doing their daily shopping (Francaviglia, 1996). Thus, with the noticeable success of main streets in many cities and towns, several urban planners and decision makers tried to adopt the model of the ‘main street’ and its characteristics in other cities and suburbs, this would help on creating new mains streets as well as on revitalizing cities centres and dead old streets, mainly by increasing commercial activities and therefore becoming more vital (Southworth, 2005). It is important however to mention that since the large development of shopping outside of cities and the fact that retailers start shifting towards bigger centres, the traditional role of the main street was compromised along the smaller centres and the liveability that existed within their

neighbourhoods. The image of the 'main street' that once was symbolized in the last decades became more and more unreliable (Griffiths et al., 2008).

### **I.2.6. The Neighbourhood**

Neighbourhoods are an important physical part of the city and they are characterized by unique social, economic and physical features, and each feature can present an understanding about neighbourhoods. They are considered as the main entity of the city and an element that affect the process of cities creation. People spend most of their daily activities in urban spaces, they live, shop and wonder within their neighbourhoods, thus, it is necessary to consider the needs of the local society whenever designing or planning future neighbourhoods. From a larger scope, urban neighbourhoods also are a big part to the formation of sustainable cities. Through the value that they provide around the principles of economic, social and ecological environment, they are a part from many others to construct sustainable settlements (Al-Hagla, 2010; Hao et al., 2021).

Giddens (1984) states that's a 'place' can be viewed in different facets, however, in order for the place to be characterized by a 'local' character, it is the people in the space along with their social activities is what shapes this space. In neighbourhoods, streets are the elements that identify their limits and the type of fabric, streets along with residential open spaces are the places where social interactions unfold, together they create a unique local character and experience for residents when wondering in the area. Neighbourhoods planning is also important element for commercial revitalization inside cities. In neighbourhoods, retails and commercial uses such as convenience stores, coffee shops and restaurants.... are mostly dedicated for local residents and potentially employees that work in the same area, thus, stores distribution would be denser depending on the compactness of residential and firms that exist in neighbourhoods (Schuetz et al., 2012)

### **I.3. URBAN SPACES AS COMMERCIAL PLACES**

When revisiting the development of urban spaces throughout history, we saw the importance of commercial activities on keeping the dynamicity in the public spaces, and often they were the only factor that drove people to a certain location, which also can contribute in increasing the social interaction aspect in an indirect fashion. Public spaces such as shopping areas, commercial streets, community centres, and high accessible streets, share an active role for

cities' communities as they serve as a 'self-organising public service', a place where people are joint together to create new experiences and value (Mean and Tims, 2005). In the next section, the focus is to look into these different functions as public spaces as well as attractions and their influence in the city.

### **I.3.1. Commercial land uses**

From a geographical point of view, Land use is considered as one of the powerful shapers of cities and urban form. The pattern of socio-economic functions in cities is a concern when we are studying cities spatial structure, as they can influence people's behaviour and their adaptation to their space. Clark (1985: 667) sees that urban form is mainly areas of different land uses that take location based on the possibilities of accessibility.

In the city, commercial uses are classified to several categories; offices, industrials, leisure, healthcare, retail... to name a few, all these functions play a huge role on keeping the urban space vital. "Shops and stores are the most ephemeral of all building types. The ultimate architectural fashion victims, their need to remain up-to-date ensures that even the most expensive schemes, by the most renowned architects, have fleeting lifespans" (Oxford Companion to Architecture vol. 2 2009: 834), and therefore the focus of this part will be on the type of commercial land uses and their important role for the urban social life and the changing cities' structures, as the different models of commercial functions such as commercial streets, neighbourhoods' centres, shopping centres, they represent the environment for all kind of public life between citizens (Farahani and Lozanovska, 2014).

### **I.3.2. Retail commerce**

Vernet and de Wit (2007) in their book *Boutiques and Other Retail Spaces* defined retail architecture as "those market spaces, both real and virtual, that affect the relationship between supply and demand", which means that it gathers all types of functions that provide the needs of the people such as stores, shopping centres, and even internet shopping. Thus, shopping doesn't end at shops and retail spaces as the activity of consumption continue on attaching to consumers even in cafés, homes (with internet), parking areas, and even the whole street, all these means provide a shopping opportunity in our everyday activities (Gregson et al. 2002).

Nowadays retail commerce has become a necessary part of urban space where it is expanding everywhere with a diversity of functions, it can be found in libraries, museums, open spaces, and even workplaces, it's a truly visible representation of the public realm. In the other hand

traditional commercial space that once held a character began on disappearing while other commercial models such as malls continued on increasing and creating a new environment only for retail, this has contributed in the withdrawn of people from city centres (de-territorialisation), which also would reflect on the urban development and design that would meet the needs of society in the future (Karrholm, 2016).

Consumption space may be seen as anything from department stores, cruise ships, casinos, bowling alleys to even housing areas (Miles and Miles 2004). Sharon Zukin (1993) stated that urban space has been changed to a 'landscape of consumption' rather than a 'landscape of production'. Many scholars also argue that in modern cities, their primary role has become all about consumption, which in return affected the social role that cities once represented (Miles and Miles 2004; 172).

Several researches that were done on consumers behaviours showed that shopping does not actually consist of the price and the quality of products but with the identity of people and social affiliation, where consumers attach their position in society with their labelled possessions and where they prefer to do their shopping (Zukin, 2004). Accordingly, retailers now pay more attention to the design of their shops to provide more of an attractive, friendly and pleasant atmosphere to cope more with their group of people, with aimed and elaborate rules (Klingmann, 2007, Lonsway 2009). Salesmen now plan and organize their timetables with better work opportunities, with important yearly events, special offers, and adjusting their opening hours in comparisons with other stores just to enhance their chances in success and profit (Karrholm, 2016). Retail locations also are not random as they mostly adjust to the movement of people to take advantage of the areas with high density of flows. Hillier (1996) studied the relation between the urban spatial configuration and pattern of commercial activities' distribution where he demonstrated how shops tend to take the most accessible and attractive locations within the city, in space syntax theory that's what he called integrated city streets. Raeon (2010) also mentioned six important attributes to take in consideration when selecting a location for a retail store, which includes, visibility, store's identity, comfort of shoppers, the dynamicity of people around the shop, vehicular flow and the availability of parking spots.

Buying or selling is an opportunity that can be found without planning, however, when talking about shopping, it's an activity that only occur in a dedicated space, which also would affect the urban space and its development over time, several studies have been raised lately to deal

with the phenomenon shopping and retail growth and its influence on cities, towns and regions. Not only that they are considered an important function in urban development, shopping spaces has become an emblem for urbanity in the present time. (McMorrough 2001; Zukin 2004; Karrholm, 2016). Retail commerce development is becoming an inseparable part of cities growth, they influence economic structures and even the pattern of urban space. Thus, to provide the needs of people while maintaining a healthy urban life, it is necessary to study the pattern of distribution of retail stores in the urban space

### **I.3.3. Shopping centre**

The shopping centre, also called a shopping plaza is considered the modern adaptation from the marketplace (seen in the historical development of public space), it is a compilation of several separated stores and services gathered and managed together, they are usually arranged in a single row and share the same building. This unit also may provide other uses such as cars parking, restaurants, theatres, leisure activities, and even offices and banks. Besides their main role of being as shopping locations, these large centres also serve as places for entertainment and social gatherings.

In term of retail business and land use, shopping centres were considered as a success during the twentieth century (Beyard and O'Mara, 1999). From the 1950s and for over 40 years they represented the retail picture in all over American as well as Canadian cities as their numbers surpassed any other leisure facilities (Kowinski 1985). Shopping centres were so wide spread and served entire cities and regions, they usually drop under; super-regional, regional, community, and neighbourhood centres. The neighbourhood shopping centre which is smallest among them serves as a supermarket to begin with, and mostly provide daily services like convenience stores, laundry services..., and generally serve from 2500 to 40000 in a six-minute period of time. The only difference that the community shopping centres have beside all the mentioned activities in the neighbourhood centre, is that they provide more variety of stores such as clothing stores, repair stores and so on, this type usually serve between 40,000 to 150,000 users. The regional shopping centre in other hand serve a whole geographic area of a city or a state, by providing multiple department stores along with other many stores and services (ICSC shopping centre definitions, 2020).

#### **I.3.4. The mall**

The term of the 'mall' originally derived from the meaning of a shopping promenade for pedestrians, it is considered as a place that gathers a variety of commercial activities where shoppers can easily reach to them in the same has been found since the ancient 'Agora'. Shopping malls are usually confused with shopping centres as they share some characteristics, however, they are different in term of their accessibility as stores are grouped together under one building. They are considered an evolved version from the department store that appeared during the modernism period (after applying the Athens' Chart) and emphasized the idea of separating functions in the city, these malls played one of many roles in destroying the connection between different parts of the city where usually all-important interactions took place such as markets and commercial streets, because they were mostly located outside the city and were easy to reach by car 'out of city shopping'.

In the U.S, the mall was a solution for the increased needs of people who lived in the outskirts of the city, initially it provided necessary things for the public such as commercial activities, however, later on it started providing more additional functions as people found it as a destination for meetings and gatherings inside a vast space with several means for mobility to facilitate the movement inside the building given that the city centre was far from within reach. After the success that the mall had in the outskirts of American cities, it was transplanted into the city centres with some adjustments like providing parking lots underground (Stancu, 2010). As this commercial model continued its growth and implementation overtime, and by providing a diversity of functions and activities while offering a safe comfort space for pedestrians to wander, it started taking over the city centre, while urban planners and designers started abandoning urban space and the optimal characteristics for people spatial use.





**Figure I.10.** Ritaj Mall, Constantine. **Source:** <https://next-ritajmallcom.yet.vercel.app/>

### I.3.5. The department stores

The beginning of department stores was a developed version from the traditional retail stores that were once resided in commercial streets (Stancu, 2010). In the nineteenth century, department stores played the role of public spaces for people, they were also one of the easily accessible destination for women in the city to go to frequently (Bergman, 2003)

A department store in general is considered as large-scale store (stretched horizontally and vertically) where the main focus is the inside of the building and the activities provided in order for it work as a public space (Stancu, 2010). This model of commercial use offers a wide variety of goods and objects that are needed by people in their daily life such as clothes, food, cosmetics, and so on. The department store also could specialized in one type of products, which are shown with the ones that belong to a chain of stores in which they are usually located around a single country or even multiple countries. The difference between the department store and a shopping centre is that a department store is a single large store while the other one is a compilation of many stores in a single large complex.

### **I.3.6. Big-box store**

The development of different technologies of distribution systems in the early 1990s has helped with the appearance of the new specialized retail model, it's called the 'big-box store'. This new store has shown its impact by the revolutionary system of tracking products and merchandise as well as the easy communication between manufacturers, buyers and seller (Hughes and Seneca, 1997). Later on, these big-box stores have become the most successful and used retail models in the western cities. However, these new models have over-shadowed regional shopping centres and was the cause to the death of department stores, given that they were considered an important part of American cities (Kmitta and Ball, 2001)

### **I.3.7. The Bazaar (market)**

Earlier before the tenth century, markets of historic traditional Islamic cities were positioned in the city borders, they were often distributed along commercial routes and related to the caravanserai (outside the city), after that period of time, commercial areas and streets became inseparable part from the city centre and distributed from along walkways that connects one gate to another, they often represent the identity and character of the society of the area, which calls for proper policies to deal with their issues and to adopt with their future needs (Gharipour, 2012; Mehanna and Mehanna, 2019). In the traditional Islamic city, the bazaar or the Souk is one a few places that is considered as a public space, where it primary provide commercial uses for the people as well as a place for gatherings and social interactions. Unlike the mosque and the school, the market is not fully dominated by the religious aspect where people are restricted by certain rules.

Unlike market places that had a centralized pattern of commerce distribution, markets in middle east cities were distributed along internal streets in a linear pattern (Moosavi, 2006). As seen in the previous section, the whole common composition of the Islamic city is a group of inner spaces (covered streets) joined together in a single system which gives the perception of moving through interior places rather than the typical city compositions with volumes and opened streets. The market also follows these rules of design (a street market), as it is mostly covered which helps in separation of different types of commercial functions according to different sectors. The market provides locations for 'en-detail' trade (retail), and others which specialized in 'en-gros' trade (wholesale). In the bazaar most of the stores are open to the streets and the items are displayed directly to shoppers, in front the store, or inside the stores hanged on the walls to facilitate examining products and to ease the trade between the seller

and buyer. Thus, Bazaars are the definition of a public space with an aspect of privacy, where people can find their leisure in doing their activities (Saoud, 2002; Stancu, 2010).

### **I.3.8. Commercial streets**

Commercial streets or 'strips' are defined by the linear pattern of stacked retail and commercial services in 'box-like' form of buildings with visible parking lots in front, sometimes they host the same type of stores such as clothing stores only streets, and other times they provide a mixture and a variety of independent stores and social services (offices, agencies, cars dealerships...), this type of arrangement represents the typical commercial strips especially in American cities (Clay, 1973, Mazer and Rankin 2011 ). Commercial streets are not only a destination for shoppers to fulfil their daily needs, they also operate as a place for leisure, entertainment, and relaxation. Several researches that dealt with shopping behaviour, found that some of the shopper don't just use commercial streets as destination to acquire their needs only, but also to wander in the city, meet their friends, traverse from a place to another, and some other time just to watch people and enjoy a vital active place (Mehta, 2009). Other researchers have related the shoppers' behaviour into sociology and psychology aspects such as sensory motivations and the need for social affiliations into a certain community (Tauber, 1972; Jansen-Verbeke, 1987; Falk and Campbell 1997). These streets also are used to travel from different urban areas as corridors, where they often found in strategic places in the city, Sawyers and Tabb (1984) argue that strips work as connectors between the centre and the other sub-centres of the city which make them as the 'in-between' spaces. In the last two decades of the nineties, commercial streets have been ignored in terms of urban planning in American cities, their role was simply revolved around being connectors between the sub-centres inside the city while they turned their attention towards renovating city centres themselves, as a consequence to this, these commercial corridors lost their connection with the rest of the city as they become fragmented, which then considered as an unsafe and a repulsive urban development (Loukaitou-Sideris, 1997).

One of the indispensable issues during the twentieth century in urban planning is the uncontrolled development of commercial strips, where they can be a cause to the lost of natural resources, depleting of open spaces, traffic congestion and other pedestrian movement issues, yet urban planners and decision makers still ignore their growth. This development is usually guided by the growth of population, conventional zoning, and often by the real estate and tax system in certain area, as well as the belief that high active and busy streets are good location

for retail stores and other commercial activities. Whether these stacked stores are in a linear pattern or in a more compact form, they still ruin the experience for some people and their sense of place with their repetitive shape of buildings (without character) composition. Moldoff (2004) stated that ‘planned zoning’ could be one of the solutions to keep this phenomenon of development under control as it can limit their expansion and also keep up with the needs of the community. Another solution would be to adopt retail with a pattern of nodes in important streets’ intersections while decreasing the number of stores in the rest of the street. These nodes can include a variety of commercial uses such as offices, housings, stores..., however, it is important to zone and control this planning as it can be get out of hand at any moment (Moldoff, 2004).



**Figure I.11.** Gottingen commercial street, 1957. **Source:** Roth and Grant (2015)

### I.3.9. The Commercial district

Commercial districts are the distribution of retail stores in a concentrated manner within a certain area, it is considered an exhibition of commercial accumulation whether internal shops (shopping malls) or outdoor shops (along streets) (Berman and Evans, 2007). In the United Kingdom, dense high streets are called a commercial district. As main streets, they are also mostly dedicated for commercial uses, they gather all different types and facilities of commerce at different scales, which helps increasing the connection between commercial activities and consumers from different locations and ranges of the city (Wang et al., 2015).

The variety of the pattern of retails within a commercial centre itself is considered as a commercial structure inside the city. Since this concentration of retail are becomes more eminent through time, it keeps on growing and they start serving to the diverse shopping needs of people and residents across the city (Oppewal and Holyoake, 2004)

### **I.3.10. Mixed land uses**

Urban land institute defined the concept of ‘mixed land use’ as the diversity of functions and activities in the same local urban space (Urban Land Institute, 1987). Mixed-use areas are mainly for residential purposes that also provide a diversity of commercial uses such as retail, industrial and often cultural uses, mixed-use areas represent the most public and active places in the city by being the important part of streets and neighbourhoods. Brower (1996) argues that one of the important drives for people to visit a certain area, is the variety of activities along with other characteristics. For the western countries the mixed of land-use is an important element to keep the density of users balanced in the different areas of the city, it will create vitality and liveability, attractiveness, and even improving the security in some areas that were abandoned from people (Hoppenbrouwer and Louw, 2005).

The combination between residential buildings and commercial uses were always a part of industrial cities, between the nineteenth and twentieth centuries, modernists urbanists opposed this idea of mixed uses in neighbourhoods, where these commercial activities could affect the character of neighbourhoods, raising other problems and disorder as the role of neighbourhoods consists only of being residential areas. Jacobs (1961) in her book however, stood by the idea of mixed-land uses and challenged modernists ideology and urban theories of space separation, as she stressed the positive effects of the presence of commercial uses within a residential area and their role on vitalizing streets as well as the security aspect (more natural surveillance). Moreover, in the literature of urban planning and design it was shown that mixed-use neighbourhoods are actually belong to a favourable process part for the development of a sustainable, dynamic and viable urban public life (Jacobs 1961; Whyte 1988; Krier 1992; Calthorpe 1993; Kunstler 1994; Ewing et al., 1996; Duany et al., 2000). The continued growth of mixed land uses in the contemporary urbanism, was one of the dominant developments of commercial/residential models, this however, was the cause to the shrinking of public domain, which presented a different issue.

Correlations between the type and number of mixed land uses were only valued in several studies, Jacobs (1961) sates that the balance between the different types and numbers of land

uses can greatly affect what character the street can exhibit, as this was among the first researches to examine the relationship between mixed land uses and their social character. Mixed land uses are believed to provide a destination for people to reunite and social interact even when they are from different origins and backgrounds, together to build and participate in a wide diverse of activities (Talen, 1999).

The growth and change on the structure of retail uses especially in the outskirts of cities has a large influence of the urban development of cities as they can be the cause for urban fragmentation. However, shopping also have a positive side to it, as it gives people an excuse to meet and social gather in urban space (Graham and Marvin, 1999). Thus, shopping and commercial uses are ‘a two-edge sword’, they can fragment the city as they can play a large role in improving the dynamicity of the urban life.

#### **I.4. CITY CENTRE, CENTRALITY AND COMMERCE**

##### **I.4.1. The concept of centre**

The term of centre has several meanings in many disciplines, in the Cambridge dictionary it is defined as “the middle point or part”, its also “something that exists in the middle of an area”, in architecture and urban planning its “a place or building, especially one where a particular activity happens”, it is also “an area, city, or country which is known for a particular business or activity and where a lot of business, etc. takes place”. The centre can be identified by its ‘content’, it is therefore related to presence of activities, functions and the presence of liveability.

In urban planning, the centre is referred to the location where activities, employment and services take place in a close clustered pattern of distribution (Chiaradia et al., 2009). Labasse Jean (1970) defined the term of centre as a place of convergence where the city exercises and asserts its power from which an image emerges and exhibits the importance of a that location. Thus, the centre is not a point but also place where its meaning and importance changes according to different conditions, these conditions can be visual, structural or functional characteristics. It is the place for gatherings and social interactions, the city centre is considered as the heart of a city, the shopping centre, the leisure centre, the research centre, the training centre (Leburn, 2002). The centre has always been considered as a space of assembling to fulfil a particular function. The organisation of the centre is dependent on social, economic, religious

factors and so on. However, the centre doesn't not affect directly the life and the dynamicity of the environment, but rather helps creating a place where interactions could occur. Roger Brunet (1998) sees the centre as "a point in which phenomena are distributed in space". It is therefore a polarizing and organizing element.

The term of urban centre is also consisting of the gathering of activities, services and employment. Throughout history, it was obvious that centres change in size, shift, specialise, diversify and even disappear, which lead us to the next point; Centrality.

#### **I.4.2. Centrality**

The term of Centrality in urban planning is known with several meaning such as 'proximity' or 'accessibility' but it is mostly used to emphasize the importance of some areas or streets in the city compared to others. Centrality is "the fact of being central or being in a central position" The dictionary of planning and town planning explains that centrality describes the action of a central element in comparison to its boundaries (Merlin and Choay, 1988).

Centrality has been the centre of attention of many researchers in urban planning, and largely in economic geography (Wilson, 2000). Centrality concept means the ability to offer an easy accessibility from immediate and even distant places in the city, therefore, more visibility and more popularity, from that it is easy to assume that central locations tend to attract more retail and commerce activities to take profit of the high density of costumers who live there or only passing by (Porta et al., 2009). Space syntax theory has addressed the issue of centrality as a core element in urban analysis through the concepts of 'visibility' and 'integration' (Hillier, 1996; Hillier and Hanson, 1984).

Urban development is strongly related to the centrality of public spaces, given that they serve as a guide for economic and social development (Mehaffy et al., 2019), especially with how urban development has changed over the last years from being a monocentric model that depends on an economy location. From the 1980s, the structure of large cities has known significant changes, one of them is the appearance of polycentrism, where cities' major activities tended to be clustered in different centres (sub-centres) rather than being in the Central business district. There is also the growing sprawl of economic activities which created a dispersed pattern of distribution in the city (Anas et al., 1998, Giuliano et al., 2007)

### **I.4.3. Commercial centre**

Commercial centre corresponds to the location of economic activities, it indicates the places with the most important commercial interests. City centre commercial activities provide a special environment and experiences for users in and outdoor stores, therefore, the city centre plays an interesting role on shaping and affecting the customers experience. A city centre with its different characteristics influence shopping in a different way than e-commerce (on the internet) or shopping at malls. These characteristics are distinguished and connected to the place they belong to such as the atmosphere and other leisure activities, which could bring the attractiveness to the city centre with a unique image that is different from other places in the city, which would also make the city centre a strong convergence destination (Öner, 2015).

According to many scholars, city centres all around the world are continuously declining during the last decade (Johnson, 2013; Myrsten, 2015). This is related to the overall decrease in retail stores that drifted away from the city centre as well as the growth of e-commerce and shopping malls (De Nisco et al., 2008; Astbury and Thurstain-Goodwin, 2014). Nowadays, mostly in American cities, ‘dying city centres’ are considered as a big issue for retailers and the vitality of cities in general, because the city centre and what offer is an important element for attraction (Zenker et al. 2013). Therefore, it is easy to say that commercial activities inside the city centre is what offer the attractiveness for the place.

## **CONCLUSION**

This chapter has presented a theoretical review on public spaces, to understand their development and the relation that exists between their components. Since old history, public spaces; agora, the market, Souk... all represented the centre for functional and social life, a place where people can gather and accomplish their leisure activities. Later on, however public spaces have been radically changed, commercialized, remodelled, and privatized. This was one of the causes that turned public spaces into consumption spaces rather than spaces that support the public life.

A liveable street is the street where groups of people have the opportunity to meet and enjoy their social activities, either stationary or moving activities which includes, wandering, sitting, talking, reading, working, shopping, and so on (Mehta, 2007). Streets pattern and what they offer as elements and furniture for activities, contribute to the temporary spatial uses and the



interaction between people either in a relaxing and comfortable environment or in a repelling way (Jacobs 1961; Gehl 1987).

The proper urban layout and shaping repose on the foundation of the society and their requirements, therefore, it needs to be followed to meet their demands overtime as they keep on changing. For instance, the new commercial models have destroyed and fragmented city centres and were the reason for the emergence of the ‘in-between’ spaces (spaces that don’t belong to either public/private domain neither hold a symbolic expression which will be developed more in the next chapter) such as shopping malls and other post-modern places, which poses other issues to the use of spaces for men and women more specifically (Tyshchenko, 2017), thus it is necessary to focus on these spaces in urban development rather than adopting new ideas with no connexion to the intended community. “The success of a particular public space is not solely in the hands of the architect, urban designer or town planner; it relies also on people adopting, using and managing the space – people make places, more than places make people” (the success to people, 2007). Moreover, it was seen what the role streets have represented in the city. To improve the quality of urban life, at the present time, urban designers and decision makers must also look towards an active dynamic street that provide the diverse needs of people while taking the aspect of safety under consideration, to attract people and encourage them to feel that they belong to that space (Gehl, 1987).

Public spaces, streets and city centres must be designed to cater for the needs of society with taking into consideration the spatial use and attraction aspects, which would increase the chances for people to socialise. In order for them to play its proper role in the city, planning authorities and decision makers are the most actors that can shape them correctly, while inserting the key values and interests of the public, all through rules and policies.

# CHAPTER II

## SPATIAL USE AND SEGREGATION

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“Urban segregation is a process emerging both from material dimensions and culturally driven perceptions, meanings, and feelings attached to different spaces. Individual and social groups’ experiences of the city shape urban sociability and mobility, residential patterns, the use of public spaces, and so on”

- Bayón & Saraví, 2018

## INTRODUCTION

Gehl (2011) argues that when people participate in certain activities within the city, there is a possibility for other events to appear in the same space by a ‘self-reinforcing’ process, this would provide participants with multiple opportunities and events to participate and experience (a multiplied effect), the activities can be either dynamic such as walking, shopping and running, or only static which can be shown in gardens and other public spaces where people just sit over the chairs, to read a book or only to enjoy the view. He also added that there need to be specific and favourable conditions in order for people to use a certain space, this would also mean that even the individual small details are a crucial part for events to occur (Gehl, 2011). The relation between places, people and events helps on shaping a community where people feel that they belong into (Oldenburg 1981; Hester 1984). This relationship is what helps creating the connection between the past and present of communities, they might look simple but yet necessary for a social value (Johnston 2005; Lofland 1998).

In our way towards understanding the spatial segregation of people in the city, the previous chapter of this thesis has presented urban spaces as constituents of a network with several characteristics and what they represent for people as a whole, from places to fulfil their daily activities to places for socialisation and different qualities of urban life. In the second chapter however, the focus revolves around the spatial use of these spaces for people together and separately, given that urban spaces may contribute to the segregation between users in both public and private realms as well as genders.

Many factors could affect urban spatial use such as the lack of security, space affiliation, spatial separation and so on, which also could set restrictions to men and women differently. Thus, the first section seeks to understand the segregation in the city with its different aspects. Segregation also is related to the concepts of public and private spheres and the limitations between them, and how privatisation was the cause to the appearance of the in-between spaces. The next section will revolve around the separation of genders in the city since ancient times and how both men and women approach the city. The last part will gather some of the concepts that deal with territoriality behaviour of people and their preference for a better spatial use and interaction.

## II.1. THE SEGREGATION IN THE CITY

Public spaces play an important role in the formation of communities, they help create a culture for the public as well as enhancing the diversity between cultures (Low et al. 2005). Throughout history, groups of people from different classes and backgrounds were restricted to use or access some public spaces, either by regulations, or by fear from particular spaces. While dominated by only a single group of people; women, young people, individuals or ethnic minorities have always suffered restrictions in terms of using public spaces and the will of moving freely. Moreover, even with the development of modern cities, it was noticeable how they turn into a compilation of segregated area which in turn was a consequence for the decline on the spatial use as well as the communication in some centres of the city (Madanipour, 2003).

Hillier and Hanson (1984) in their book *The Social Logic of Space*, have emphasised the issue of spatial segregation and its harmful effect of cities. They introduced the theory of space syntax, and showed how segregated spaces offer less accessibility and mobility in the city, which in turn introduces fewer choices of itineraries to people, therefore less dynamicity in particular areas and more crime rate.

Generally speaking, spaces have always been connected with certain kind of experiences, they are a manifestation of the feeling of safety and the emotional affiliation and attachment such as the home. Nevertheless, feelings and emotions that are connected to a specific place can be perceived differently for individuals. Therefore, the place with a social character is related to the inequality and difference. The segregation in urban space is not only related to space, but also to the place construction through its cultural and social transformations. The process of place construction helps understanding better segregation and inequality and how users experienced this phenomenon (Cresswell, 1996). Cresswell (1996) argues that place construction is one of the most contributors to the spatial separation, exclusion, inequality and how different groups of people are assigned to different spaces according to their backgrounds.

The distribution of individuals and objects are connected with the cultural and social structure of certain spaces along with people's perception and the feelings of attachment of them to their spaces (Varady, 2005). Social segregation in urban spaces creates a compilation of restrictions and barriers for communities and individuals. And since participants in space naturally have an interaction relation with the spatial forms, segregation could lead to more limitations and exclusion of use (Cassiers and Kesteloot, 2012).

### **II.1.1. Terms that are related to segregation**

Segregation is a process where a particular group of people (race, gender...etc) are treated differently and inferior to others, they are forced to cluster in a specific area or space, often it's called 'ghetto' which considered as a part of a city, often a slum area, occupied by a minority group or groups. There are several terms that belong or hold one of the aspects to segregation (Varady, 2005).

Racial segregation for instance is the segregation that occur by race, the united states for example are mostly racial ghettos. A 'ghetto' is a concentration of people in a specific area that was caused by the dominance of a certain society. Quartering in the other hand is the separation of urban space by quarters, this occurs by the inference of the private market of housing and real estate, where they are separated in terms of the wealth and income of houses. This type of segregation would contribute to more segregation through the distribution and clustering by class (Varady, 2005).

Withdrawal as a process where a dominant group of people (both economically and socially) voluntarily separate themselves from a certain area, this process contributes to more segregation where it would play a role in the emergence of restrictive enclaves. An enclave is an area where a group of people are concentrated, this area is self-determined by various factors such as religion and ethnicity, grouped together as a way to growth and protect their cultural, political, and social development (Varady, 2005).

### **II.1.2. What control the segregation and Clustering in cities?**

When looking toward the pattern of clustering in cities throughout history (Marcuse and van Kempen 2002), it might be possible to figure out a proper understanding about the different forms of segregation and whether it is acceptable or not. It is logical to assume that cities by nature are and always have been separated by several 'lines' creating a diverse pattern of clustering. For instance, some of these lines represent the social separations that are caused by the action of powerful groups that are clustered and self-controlled. Lines that separate these groups could be under the effect of many categories; gender, religion, class, occupation, income, religion/cultural preference and so one (Varady, 2005). Varady (2005) see that these lines of division could be categorized in three groups; culture, the position in the hierarchy of power and the functional and economic role.

### **II.1.2.1. *Division based on Cultural differences***

This kind of division is considered to be easy to distinguish, they might be seen in the differences of architectural style, costume or even the language for example. This may lead to segregations based on religion, ethnicity, origin, nationality and so on. Most of these divisions might be grouped under the term of ‘cultural’, however, many others could be a result of either manipulation, unique traits of individuals, or a combination between both (Varady, 2005).

Gieryn (2000) sees that “the meaning or value of the same place is labile-flexible in the hands of different people or cultures, malleable over time, and inevitably contested” (p. 465). The cultural aspect of the space has its own clear effects on urban space, it shapes the social development and the behaviour of users, and it is necessary to take it under consideration on urban studies that are connected with the fragmentation and social segregation (Varady, 2005).

Ethnic segregation for instance could lead to disagreement or even hostility between individuals, it obstructs understanding and reduces social interaction between people from different groups and backgrounds which will lead to more mistrust between them.

### **II.1.2.2. *Division based on functional and economic role***

This type of division is the outcome of economic and physical logic of organizations, could be seen for example in the division between residential areas, factories and farms. Ages ago, this type of division was seen in the separation of guilds and the provided services for them such as retailing and wholesaling. The distribution of services, occupations or industries influence the clustering of people where they usually tend to cluster near routes that provide transportation and easy accessibility to other areas. In the other hand, when looking into residential organizations, workers tend to choose houses that are close to their location of employment which would also form some kind of residential division. Zoning for instance is the face of legal functional division, where the city is separated in terms of type of functions and to areas that they are within, they are determined by either economic use, or by its impact on the environment; vehicular traffic, air circulation, or even shadowing. These types of segregations that are based on functional attributes are unrelated to cultural differences and do not indicate an inferiority compared to other functions (Varady, 2005).

### **II.1.2.3. *Division based on Differences in hierarchical status***

This type consists of power that can be owned and exercised in different domains; economic power, legal power, social power and so on. Class for instance, is relevant when talking about the differentiation that is related to the status, income also could be a representative for status. The same goes for occupation and socioeconomic status. All these aspects could enhance the relationships of power and authority (Varady, 2005). Bourdieu (1999) also claims that within hierarchical societies, the ladder of social life and social distances are exhibited through hierarchized spaces. Thus, social inequality indeed, greatly affects the spatial pattern of cities.

All these three categories of divisions exhibited by Varady (2005); Cultural divisions, functional and economic role division and hierarchical status are all corroborate and contradict one another at the same time, and their interrelationship is what was seen in cities over time. For instance, Cultural divisions might contribute to more inequalities in status until culture and status become almost similar; this is notably seen for example with Arab/Jewish or black/white differences. The divisions of culture and status often get crossed by the functional aspect of division; because sometimes groups that are separated by status and culture could be connected together by economic functions, and them being near each other and working together might influence the production efficiency. Function and status aspects also could carry a relation between each other, for example employers prefer their employees to live not far from their work place, in the same time they do not want them to live closer to them (their houses). However, Cultural relations also could contradict 'status' differences; in groups that have the same culture, they may have differences in class and in economic functions for instance (Varady, 2005).

Apart from these mentioned factors, the author introduces the role of space as a more complicated aspect to the segregation. The role of space that is socially formed, changes with the alterations of economic and social configurations such as; the diversity in economic uses, the cultural patterns and the effect of the status and power (Lefebvre, 1992), adding to that several other factors that can affect the spatial and social division and its location such geography and topography; for instance, individuals that belong to upper class tend to live in places that provide high amenities, however, even this example is variable and subjected to economic and social changes as well.

Historically, it was seen that the pattern of segregation is manifested differently in space, even Robert Park (1926) has emphasized this idea and claimed that spatial relations are linked to

social relations inherently. Moreover, this influence is mutual where social relations define spatial relations and often the other way around. When social relations are in a constant process of changing or when the spatial use distribution doesn't reflect those social characteristics, then there will be possible conflicts over the spaces and the relationships that are experienced. Building walls for example might represent the instability between these relationships because they are one of the elements that contribute to more spatial separation (Marcuse, 1997).

Segregation however is not fully bad, given it is seen as one of the methods for resolving differences. Segregation is a result of two powerful forces; the positive by promoting solidarity, and the negative by preventing dispersal, and Both of these forces are opposite to one another (Varady, 2005). Varady (2005) see that one of the most fundamentals to fight against segregation is firstly to consider that segregation phenomenon is harmful, and he thinks that the involuntary division of space is an unwanted thing in democratic societies; through social and public actions like restrictive zoning, or through the market and the influence of wealth and income in the segregation. He then adds that anti-segregation policy is a good path to follow which promote integration of different group of people rather than trying only to eliminate segregation.

## **II.2. PUBLIC AND PRIVATE SPACES**

The terms of private space and public space represent a fundamental image of the segregation between genders in the city, they reflect the relationship that exist between genders' role in the society and urban planning in general. For several decades, spatial segregation was part of cities, either intentionally or unintentionally. That was exhibited in the reduced accessibility, hybrid spaces, or the exclusion of spatial usability. However, despite the phenomena of privatisation and separation of spaces, urban space remains the most prevailed characteristic of a sociable civil city (Bahrtdt, 1974).

### **II.2.1. Public space**

The term of 'public' has several meanings, and it is actually derived from the Latin word '*populus*' which means people. Oxford Dictionary defines this term as "an adjective of pertaining to the people as a whole; belonging to, affecting, or concerning the community or nation; carried out or made by or on behalf of the community as a whole; authorized by or representing the community; open or available to, used or shared by, all members of a



community; not restricted to private use; also (of a service, fund, amenity, etc.)” (Madanipour, 2003). The mutual relationship between the public sphere and the public life has always led to the emergence of new version of publicness with different limits. Given that public spaces are accessible to the public, they are usually protected as they are an important element for economic development (Feehan and Heit, 2006).

In space syntax theory, the main interests of its urban studies revolve around examining the spatial configuration of the urban space and how private spaces are related to public spaces. Hillier and Hanson (1984) for instance define public space as “the result of the arrangement of buildings, and possibly other bounded areas such as gardens, parks and the like”

### **II.2.2. Private space**

In urban design, the term of ‘private’ was often defined by feminist writers as being the household spaces for individuals. In anthropology, it holds the same meaning however, the only difference is that they use the term ‘domestic’ rather than ‘private’. In the other hand, the rest of other spaces either outdoors or indoors belongs to the ‘public’ realm, regardless if they are publicly or privately owned (Madanipour, 2003).

### **II.2.3. Public or Private?**

The city in general consists of spaces that belong and accessible to the public such as parks, squares and streets, and other spaces that are privately owned such as buildings that are either completely restricted for people or they are more controlled in terms of people who have permission to use the space (Forrest and Paxson, 1979). Shopping malls and stores for instance are privately owned but are designed by a zoning ordinance which allows for the them to be used on the basis of some requirements. Other buildings might be owned as well as open to the public, yet only a group of selected people who are authorized or they feel socially affiliated to use their spaces. Eventually, all the ‘public’ spaces that we have talked about and more (plazas, museums, parks, libraries, stores, squares, and malls) are still dedicated for public use but with different levels of accessibility (Franck and Paxson, 1989). Houses in the other hand are spaces that provide a sense of privacy with several characteristics; it provides protection from the outside world as well as other individuals, it represents a private personal space and finally a place for social life (Madanipour, 2003). Hester argue that although neighbourhoods are considered as public space, however, they are also equivocally privately owned. People in their neighbourhoods usually consider spaces such as stores, streets, alleys, sidewalks and parks...

as 'sacred' places that is collectively owned by them (Hester, 1984). Moreover, some privately owned spaces have become semi-public spaces due the easy accessibility and the events/activities taking place in there. Because in many neighbourhoods, people use their own house's yards as places for gatherings, social interactions, events, festivals and so on (Swapan et al., 2019).

In space syntax theory, public space is also connected to the private space in various levels of depth, and the opportunities of the social and economic life of people in space is to somewhat controlled by the way public and private space are connected (Van nes and Yamu, 2021).

According to Madanipour (2001) one of the essential fundamentals that can help distinguish between public and private spaces, are the capability of the individual to separate between his 'inner circle' and the outside world. Several scholars claim that what actually differentiate the meaning of 'public' from 'private' space revolve around three attributes; control, access, and interest (Benn and Gauss, 1983; Pitkin, 1981), Benn and Gauss (1983) however, state that legal ownership doesn't apply and surpass these attributes, which means that even when a space is public, it is still can be restricted for public spatial use and vice-versa, and when evaluating public spaces, control, ownership and access are the most concepts to take under consideration.

There are several architectural elements that serve as the borderline between public and private spaces such as walls, entrance doors, and windows of residential buildings. Nevertheless, the differentiation and the limits between public and private spheres are increasingly becoming blurred as they exchanged some of the qualities of each other, especially with the adaptation of concepts such as visibility and ease of access to spaces (Swapan et al., 2019). Madanipour (2003, 2006) has pointed out that not only the private sphere affects the public, but the private sphere is also contained within the society domain. He then illustrates that the public sphere is the aftermath after people have set the limit of their private sphere. Thus, there are several levels of privacy and publicness which creates a variable continuum with no clear separation between one and another, they are called as; semi-private or semi-public spaces.

Madanipour (2001) claims that urban space is not only separated in terms of public/private spaces, but also in terms of socio-cultural aspects, and it appears especially in neighbourhoods, where they are divided into places that gather particular social groups. The social segregation between private and public domains reflects into a larger scale which is the physical structure of the city creating more public and private spaces, moreover, the relationship between individuals themselves is what generate the separation of these spheres. Throughout time, physical and social urban structures continued to being subjected to radical adjustments to

accommodate with the changes between private and public spaces, as the segregation in urban spaces have influenced communities and social interactions, recently however, decision makers started to pay more attention towards this separation of spaces and to what extent they are controlled (Madanipour, 2003).

It is logical to assume that public spaces are not open to every individual equally, either in the past or in today's cities (Jackson 1998: 176). Since the beginning of time, the concept of 'public' has always been the contrary to the term of 'private', and the privatization of the public space has also been considered as a menace to its fundamental characteristics. Therefore, the spaces that once were open and public for individuals such as streets and plazas, started becoming increasingly controlled and privately-owned spaces. This may lead to a negative development of spaces such as the loss of opportunities and freedom in gatherings and social interaction with others, which is one of the important things that has been stressed in literature (Atkinson and Blandy, 2005, p. 179). In some cases, the safety part in architecture might be seen as one of the visible contributors to spaces privatization. For instance, fenced public spaces, shopping malls and centres with security agents, skywalks that limit access to certain users, all these are considered as examples of the forced safety that is caused by the restructuring of urban spaces.

With the increasing awareness to the phenomenon of privatization among scholars, it is also necessary to put a spotlight on the causes that are contributing to the creation of hybrid spaces. One of the reasons behind this process of privatization are the actors that hold the responsibility for their developments, because hybrid spaces don't just arise as a result from individualism or cities restructuring, it is created and directed, and administrative representatives are responsible for the management, designing or selling of urban spaces which are the main reasons for the appearance of hybrid spaces. Thus, these actors need to be accountable for their motivations and objectives (Nissen, 2008). Privatization however is not the only threat for public spaces but as Bauman (2001) claimed is 'individualism'. This consist on the intention of people to claim public spaces as their private property to invest in their business, another thing is the non-interest for the needs of the public space and public life of citizens but their individuals' desires only (Elias, 1939).

#### **II.2.4. In-between space**

As mentioned in the last chapter, urban spaces are in a continuous process of transformation, especially those between public and private spaces, it appears on buildings with fences and the

opacity of materials that can obscure the senses of individuals, and it appears also with the personal involvement such as security agents and people in charge of accessibility. As a consequence, this development contributes to the emergence of a space with a 'hybrid character' that acquires mixed characteristics from both public and private spaces, which in turns provide different levels of accessibility and usability (Nissen, 2008).

In-between space is considered the place and the first step where social interactions occur between residents. The spaces between the private and public spheres (buildings and streets) represent an important location for social interaction (Gehl, 1996), where the layout of this space is what determine the strength of social relations. For instance, spaces as courtyards, balconies or the siting spaces in sidewalks work as transitional spaces between public and private spaces, and they are slowly becoming the space for social interference within a neighbourhood. These semi-public spaces help on improving social sustainability in the city, however, their role could be different depending of different cultures (Scott 2006; Guimaraes 2012). This term was adopted by several researchers such as Gehl (1996), Hillier and Hanson (1984) and others. Although their definitions held a close meaning, they were diversely defined, to them, in-between space was seen as a soft edge, a buffer zone and a boundary between public and private spaces.

The concept of 'soft edges' (also known as the semi-private spheres in residential streets) was initiated by Gehl for an objective that is to distinguish the limits between private and public spaces. Gehl (1987) claims that soft edges are a necessary element for the sensation of safety and people socialisation. Mehta (2013) also sees that the spaces with ordinary facades of building are considered as dead spaces, that doesn't look appealing for people. As mentioned in the first chapter, public spaces' attributes play an important role for the quality of urban life and liveable cities.

Soft edges also along many other elements play their part on increasing the dynamicity in public spaces. They are an 'active facades' and along suitable urban furniture, they usually motivate people to gather and use these spaces. These façades work as visual connectors between the outside and inside spaces, together they exchange properties and enhance each other (Gehl and Gemzøe, 2004). According to Gehl, there are three levels that characterizes the soft facades in urban spaces; the first level is the degree of physical permeability that exists between urban buildings (or facades) and the movement of users, the second level is the visual permeability, and finally the small details of facades such as the articulation and texture.

In cities, active facades are considered as the most impactful element for the attractiveness and vitality, they represent an open and free atmosphere to users (Gehl, 2010). Moreover, Gehl also sees that the location of permanent activities take place in relation with the soft edges. The spaces that are shared in front of Soft edges are naturally fitting places for a diverse of activities as they connect the private space (inside buildings) with the public space (street). Generally, people are more attracted to the irregular and interesting face, they provide activities and are suitable for people (Gehl and Gemzøe, 2004).

Soft edges facades in streets also affect the speed of pedestrian's movements. This was showed in a study conducted in Copenhagen, that there is a relation between the speed of pedestrians and soft edges facades where they tend to walk slower near soft and active façades (Gehl and Gemzøe, 2004, Gehl et al., 2006). Gehl (2010) argues that that the distance perceived by pedestrians play an important factor to decide whether to walk through or not, for instance the apparent part of buildings makes distances look shorter and appealing for pedestrians.

All in all, the in-between space represents the common ground for citizens, it's where they share experiences and mutual responsibility. This space can be used for managing pedestrians' movement along several other functions (Madanipour, 2003).

### **II.3. GENDER IN THE CITY**

In most societies of the world, the general belief is that women belong to/or near residents, while men have the opportunity to reach further places from their houses, especially in active and populated spaces. Many feminists showed their disagreement with the traditional modern family, they disliked the fact that women were linked to the private interior spaces (homes) with their work as housewives and mothers, while men had their freedom in the public sphere of the city as breadwinners for the family. With this separation of roles and especially between the private and public spaces, they always saw women in a second position after men (Madanipour, 2003). According to Rosaldo (1980), this separation of space and functions between men and women is strictly related to social processes, and that looking to genders differently confines the knowledge gained from the relationship that exists between women and men as well as other women. As mentioned, although gender differences in the public and private realms seems to be a global phenomenon; however, the activities provided for both men and women and the way they approach them is different between societies.

When women wander in the city they are usually accompanied by children or other women, and they often use public spaces that they are frequent to them or that are used by women also. However, when they are alone they tend to avoid using spaces that are used by people that are different from themselves, people with different background; cultural economic or racial. (Franck and Paxson, 1989). Contrary to women, men don't need to be accompanied with other people in order to use public spaces. Whatever the character of space, women also avoid using spaces during the evenings especially when they are alone. Several researches also suggest that women are less likely to engage in activities whenever they are accompanied by men. Generally, women tend to be attracted to the spaces that make them feel safe, they are oriented towards places that are active and populated, more specifically with women. Therefore, women are seen as selective individuals to the spaces they use and fulfil their daily activities, mainly to the characteristics and the people that are using the space (Whyte, 1980).

McDowell (1983) has done a broad review on gender segregation in the city through many domains, he explored mainly the changing nature of interrelationships of production and reproduction process in space. In her paper she thinks that abandoning the gender aspect and issues in urban space can reflect on the structure of cities and urban processes in general. However, the focus doesn't need to be only restrictive to women and only women issues, but rather the relationship and social interaction in cities that can lead to more injustice towards women.

### **II.3.1. Gender in ancient Athens**

Aristotle has emphasised the clear separation between the public sphere and the private households in ancient Athens, as it was an inseparable part of their society life (Elshtain, 1974; Pitkin, 1981). Public spaces in the city of Athens were an important destination for citizens and were open only to men, while women were related to less important spaces mainly households. In the fifth century, the movement of women was restricted to only some spaces in the city, where they were forbidden to use several others including the places for gatherings (agora) (Keuls, 1986). The only time women were permitted to leave their houses without escorts is when she gets out to retrieve water. This situation that deemed women as a 'second sex' had continued for longer periods of time in many Greek villages (Hirschon, 1981).

### II.3.2. Gender in the 19th century

During the 19<sup>th</sup> century, the separation between genders in American societies was also related to the separation between public and private spheres. With the growth of industrialization, this separation started to affect particularly middle-class families given that men were supposed to travel long distances (public sphere) from their houses for labour and production activities, while the domestic private sphere was the place for women to stay and take care of their children and housekeeping (Cowan, 1983). Despite the appearance of working-class women (single/young women) and their integration into the city as workers, society still stood against the fact that women, especially married women leaving their houses, and considered the things that they wanted to reach as activities only for men to realize. Before the 1840s women workers were more acceptable than before by the society in both realms (public and private), as they were needed during the colonial periods in the variety of professions such as silversmithing, butchery and so on. However, after the 1950 the same occupations were no longer provided for women (Stansell, 1986). Following this, the rise of department stores in the beginning of the 1840s provided women with opportunities as well as comfort to leave their houses and participate in the activities available in the public realm (Barth, 1980). Department stores gave an excuse for women shopper to stop-by and use restaurants, reading places and other activities (Rothman, 1978). Although women began to have more freedom than they used to be in the city and public spaces, they still fear from harassment, their movement was still limited when they are alone, the activities and occupations provided for them are often segregated from others in the city, even so these activities were still a part of their house tasks (Stansell, 1986).

The ideology of ‘separated spheres’ was set to refine the boundaries between public and private spaces, it was set to responds to the expected and desirable traits of a women in her society. Women were supposed to preserve the important moralities in society such as; purity, domesticity and devotion, and especially to nourish the moralities of their children as well as their husbands (Welter, 1966). While the urban life is the place for paid labour, population gatherings. It was characterized by its rough, competitive and often immoral aspects. Therefore, the home was seen as the refuge for women, it is safe, peaceful and genial to stay and build her own society that differs from the harsh life of the city (Davidoff et al., 1976)

### II.3.3. The ‘flâneur’ and ‘flâneuse’ of the 21st century

The concept of the ‘flâneur’ (stroller) was initiated on the 18th century by the philosophers Rousseau and Goethe, the role of ‘flâneur’ was defined generally as an objective spectator,

where he avoided any social connection or any activity that requires a close distance between him and the objective of attention, he is like a tourist in the contemporary city, he however, has its own influence on the city and the image represented of public spaces (Van Nes and Nguyen, 2009).

“The department store may have been, as Benjamin put it, the flâneur’s last coup, but it was the flâneuse’s first” (Friedberg, 1993). After the “Haussmannization” process of Paris streets and the arrival of the department stores, it made some changes on the historical city which caused to the domain of the ‘flâneur’ to disappear over time, leaving a place for the ‘flâneuse’ concept to emerge, these changes helped the ‘flâneuse’ giving her more activities and more excuses to wander in the city. The ‘flâneuse’ is not just the female ‘flâneur’, she is another version of him, and her role is a bit different from the ‘flâneur’ in the city, but sure enough, after a while and after the appearance of the department stores, the ‘flâneuse’ became a consumer, a ‘badaud’, as she moved inside these departments stores reducing that distance between her and the exclusive activities in the city. From the end of 19th century, the ‘badaud-flâneuse’ had engaged in more activities in the city like art and theatre, which let her express herself as an active member on the society, and to try to become independent from the ‘flâneur’ domain (Van Nes and Nguyen, 2009).

However, some critics had appeared about the non-existence of such thing as the ‘flâneuse’, the writer ‘Wolf’ argues that even with the extension of the activities and the dedication for the ‘flâneuse’, she still can’t be compared to the ‘flâneur’ especially in the aspects of security and wandering the city any time she wants, as she remains only a member for private spaces like her house. The description of these concepts helps to understand what image does the city represents for both genders over history, therefore these concepts doesn’t really exist, instead they’re only a helpful way to analyze the city from the perception perspective of both genders, where the man had always the higher hand in the usage of public spaces on the city (Van Nes and Nguyen, 2009).

Nowadays the concept of ‘flânerie’ still exists by the adaptation of old characteristics with some new modifications. However, contrary to the ‘flâneuse’, the ‘flâneure’ still has the full freedom within the city without any restrictions. The ‘flâneuse’ still needs a proper excuse to go out from her house, and as mentioned earlier, most of the times that she leaves for the city, its related to shopping activities and domestic tasks. Moreover, the environment quality also plays an important role in distributing men and women equally in the city. Therefore, it is



necessary to design urban environments in relation with the difference of perception between genders (Van Nes and Nguyen, 2009).

#### **II.3.4. Gender in Arabo-Muslim cities**

Gender separation has been always embedded as a part of Muslims culture and tradition, where women have long been confined to the domestic sphere; however, this phenomenon seems to begin changing under the influence of societal developments. Women's access to public spaces is now very noticeable in cities of the Arab world, even in those that are still dominated by patriarchal structures (Le Renard, 2012; Ladier-Fouladi, 2004).

In Algeria, the modernization movement that has been initiated after independence and the sociological changes that resulted from it have profoundly affected the traditional structure in the country leading to more adaptation from the western lifestyle (Benzerfa, 1992), even though this phenomenon was not accompanied by a greater presence of women in the labour market, the education and health sectors however are currently 80% female (Katteb, 2011).

In the Quran it was stated that “*the man is not like the women*” (3:36), that is correct especially when see it from several facets; physically, mentally and emotionally. They think differently and even perceive the world differently, but the most important thing to understand from this is that no one is better than the other, because with all these differences they both have unique skills, responsibilities and roles in society, which means that both of them complete each other. Moreover, all above this, both men and women are considered equal in Islam, as Allah mentioned in Quran “*Never will I allow to be lost the work of {any} worker among you, whether male or female; you are of one another*” (3:195)

#### **II.3.5. Influence of the city structure on men and women use of space**

The use of space is defined by the identity of users as well as the interaction that exists or not exists between each other. As previously mentioned the variety of activities in public spaces provide a place for users from different backgrounds with a motivation to go to the city, which even make the city more vital and dynamic. However, the controversy in this relation is the anonymity aspect of people, where they are strangers to one another, especially when gathered in the same spaces such as shops, parks, or even streets. In several researches this anonymity showed that it can also encourage violence and other aspects of danger in urban space, especially for women who are usually more vulnerable than men, this shows how women are

not able to experience the urban space as men do, as it can be a strange and an unsafe place rather than enjoy it (Karp et al., 1991; Madanipour, 2003).

Many feminist writers express their dislike for cities and how they were planned and shaped to be throughout time, as they are mostly built and controlled by men which left women out of the equation, and the same case goes in other domains of life where they were always considered as a second gender (Elizabeth Wilson, 1991). Urban spaces that are dominated by a single gender only are identified as 'gendered spaces'. Daphne Spain (2015) suggests that gendered spaces specifically for women are necessary for their presence in urban spaces. These spaces present a safe location for women to use apart from their houses, they can experience the city and explore their identity in more ways than they do inside their family. She also adds that not only segregated spaces repel women from participating in the urban life, but also refusing to use a certain space voluntarily may amplify this segregation.

The city is "gendered nature of urban space" and the woman is side-lined in the city by several aspects that can limit her mobility; socially by her primary role in the family and her society where she has to stay at home, and physically by the city's structure and its influence on the pattern of movement for women, as they tend to avoid to use several spaces which is derived from the feeling of unsafety (Karp et al., 1991; 153). For instance, the development of suburbs is considered one of the problems that obstruct women's movement from one place to another, where the long distance from the centres with activities represent a barrier that keep them at their houses, especially with the difficulty for them to use public transport (Madanipour, 2003). The difficulty of women's movement (both geographically and socially) is also related to the separation of work locations from homes during the industrialization process where residential buildings were moved to the suburbs of cities. In the twentieth century, the new suburbs and towns presented yet again another barrier for women, the increasing number of households magnetized them to remain at their houses as mothers, to take care of their children as their main natural work. With women's job being restricted only to private spaces, their contribution to urban life was unseen and thus considered as an unpaid labour (Karp et al., 139). Woman's invisible work however is not all negative, it can be perceived as the linking point between institutions, markets and homes, to co-ordinate and mitigate the segregation of functions and activities (The Research Group for the New Everyday Life, 1991:12).

Although urban structure still restrains the mobility of women in urban space and their ability to participate in a diversity of activities, contrary to old periods, women are more integrated in

the city and they often work the same paid jobs as men, especially with the emergence of modern services throughout the city and the decrease in old traditional industries which presented even higher opportunities for jobs. This started to influence the relationship between their identity and the traditional assumption of them being only housewives, this would also set new changes in terms of women's accessibility and movement in the city and the way the public space is organized, as she is now part of the economic system and her influence is more recognisable (Franck and Paxson, 1989).

Accessibility and safety along many other factors are important for a favourable and a comfortable use of urban spaces by women. For example, shopping centres, well-furnished spaces, illuminated spaces and pedestrian streets, all may contribute to provide a useable space for women that they feel safe within.

#### **II.4. URBAN SPATIAL USE**

Understanding urban spatial use by people itself is a broad topic. Gehl (1987) for instance, attempted to understand the activities of people in urban spaces by classifying them into three categories. Firstly, necessary activities that occur without the impact of environment factors, people here feel required to carry out their activities despite the influence of social and physical obstacles, these activities could be shopping, going to work or taking the bus from one area to another, which are all considered as obligatory activities that must be done. Second, there are the optional activities which are more related to the external physical and changeable factors such as weather, although they do not present a restriction for individuals, however, people that see themselves displeased by these factors prefer not to participate in their planned activities for that moment; this include hiking, jogging, enjoying outdoor spaces... and so on. Finally, social activities that are dependent on social interaction and people's presence, this include contact with other people or even sharing the same space as other which could play a deciding factor to join or disconnect from a certain space in the city.

Marcus and Francis (1997) in the other hand classified activities in two categories; dynamic and static activities. Dynamic activities are the ones that require physical activities such as walking and running. Static activities in the other hand exhibits the motionless part of using spaces such as sitting, watching, talking, reading... and so on, these static activities are also considered as important attractions for people. Both of these categories could be individual or collective between users.

Several studies have shown that one of the main objectives of people when joining a public space is to be in contact with other individuals, to be able to see and to be seen (as spotted with the concepts of flâneur and flâneuse earlier), and to experience the space and the presence of people from different perspective of users. This is also was emphasized by the study of Whyte (1988) on urban plazas in New York city which showed how people are attracted to populated spaces. He argues that people prefer to join urban spaces that are already vital with other people, and avoid using deserted places. This shows that people seeing other people is important factor in the spatial use, he considers the dynamicity of a street develop by the interaction between people that are present in the same space (Whyte, 1988).

Architects and urban planner's main objective in designing public spaces that cater for the need of people and their social life. Thus, the most ideal question to ask is what kind of space can people find comfortable and useable for their daily activities (Bada, 2012). The preferred spaces to use are the ones where individuals' capabilities are more effective and where they find their needs available for them (Kaplan, 1973).

In studies that concern environmental aesthetics, peoples' preference and choice between urban environments are lined to two approaches. The first approach consists of the degree of affection and excitement that the environment exhibits for individuals though several properties such as temperature, light and the visual pattern of the space. in this approach it was shown that people are attached to spaces through their feelings and emotions which also affect their behaviour to decide whether use or avoid a certain space (Berlyne, 1973; Mehrabian and Russel and ,1973).

The second approach revolves around the cognitive processes, which focuses on how the environment is perceived by individuals. According to Kaplan (1987), in order for an environment to play its proper role in welcoming users, it got to have some kind of diversity and complexity. Moreover, it needs to make sense, by being coherent, where the different parts of the environment need to belong to each other to become understandable and identifiable by people such as landmarks. The mystery part also plays its own role for users, it provides the element of exploring. The aspect of the appearance is also an important factor in the people spatial use and their attachment to it. Nasar (1988) argues that the visual quality that is perceived by humans is formed by two essential needs, where the environment has to be appealing for users as well as make a sense for people to use it.

## II.5. SPATIAL INTERACTION

Marmot (2011) sees that the goal from social interaction is mainly to socialize, resolve problems, make decisions and share information. Spaces that hold interactions are generally linked with concepts such as accessibility, privacy, functionality and proximity... and so on. Interactions also can be arranged or through unexpected encounter (Ferguson, 2007). Therefore, interaction requires an appropriate space and distance between individuals for the occurrence of interactions between them (Festinger et al., 1950).

Rummel (1976) defines social interaction as “the acts, actions, practices of two or more people mutually oriented towards each other”. Through this quotation the author emphasises that spatial interaction is not determined by the physical distance, behaviour and the type of physical relation, but rather it is the results of ‘mutual orientation’ towards one and another. Turner (1988) however criticized this approach, he argues that what Rummel deals with (social action) as a topic for sociology domain. For turner, social interaction defined as the “situation where the behaviours of one actor are consciously reorganized by, and influence the behaviours of another actor and vice versa”, it’s the “timeless” and an unchangeable quality (Turner, 1988; p. 13). Turner classifies social interaction into three parts: the first one is motivational process, here individuals are crowded for interaction, the second element is the interactional process which consists of the type of activity and how individuals affect one another, the final element is the structuring process which is revolve around the physical space and recurrence. For example, we every day we start by holding the motivation to walk away for home and encounter other people to have a conversation with them, this sequence of interaction would be repeated and structured in a cycle that occur in a certain space every day.

Another point of view for spatial interaction which is Gibson’s “affordance” theory that is related to the interaction in “in-between” spaces. Gibson (1986) explored the interaction between an agent and the physical environment. Through providing multiple attributes and a quality of the environment, it presents the agent with opportunities to interact with it. He focused on the individual’s cognitive activity and how it is affected by the attributes of the physical environment. Moreover, besides the affordance concept, spatial properties as well as the type and the purpose of interaction are all an important factor for social contact.

Skjaeveland and Garling (1997) also see that social contact consists of four spatial requirements, firstly is the space where interaction takes place which is the most important part, second are the supplementary physical attributes that helps with interaction such as the

furniture in streets, third, are the in-between and private open spaces such as verandas. Finally, is the part where the place of interaction is visible and has surveillance over it. To sum up according to their study, interactional space can be effective through many characteristics such as the size of space, the degree of enclosure, the seating environment, visibility, accessibility and surveillance among many other aspects. For instance, Gehl (1996) sees that interaction is more likely to be efficient when standing at the same level however, elevated spaces such as lifted gardens and indoor spaces that are extended towards the outside provide better opportunities for interactions and personalisation among residents (Skjaeveland and Garling, 1997).

Lyam and Scott (1967) define interactional space as the “area where a social gathering may occur”, it’s the territory that is temporarily used by individuals or a group of people. It’s the place where people can sit and talk as in the coffee, wander around as in the park or doing some kind of sport in a green space. This space is not only linked to the physical attributes like the appearance and functions, given that the social aspect also plays its own role such as cognitions. Despite the correlation between social interaction and physical design, Kupper (1953) thinks that the physical distance (distance that exists between one building and another) and functional distance (the location of land uses and services) are not effective when talking about social interaction, but rather it remains similar especially in the same society, this means that social interaction and how it is developed is more linked with the individuals’ life and their similarity of thinking.

## **II.6. CONCEPTS ON THE PREFERENCE OF SPATIAL USE**

### **II.6.1. Sense of place**

According to Relph (1976) the sense of place is defined by a compilation of three elements; physical properties, activity and the meaning. In the other hand, Shamai (1991) claims it is actually the manifestation of the location, landscape settings and the human involvement. Sense of place is the relation that is exhibited between the people and their environment, where people can use the space and their intervention could affect the aesthetic and the quality to enrich it with their identity (Soini et al., 2012). Williams (2007) also claims that the ‘sense of place’ can be seen and understood from three different perspectives. Firstly, the sense of place can be detected from the knowledge and the cognition of a space. The second point of view is seen as

the capability and capacity to experience something, it is similar to the keen eyesight. Lastly, the sense of place can be acquired through the character of space, from the properties of the environment.

In psychology domain, this concept was designated by the feelings and the attachment that individuals hold to a certain place (Shamai and Ilatov, 2005). In cognitive domain, the sense of place is provided through the exceptional quality that belongs to a certain space, it is sensed by the experience and perceptions of users. Usually however, the qualities of space are viewed in the same way by several individuals which would make the place globally recognized among many users, and therefore enhancing the sense of place (Martin, 2012).

The 'sense of place' notion bears many meanings, and with the complexity to understand its context, it was shown that it is not easy to be assessed. However, with the available viewpoints, the closest meaning to describe the concept is 'identity' (Lynch, 1981), According to Lynch (1981), it is "the extent to which a person can recognise or recall a place as being distinct from other places – as having a vivid, or unique, or at least a particular, character of its own". It is the symbolic, meaningful, rational relationship between people and the space they use, and this is shaped differently depending on the society and its dynamics (Jorgensen and Stedman, 2006).

Spaces that are mostly used by women tend to have a sense of place that is totally different from spaces that are used by both genders, therefore it is necessary to provide a sense of place and an identity that is suitable for both men and women, this could be achieved for instance by providing activities for both genders, a liveable dynamic space that they belong to.

### **II.6.2. Proxemics: Personal space**

According to Edward T. Hall, the concept of 'personal space' was initially applied by Heidegger, he defined it as the 'protective bubble' that every being encircle itself with and between others (Hall, 1966). Madanipour (2003) sees the personal space as the invisible and mobile layer that envelops the body, it's the space between the body and the space that is known for its geographical or architectural characteristics. Personal space can also be formed through physical boundaries such as glass walls or cars metal, as well as any other type of determinations of space such as symbols and signs. However, personal space is generally objective, and although people can see the dimension of this space differently in individuals, it is without a doubt something felt and observed mutually by the person and the other individuals

around him. Personal space notion was a main topic that Edward T. Hall tackled, he discussed the using of space by the variety of people in a cultural dimension (Hall, 1959; 1966). In his book '*the hidden dimension*' Edward T. Hall classified the relationships that exist between individuals in spaces (by distance) into four categories; intimate, personal, social and public. For instance, individuals forming short distances while in contact with friends is an evidence of the sensation of lesser threats than when leaving longer distances from others. Because social communications in 'personal space' are maintained through close distances, which shows the intimacy towards one and another. Another example is the people who belong to higher social ranks, these people are most likely to maintain longer distances between themselves and others who also think of the same behaviour.

The magnitude of personal space is defined by two factors; communication and protection between an individual and others. The size of its space also relates to the situation of individuals and the desired amount of interaction with other people, or the necessity of space when they are carrying out their activities (Figure II.1). Personal space is also strongly attached to the location where social interactions happens along other several factors, such as gender, age, social status, personality as well as cultural differences (Bell et al., 1996).

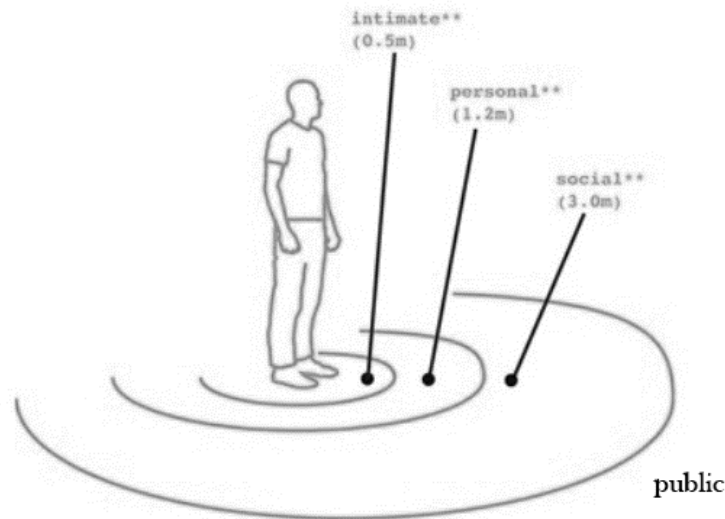
The first distance (intimate) is determined from 0 to 45 centimetres, which express the feelings of comfort, tenderness and other strong affections. Personal distance is defined from 0.45 to 1.20 meters, it's the suitable distance for conversations between family members or close friends. Social distance in the other hand is set between 1.20 to 3.70 meters and mostly used to have regular conversations between friends, co-workers, neighbours and so on, without becoming too personal. Finally, the public distance category is the one that is longer than 3.70 meters, this is considered as a distance that is used in formal occasions, mainly when a conversation is one sided and the other side only wants to listen or observe without getting involved, such as in teaching or meeting public figures (Hall, 1966:113).

Unlike men, women are always more alarmed to their personal space, especially if a stranger entered, and more so to an old person than a child for example. In some researches, it was confirmed that men are always keeping long personal spaces than women, moreover, both genders in general tend to keep shorter distances from women than men. Furthermore, women tend to socialize with liked individuals as well as other women at closer distances than men with men pairs (Bell et al., 1996). However as mentioned earlier, this is not a strict rule for



social interactions of men and women as these rules are variable depending on cultural, ethnic and other factors (Altman, 1975).

Hall believes that understanding the spatial behaviour of the people between a variety of cultures properly, could provide a guideline for cities' design to achieve sociable environments that provide security and safety among people from different backgrounds.



**Figure II.1.** The four categories of personal distances by Hall (1966)

### II.6.3. Security and natural Surveillance: The Defensible space

In order for an urban space to deliver its purpose and considered as a successful place for the public to use, sense of security plays an indisputable role in this equation. Security means the individual/communal 'protection', along their relatives and properties (Carmona, 2003). Lawson (2000) claims that the sense of safety is a fundamental necessity for providing a sense of stability, predictability and sustainability in social life. To provide a sensation of safety and a controlled city development for citizens, the concept of local safety and services is seen as one of the people's essential needs.

The aspect of security for people is necessary when talking about the architecture of safety. However, this sensation is not felt with only the security provided by secondary elements but rather with the evaluation of individuals themselves. Moreover, despite politicians attempts to increase the sensation of security by publicizing the decreasing numbers of crimes in the city, people still see themselves as the lower percent protentional victims (van Dijk et al. 2005).

Although the term of safety plays an important role in creating vital and dynamic urban spaces, it is necessary to distinguish the difference that exist between the 'risk and 'fear'; this mean that there is a clear difference between the (feeling of safety) and (actually being safe), because the space can feel safe due to its reputation, however, but considering a space being safe regardless of its reputation can indicate the opposite.

The increasing in crime rate has been always correlated with the anonymity of the city. People began to pull out from cities and urban life due to the fear of being the victim to a crime. The continuous influence of the insecurity in cities also could lead to several behavioural and psychological impacts for users that are obligated to go to the city, such as avoiding the use of certain public spaces, less socialisation, and changing their walking paths and daily activities (Miethe,1995).

From the gendered spatial use, insecurity would also lead women to be afraid from going to town centres freely to fulfil their daily activities, as they are mostly controlled by men. A Number of studies have shown that reach 65% of women avoid going out at night times as they fear from getting assaulted, while 36% avoid using public space even during the day time due the fear from the low chance of getting mugged. Women by nature are more vulnerable and feel more threatened than men, therefore they are more exposed to victimization, and it's a feeling that is shared between women within different cultures around the world, where it was embedded in a system of society that is controlled and dominated by men. Public spaces for women are used and perceived differently than men. To minimize their risks, women tend to overtake caution measures and avoid any unnecessary presence in the city, they would avoid to use certain public spaces, restrict their mobility in the city and discontinuing several daily activities only to prevent any danger that may occur to them (Stark and Meschik, 2018).

In the last decades, urban designers started paying more attention towards the reduction of crime by investing in an environment that prevent crimes. As mentioned in the last chapter, modernists have been criticized mainly by the works of Jane Jacobs (1961) and Oscar Newman (1972) for their designs that contributed to the isolation of spaces and were the cause for the occurrence of more crimes, violence and vandalism. This criticism has opened the way for many other guidebooks that offer a guideline on how to reach for safer spaces inside the city such as (Fennelly,1989). The several works and recommendations on crime prevention through environmental designs have shown some improvement. Although these guidelines were used in the creation of new environments as well as the management of older ones, however, many

scholars saw the insufficiency of environmental designs as it was considered limited, they pointed out that the physical aspect is not fully sufficient to treat crime phenomena in general, but rather the adaptation of social aspect as well (Ekblom and Pease, 1995). Nevertheless, the intended strategies in urban designs to decrease crimes have caused secondary conflicts, because too much safety means less openness, and more security means less choices of routes for movement, thus less freedom, which required better strategies.

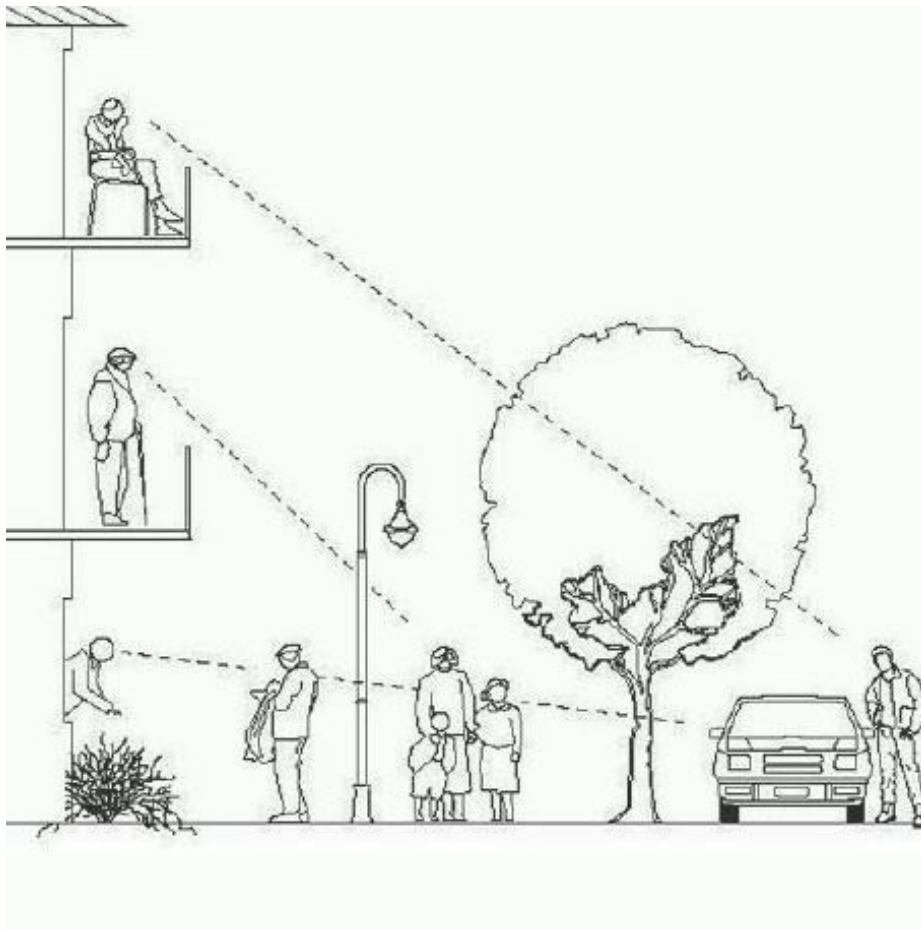
In metropolitan areas, it has been argued that a decent density of people in streets could form a defensible space. Local residents could keep surveillance and control over the public spaces in the city, which could reduce crime incidents in general (Figure II.2). The design of residential areas could greatly impact the safety of environments, this is would be viable through structures that increase the potential monitoring as well as through symbolic barriers. Newman (1972) argues that there are four physical design components that must be taken under consideration when trying to reach for safe environments; one is the location within the city; the clear limitation between public, semi-private and private spaces and necessity of residents control; the proper placement of windows which provide natural surveillance; and finally, the buildings forms. Newman stressed that environments has an undeniable effect on crime prevention. "crime, born of a poverty of means, opportunity, education, and representation, could be prevented architecturally" (Newman,1972:11).

Although these elements could be effective for the security and crime prevention, they can also have retrograde effects on urban space, mainly by the fragmentation of spaces which would also contribute to more social segregation in the city. For instance, the appearance of 'Gated communities' in residential areas throughout America and Britain in both new suburbs and centres can easily show the changes of cities, for the purpose of providing security, they restricted access, privatized public spaces and refused to contact others (Davis,1992). That is not the nature of cities however, segregation is not a solution, cities are built in a way that allow encounter between strangers and local residents, to improve socialisation and urban life, this is how to achieve security and sensation of safety.

Crime in one of the unescapable issues in cities, thus protection and the sensation of safety must be always taken into consideration. Jane Jacobs (1961) in her book (*The Death and Life of Great American Cities*) has talked about the role of protection as a main part in urban planning. Just as Oscars Newman stressed the role of street activities, Jacobs also argues that there is a positive correlation between the safety and level of vitality of streets. She illustrates

that with the existence of numerous people on a street, it creates an interchangeable protection between them. Through their windows, people inside their residents also would monitor the street if they find it entertaining or trying to observe some events that are happening in crowded (active) streets. This also creates a feeling of responsibility to residents whenever they have their own outdoor space that considered safe to them, which creates a protecting sense towards the area from external elements.

People find their leisure and comfort while doing their activities in safe spaces. Positive urban layout would encourage both men and women to use spaces more frequently, more density and movement flow, thus increasing the dynamicity and vitality of public spaces.



**Figure II.2.** A sketch that shows how natural surveillance is conducted in space. **Source:** (Ceccato, 2019)

## CONCLUSION

In this chapter the objective was to understand the pattern of spatial use in the cities, and how segregation can lead to more problems in terms security and freedom in urban spaces. For Jan Gehl (2011), the integration in space means the ability of people from different backgrounds to gather and carry out a variety of activities alongside one another. Segregation however indicates the separation of the different groups of people and activities. What we understand from this is that functions and activities in public spaces are a large factor that allow people to join and affect each other's life in the city. Moreover, the mixture between the different activities and people is what provide an image of the existing society and how it functions.

The dispersed distribution of people in the different spaces of the city (urban segregation), can occur through many factors (in several culture it is linked to the private/public spheres), however, it could be manifested without any particular and clear discrimination but rather by obvious reasons such as feeling comfortable in a space or not. It also can be the consequence of unequal presence of activities and opportunities for the diversity of preferences. Nevertheless, these preferences and opportunities often are controlled by several categories such as; gender, race, and so on.

Throughout history, Women has long been confined to the private sphere of the city, recently however, the public spatial use for women has changed compared to old periods of time, their responsibilities have been grown, their daily activities, and especially their experience and perception in the public spaces.

Social interaction and daily events represent the life of cities, this was proven by several researches on urban planning and design where they stress the importance of public spaces as being the stage for these activities. Public spaces are dedicated for the public use. Therefore, they are not private or owned by certain individuals, in these spaces (when well characterized) people join each other in one single community despite their differences in gender, class, or age to enjoy and create social life. This is in particular is different than that semi-private and private spaces where they are restricted from other people and only controlled by some individuals. As economic and political forces contributed into the phenomenon of social segregation, spatial development also played its role to increase this segregation (Madanipour, 2003).

# CHAPTER III

## SPATIAL EXPERIENCE: MOVEMENT AND PERCEPTION

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“Walking is first and foremost a type of transportation, a way to get around, but it also provides an informal and uncomplicated possibility for being present in the public environment. One walks to do an errand, to see the surroundings, or just to walk, all in one process – or in three”

- Jan Gehl, 2011

## **INTRODUCTION**

In order to reach to an urban vitality, an appropriate relationship between urban structure, movement and land use is needed, because a proper spatial integration can generate more movement and movement can attract more activities to the space, letting people to join each other's even if they came for different purposes (Space Syntax Ltd., 1999; Kubat et al, 2003).

The focus of this chapter revolves around understanding the movement and how it affects individuals in the city, given that users of public spaces experience different facets of the same space, and movement is considered as a one of many means to perceive this environment. Therefore, the first section will tackle the activity of movement along with different related concepts. Next is some basic psychological processes related to the man-space interaction where it will put a spotlight of the some of the notions on perception of space in relation with the experience of individuals. The final section will consist of an introduction to next chapter (space syntax method) but most importantly how movement and experience in space was addressed in space syntax.

### **III.1. MOVEMENT IN THE CITY**

Urban planning and design are greatly affected by where and how people move inside the city. Therefore, it is important to put an emphasis on it. There are several researches that focused on pedestrian movement or walkability in urban spaces such as (Forsyth et al., 2008; Sandalack et al. 2013), among them, there are studies that focused on the walking behaviour that is affected by spatial attributes and the structure of space such as the connectivity and layout of streets (Leslie et al. 2007; Sandalack et al. 2013). Movement appear differently in the local and the global scale and analysing the interchangeable movement between the two scales is important in order to understand the pattern of way-finding and orientation in the urban environment (Mohamed, 2016).

As a part from urban space and physical activities, movement is also affected social factors such as gender, age, ethnicity and so on. In many urban spaces, different groups of people especially women from various ages prefer using populated areas in the city. Women being able to use a public space freely indicates to what extent the space is secured. According to a woman on how she feels sense of safety she describes how populated areas help them better to feel safe than areas with security agents "Sad but true. We feel safer when the police are not

around. We are more harassed by the police for the way we look and dress than by those whom the police are trying to protect us from.” (Arjmand, 2016).

Gendered mobility has been overlooked in many studies, and despite women being an inseparable part from the urban space, this gendered mobility presents a more disadvantage for women than men both in public transportation or while using public transport (Greed, 2019; Uteng and Turner, 2019). Some studies showed that women fear from getting harassed while using public transport or when walking by feet from one space to another space (Graglia, 2016; Seedat, MacKenzie, and Mohan, 2006; Stark and Meschik, 2018).

As has being tackled in the previous chapter, cities design in particular is not gender-neutral, thus, they have their own share part in the segregation between genders and their mobility in the city. Considering everyday mobility, men and women experiences are different from one another. Fear of crime and insecurity in general are one of the most contributors to limit the movement of women and girls. Even how streets are illuminated and bus stops location can play an important factor in changing how women’s movement is carried throughout the city.

### **III.1.1. Concepts linked to movement**

#### **III.1.1.1. *Accessibility***

For Lynch (1960: 118), the act of access means the ability to reach a variety of places, resources, services, individuals, or even information. This goes through saying that urban spaces are considered accessible when people are capable to reach or access spaces that provide their needs and amenities without any difficulty or being hindered by obstacles. Furthermore, accessibility is necessary when talking about providing more opportunities for people to participate in a daily communal life.

To many scholars, location is frequently linked with vicinity, walkability, connectedness and transportation. Access through the comfortable public means of transportation is considered an important factor in designing public spaces. Moreover, urban spaces that are only accessible by cars and other private means of transportation are seen as inaccessible spaces for urban designers. For societies that are marginalized or have an economic disadvantage, public transportation shows more importance to access public spaces given that these groups of societies are more limited to private means of transportation (Arjmand, 2016).

Permeability is also a part from the notion of accessibility to space, because a space is considered accessible when it is permeable. Permeability is defined as “the degree to which an



area has a variety of pleasant, convenient and safe routes through it” (Cooper et al. 2009: 146). Permeability quality shows how many choices an environment would provide for people to access and travel from one place to another, this is shown through “visual” and “physical” access (Bentley et al. 1985: 12). When it comes to forming physical permeability, routes and how they are connected would increase accessibility potentials and provide people with more choices from any selected space. In the other hand visual permeability provide people with a sight over a place before even entering it, which gives them the choice to entre it or not, depending on the feeling and impression these spaces exhibit (safety and comfort) (Arjmand, 2016).

Spatial accessibility has been a huge part of space syntax theory where it was claimed how the attractivity of a particular space is related to spatial configuration. It showed how integrated spaces characterize by their easy accessibility to users which logically make them populated by nature (easy to use or only to travel by) (Hillier and Hanson, 1984).

#### **III.1.1.2. *Connectivity***

Among many factors, connectivity in streets and neighbourhoods showed their importance in shaping walkability, activities and public transportation in cities, it has been a centre of interest for scholars. Connectivity shows how urban planning and design could provide residents in neighbourhoods with more choices when trying to travel from one place to another either by feet or by using any other mean of transportation (Koohsari et al. 2017) where connectivity could help increasing pedestrian’s movement (Ozbil et al., 2011).

Neighbourhoods that are built during different periods of times throughout history have showed a diverse pattern of streets connectivity (as seen in chapter 1) and how they influenced the walking behaviour for individuals (Southworth and Ben-Joseph, 2003). For instance, in North American cities, more specifically in the older areas (city centres and suburbs), the streets pattern was often planned in a grid-like composition (Southworth and Owens, 1993). This type of layout generally considered efficient for movement given that the streets are well connected and provided many access points (Sevtsuk et al., 2016). The grid-like pattern of streets showed a better connection rate in older cities than in contemporary areas because in newer North American cities streets tend to have a curvilinear pattern of distribution with lower intersection between them (Southworth and Ben-Joseph, 2003).

### III.1.1.3. *Enclosure*

In urban research, the term of enclosure means the separation of different spaces. Enclosure helps determining the boundaries that exist between different spaces that have a large spectrum between private and public characteristics. It can be said that this concept often is an answer when looking for safety and privacy (Gehl, 2011: 79).

Several urban scholars such as Gordon Cullen and Allan Jacobs, have emphasized that the feeling of enclosure comes when the line of sight is obstructed, which can make outdoor spaces appear like a room. Gordon Cullen (1961, p. 29) states that “Enclosure, or the outdoor room, is, perhaps, the most powerful, the most obvious, of all the devices to instil a sense of position, of identity with the surroundings... It embodies the idea of here ness.”. Allan Jacobs (1993) argues that people feel positive and prefer being in spaces where boundaries are determined, as it increase the feeling of safety and make the space more special, inviting and memorable. Buildings doesn't have to only sit in the space, but it should definitely enclose and define it (Jacobs and Appleyard, 1987, p. 118).

Enclosure is achieved by the degree to which spaces are visually defined either by walls, buildings, vegetation, fences, gates or any vertical elements. Vertical elements that shape and determine spaces help interrupting the line of sight for viewers. In urban space, enclosure can be created through the alignment of a continuous set of buildings that have approximately the same height in a street for example. In this case, these buildings become the walls that form the outside room, while the street become the floor, with the sky manifesting as the ceiling of this room. Alexander, (1977, pp. 489–491) sees that in order for the space to provide a comfortable sensation of enclosure, it needs to have a homogeneous proportion between the width of the street and the heights of buildings where the width can surpass the height. Allan Jacobs (1993) suggested that a proportion of 1:2 is acceptable between streets width and the buildings heights for a fitting sense of enclosure.

In areas with low densities however, trees play the role of buildings in defining space as the buildings become unnoticeable. Moreover, when the sense of enclosure within streets is not achieved clearly by buildings, focal points at the end of streets can visually preserve the sensation of linearity. The network of streets and its pattern of layout can also affect the feeling of enclosure. For instance, the straight-lined grids with constant long streets form a continuous line of sight for individuals, this however can reduce the feeling of enclosure resulted by

buildings and trees in the street. Irregular grids in the other hand also could form an enclosed space by displaying a visual termination point such as ‘cul-de-sacs’.

Any break in the continuity of elements that form the enclosure in streets can results in the creation of dead spaces, which also would contribute to more lost in the sensation of enclosure, these breaks can be parking lots, vacant lots and other spaces that doesn’t provide uses or require people’s presence.

#### **III.1.1.4. *Way-finding***

Wayfinding notion means the behavioural and cognitive ability of a person to reach a certain spatial location. Wayfinding as a topic is alone consists of many principles and factors that are combined together along with many other groups of variables and processes which results in many outcomes. Therefore, it is logical to assume that this topic has been treated in several diverse disciplines, notably in the behavioural and environmental fields, which helped in figuring out the factors behind an effective wayfinding (Farr et. al 2012).

According to Downs and Stea (1973) wayfinding is a process that can be achieved through a process of four steps. First is orientation, where individuals determine their location according to nearby landmarks and the objective destination. Next is the route selection where the individual chooses the route that he is willing to take to finally reach his destination. The third step is the route control, where the individual keeps confirming and controlling the path that he took initially to not lose his route. Finally, is the recognition of destination which consist of the realization that the individual has reached the objective destination.

For Romedi (1984) however, the ability of wayfinding is carried out by three different actions; the making of decision, the execution of decision and finally information processing. The first step of wayfinding is when an individual decides to go to a certain destination by his own mind, this decision is made through the information provided by the environment in which it illustrates the location often in a connotative and denotative way, which sites location in a spatial setting. The first decision made may not be possible to be performed, however, with additional linked decisions (plans of action), could help making solutions for the problem that is resulted in the initial decision. All the decisions made by individuals either requires the information perceived directly from the environment, or rather the information that are gained from previous experiences of the space destination, some others are a combination from both sources. The first decisions by their own are not enough to reach the physical locations, but the

execution and transforming them into actions is what lead to the desired location. The execution of actions occurs at the right and specific moment in space, which means that they represent an important part in the journey and it is important to be taken in the right place (Romedi, 1984).

In another perspective, legibility or recognisability term seeks to improve the experience, understanding and the perception of the environment by users. By combining identity, information along with the functional and physical properties of an environment, it could lead to the formation of a comprehensive and smooth space for movement between one place to another, because the level of choice that is provided for users in a place is related to the degree of its legibility and how people can understand its composition (Bentley et al. 1985).

Lynch (1960) talked about elements of the city that are related to legibility where he sees “wayfinding” as the regular and organized use of sensory cues that the environment provides for users, to navigate your path from one place to another in either a familiar or unfamiliar surroundings. According to Lynch (1960), wayfinding that is related to environmental factors is broken down into five built environment elements; edges, landmarks, paths, nodes and districts. These elements are not separated from one and another, but rather they have a complementary relationship and overlap with each other as a whole.

Starting with the element of ‘paths’, it represents the passages where the movement of individuals occurs such as, canals, streets, railroads, highways, walkways and so one. This element here is the most important property of the built environment given that is the one that provide peoples with the opportunity and function to move from one place to another. Paths allow individuals to sense the direction as well as the scale and provide an idea of the distance already travelled and how much distance left to travel (Lynch, 1960).

Edges in the other hand are the limitations that exist between one area and another which work as lateral boundary marks. Edges can be manifested by walls, railroad cuts and even shores... etc. Despite them not being as important as paths, however, their role remain significant in the built environment where they hold together and organize the generalized areas (Lynch, 1960).

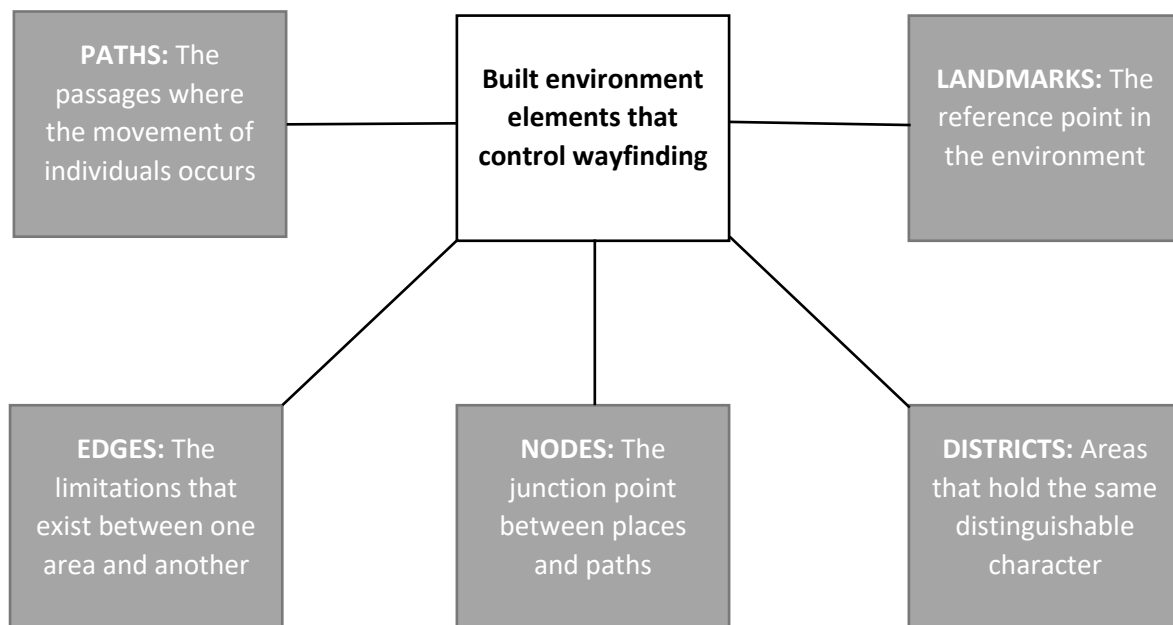
Districts element is the segments or the parts of an environment that hold the same distinguishable character. These areas are usually recognized by individuals and often used as external landmarks to travel towards them of just to pass by (Lynch, 1960).

Nodes are usually the convergence/junction point between places and paths, they represent a strategic point for individuals where they can access to an environment or an area. Nodes exist

in all environments and given that individuals make their decisions in these points (where to go next), they usually have increased attention when they are at these nodes, this shows that these points are logically an optimal location for directory boards and maps to help more in their wayfinding (Lynch, 1960).

Finally, the element of landmarks is considered as the reference point in the environment, they could be signs, towers, buildings... etc. Landmarks are usually found in local and visible areas such as neighbourhoods. This element has an important role in navigating through different spaces and especially in carrying out daily tasks. All these elements that were mentioned by Lynch are shown in Figure III.1.

Successful wayfinding repose of the relationship that exists between an individual and elements provided by its environment. These elements are presented for people to facilitate taking decisions based on the properties of the environment, and later on these decisions would be translated into actions which help the movement to the objective destination (Casakin et al., 2000). Therefore, making a decision in the environment is related to individuals and the information provided by the environment.



**Figure III.1.** Elements of the built environment that shares wayfinding as classified by Lynch (1960)

As explained, superficially wayfinding looks like a direct and simple process that occur when traveling from one place to another while depending on a certain decision on a specific timing. In the last decades however, human started using various means that helps successfully guiding them through urban space such as maps, GPS and so on (Fewings, 2001). Wayfinding also can be used also to tackle management strategies such as guiding shoppers to spaces that proved commercial activities and retail uses.

The cultural aspect could affect the information received from of the environment (Whorf, 1941). Wayfinding and decision making in general can follow the social status and the culture inherited by an individual, this can be seen for example in the languages that are used between countries, moreover, it can be seen in the segregation of different areas in the city as well as the organization of departments in a company (Hajibabai et al., 2006).

In the topic of the gender division, it was proven that there is a difference between men and women when it come to the spatial ability; cognitive processes and how the environment is perceived along with its components (Lawton, 2010). There are studies showed that gender differences also could play a factor for men and women who are navigating space (Chai and Jacobs, 2009), where men are most likely to navigate through space better than women (Lawton, 2010). On their wayfinding men prefer to use cues that are distant from them such as hill lines, while for women they prefer to use the exact cues of locations such as landmarks which will form a clear visual scene and direction to follow. Moreover, men are found to be precise while navigating to accomplish their activities whenever they have information are provided (Chai and Jacobs, 2009).

#### **III.1.1.5. *Mobility***

Public spaces are not only the places for events and activities to occur, but also, they are a place for mobility with different means of transportation, either to travel from one point to another, or only to pass-by. Therefore, providing several opportunities and choices of mobility could lead to the formation of more urban sustainability (Gehl, 2006).

As mentioned in the first chapter, throughout history, streets have represented a fundamental role in the city as a whole, they connected people as well as spaces, they made commerce reachable, they were a place for social interaction, but most importantly among all this, they were the place for mobility. From there and until the half the 20<sup>th</sup> century, streets, squares and plazas represented a unified system that help forming economic, cultural and social life inside

cities. Streets were considered multi-functional and dynamic places by nature, however, modernists ideology of function, order and hygiene and their focus on traffic movement have diminished the importance of streets (Jacobs, 1961). The emergence of car society has undoubtedly demolished public spaces as a unit, moreover, to manage the ongoing growth of vehicular traffic, the form of cities has been changed to cope with their needs. Thus, urban spaces and streets became car spaces and parking for cars rather than a place for social experience and urban life (Newman and Kenworthy, 1999).

Mobility in the city and the experience it provides for individuals while moving is something that is related to public spaces. Despite their relationship and their role in the formation of sustainable cities, these two facets have been looked as two separated and abandoned aspects in the domain of urban planning. From one perspective, cycling and walking by feet in the urban space are two of the fundamental means towards a sustainable and economic environment. However, sustainable mobility as a system is also related with the public spaces, this is shown in other means of transportation that people use in their daily life such as buses, train stations, cars and so on. (Lévy et al. 2010).

With the continues technology development and the craving to traveling faster in the city, it was inescapable for the adaptation of vehicular type of movement inside the city. Therefore, the focus has shifted away from pedestrians into designing high-speed roads and increasing their capacity for more vehicles and better communication of cars, this was referred to as a “automobile-oriented” trend (Forsyth and Southworth, 2008). Vehicular oriented cities contribute to the formation of many obstacles for pedestrians, some of them could park near or close to sidewalks which could restrict pedestrians in their spaces, there are also issue that are related to traffic jams, pollution and so on (Gehl, 2013). All this posed the question by urban planner and residents on for whom the city is really for.

#### **III.1.1.6. *Walkability***

Walking for people is the first and principal mean of transportation, by walking people can wander around the city and public environment in an undemanding and informal way. Individuals walk to pursue a daily activity, to see and enjoy their surroundings or only to walk, might do them all together or only a single one at a time. Walking is often a necessary action for individuals, however, it can be carried out just as an excuse to walk by some place. Walking act also requires space in order for people to walk freely without any obstacles in their way, or changing their path to avoid certain places. Not only that high pedestrian flow contributes to

the urban dynamicity but also it provides more sense of safety and invites more people to the city. Pedestrians and their movement in urban space is a crucial part that has to be taken under consideration in urban planning, given the influence they hold in the environment and infrastructure design.

The Oxford English Dictionary (2006) defines the pedestrian “a person walking rather than traveling in a vehicle”. Thus, pedestrian movement as an activity can be compared with other means of transportation such as cycling, driving or taking the train. Similarly to vehicular transportation, pedestrians also usually walk in order to travel one place to another, to go to work from home for instance, However, The American Heritage Dictionary doesn't present the pedestrian's movement as a mode of transport, but rather it describes the pedestrian as “a person traveling on foot or a walker”, therefore, it focused more on the walking behaviour that is not related to transportation only objective such as shopping, exercising, social interactions and so on.

The general belief that cities are there to focus on pedestrians and their needs was the consequence to the emergence of the notion ‘walkable cities’ (Speck J., 2012). What it means is to provide a public space for pedestrians which prioritise pedestrians over cars. Moreover, cities that have walkable and shared public spaces tend to present more equality in terms of gender, age, social class, and ethnicity (Sennett, 2018).

During the past decade, both of the domains of public health and urban planning have been combined together under the mutual concern of walkable communities. Walking represent the general form of the physical activity for individuals in their daily activities and leisure time. The ‘walkable city’ has become a large concern within academic and popular domains, they expressed its importance and how it will affect the future of cities. For instance, it was shown lately that walking activity has a positive effect on the health of citizens of the city (Stevenson et al., 2016).

The term of walkability has drove many attentions due to the diminishing quality of urban spaces and more precisely pedestrian domains such as sidewalks. Decision makers have abandoned streets and their main role which is not only limited to cars and parking lots. Streets must prioritize pedestrians in all cases, even when they are providing urban transportation (Short and. Pinet-Peralta, 2010). Peoples who are walking or cycling must have access to all urban space that concern them. According to Speck J. (2012), in order for the city to be



walkable it has to provided four basic aspects: convenience, attractiveness, security and functionality.

To sum up, it is easy to say that the walkable city notion one of the important factors to reach a sustainable mobility in the city. Given its advantage that it provides for the city in different aspects such as improving the sensation of safety, equality between genders, reducing pollution, improving health, and providing more balance in terms of means of transportation, urban designers and decision makes must take this trend under consideration for better future cities.

## **III.2. PERCEPTION IN URBAN SPACE**

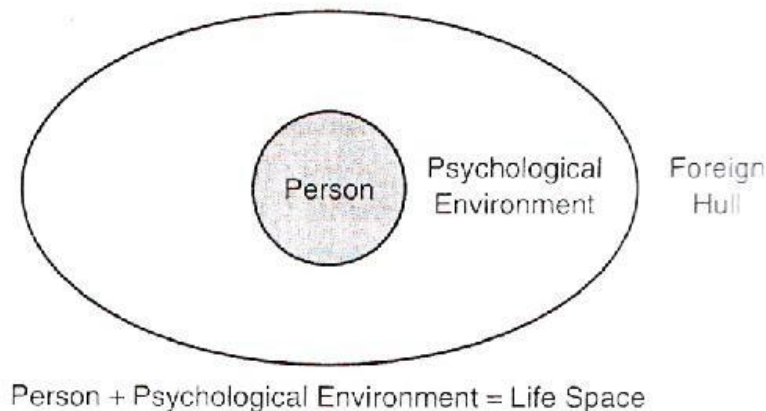
### **III.2.1. Definition of perception concept**

Perception is the process of acquiring an understanding or an awareness of sensory information of the environment. However, perception doesn't only rely on the information available, as the individual's perception is also the outcome of the relation that exist between the interpretation of the things that are perceived, his culture, and his past experience. According to Neisser (1977), it's where reality meets cognition. By using the individual's senses such as touching, hearing and smelling, perception is seen as an active process that occurs across four phases: cognition, affection, interpretation and evaluation (Ittelson, 1973). Oftentimes, perception is based more on the visual aspect especially when talking about the evaluation of space and the behaviour of users through the aesthetics of the environment. Vision help the individual read, understand, gather and categorize the information provided by a certain environment, and that is in order to discover space or carrying out a certain activity in space (movement, wandering, sitting and so on) (Gifford, 1997). According to William Ittelson there are two types of perceptions; object perception and environmental perception, the first one revolves more about the characteristics of an object while the second one consists on the general image of the environment where the perceiver are part of it.

### III.2.2. Environmental perception

#### III.2.2.1. *Environmental psychology*

In environment psychology, environmental perception is considered as one of its essential entities, it studies the relation between human behaviour and their environment (either built or natural). With this interchangeable relation, it means that the behaviour individuals as well as their experience is affected differently according the environment that they use (Bada, 2012). The concept of environment itself doesn't only consist of natural environment (green spaces and parks), but it also involves the built environment (buildings, streets and so on), which requires the understanding of both types and the relationship between the environment and individuals. Thus, it is necessary to study both aspects, the properties of the environment as well as the perception and behaviour of individuals (Gifford, 1997). Kurt Lewin for instance represented the relation between the individual and the psychological environment mathematically (Figure III.2), he assigned (P) for person, (E) for environment with the formula of his formula  $B = f(p, E)$  (Kaplan and Kaplan, 1978; Bada, 2012). All in all, environmental psychology most important objective is to took into the individual behaviour and perception by the influence of the environment that he uses (Brunswick, 1943).



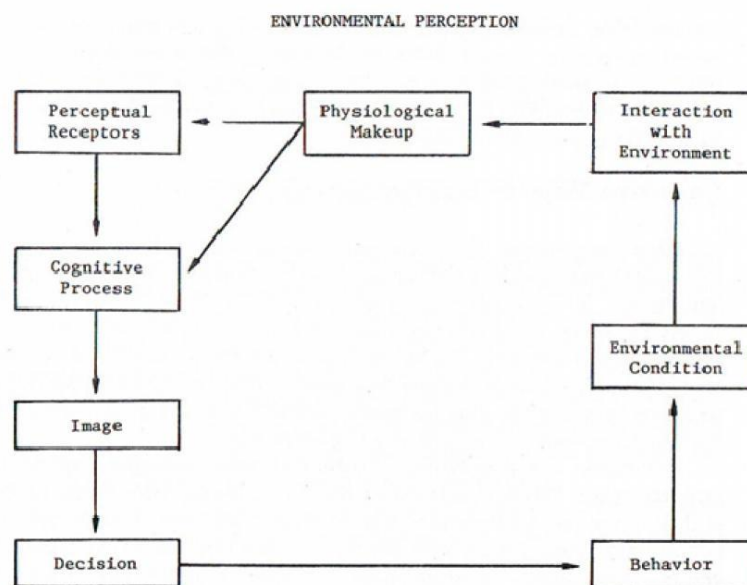
**Figure III.2.** Representation of the topological relation of person-environment by Kurt Lewin. **Source:** Kaplan (1987)

Gifford (1997) defines environmental perception as the manifested image that it is formed by information provided by the environment. Environment perception play an important role in the relationship that exist between one and its environment. Rapoport (1977) claims that when an individual uses a space, there is a connection that links him to that environment through

perception which he broke down into environmental perception, environmental cognition and environment evaluation. Lang (1987) also see that environmental perception is the interplay between the physical environment and the cognitive, affective, interpretive and evaluative aspects of the environment.

Cognitive aspect consists of individuals using their main human sense. The anthropologist Edward T. Hall in his book *The Hidden Dimension* (1960) explains how humans' sensory apparatus are can be categorized into: immediate receptors which use skin and muscle for touch, and distance receptors by using nose, eyes and ears. These are part of different level of specialization and spheres of function. Therefore, we can say that perception is a process that is carried out with a multi-sensory activity. The affective aspect means the attachment and emotional reaction of an individual to its perceived environment, this could result to either more attraction towards to that environment or completely dislike it and avoid it ultimately. Evaluative aspect is the phase where the individual assesses the environment according to his preference which define a clearer image for him.

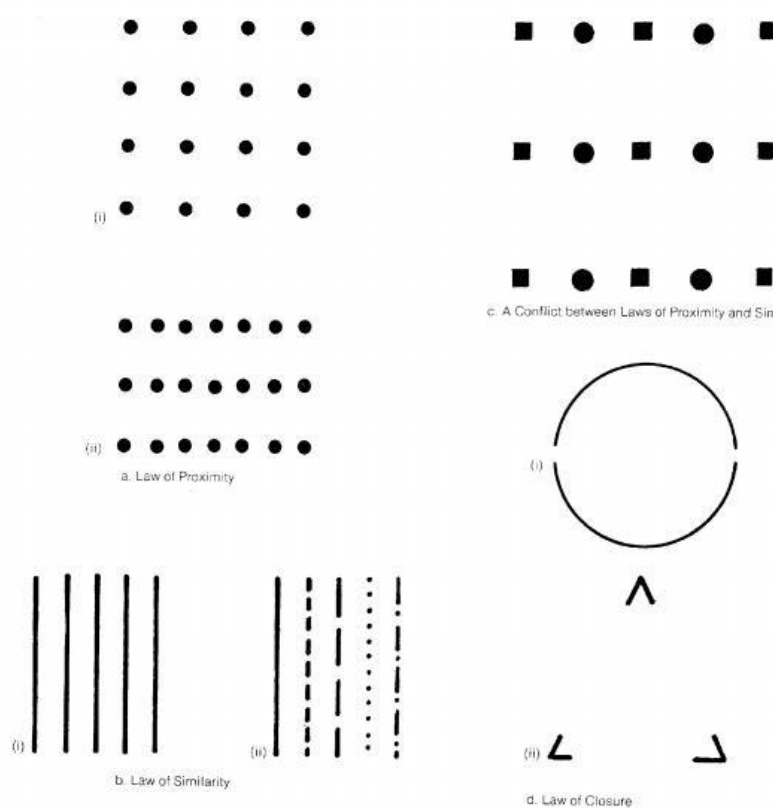
Hilgard (1951) claims that perception is considered as dynamic process rather than a passive one, he thinks that the perceiver looks for a stable environment, as cited in (Kaplan, 1987, p.36) "an environmental homeostasis parallel to the physiological homeostasis". Hilgard sees that there are two goals of perception "first, to have our perceptions keep the world about us a stable one and, second, to achieve definiteness in what we perceive, may be accepted as valid without committing ourselves as to their origin." (Figure III.3).



**Figure III.3.** Environmental perception: man-environment interaction. **Source:** Kaplan and Kaplan (1982).

Baily (1977) for instance has developed the environmental perception between individuals and the concept of landscape into two theories: the first theory of ‘stimuli-answer’ which focuses on the effects of the environments’ stimuli on the individual’s behaviour. The second one which incorporates more personal qualities (social, cultural and psychological).

In another approach of Environmental psychology, Gestalt explained perception in a group of a scattered sensation points where he explained the importance of the pattern and the whole shape of these points. This has been explained by Kohler (1975) “instead of reacting to local stimuli and independent events, the organism responds to the pattern of stimuli to which it exposed”. Gestalt psychology is based on the form isomorphis which is a mirrorlike feature that represent the perceptual experience with the form of brain’s neurophysical process, along with the forces visual field he broke it down into application, a direction and a magnitude. Therefore, he formed a group of rules that covered the pattern and appearance of shapes that set laws into the environment perception: symmetry, similarity, closure, continuance, and proximity (Figure III.4).



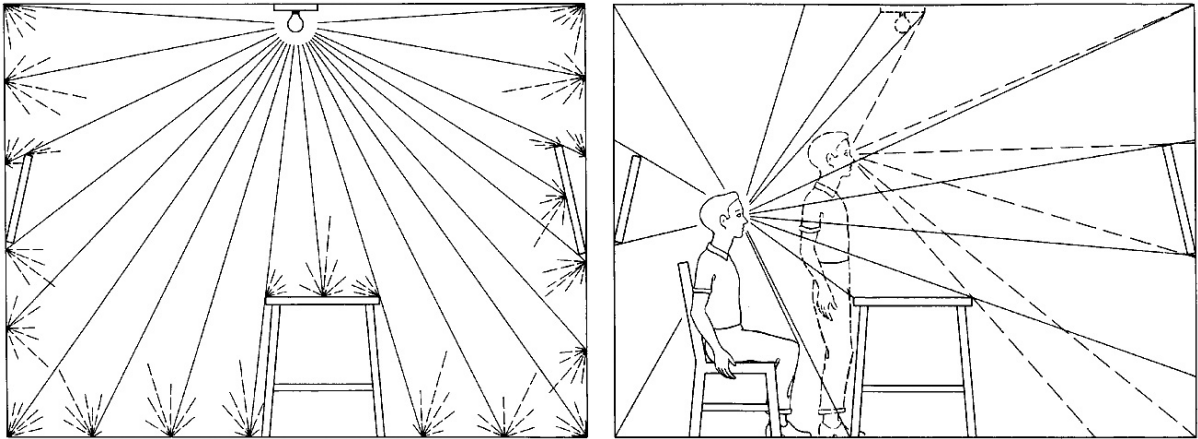
**Figure III.4.** Gestalt Principles. **Source:** Lang (1987)

### III.2.2.2. *Ecological theory of perception*

Contrary to the old conception of visual perception and how the eye is the organism that is responsible for interpreting the image of the environment, James J. Gibson (1966) has presented a newer study on the perception of the environment in which he explored man-environment relation (ecological optics). His analysis was consisted of a tangible and real experience of a perceiver in a chosen environment. Given that the interaction of the individual with his environment considers motion as one of the means by which an individual can perceive his environment through a sequence of visual changes, this analysis was based through the fact that the individual will experience his environment through movement (from one place to another). In this study, the environment is determined by three elements: surfaces, substances and medium. Medium element represents the air that allows light and movement to pass through it. Substances in the other hand are components of the environment. While surfaces element exhibit the interface of the substances and the medium, as they reflect the properties of these elements.

Gibson mentions that any diffused light by the environment's components (spaces, surfaces, and textures/materials) that comes from all directions and varies in intensities, either reflected or emanated is what manifests the visual perception. This light entering the eye is not randomly scattered but rather already arranged and structured by the environment, he called it *ambient light*. Thus, the starting point for vision is in the environment (the stimulus) and the point it arrives to is the eye, which he called the *optic array*. This light holds the information of the environment. He then adds that when the observer or objects move there will be systematic changes to the optic array (changes in angles, accumulations or deletion), which yet again result in changes in the carried information by light from the environment. With movement there will be a change in the field of vision, this would make the observer perceive objects differently, either clearer or no longer see at all as they become obstructed by other objects (*optical occlusion* and *disocclusion*). During the movement of an individual, the light entering the eye is moving in different rates and amounts (*optic flow*) which provide even more information about the environment. Moreover, while moving through the environment some of the attributes of the optic array will be variant however there will be other that are invariant which indicate the permanent characteristic and layout of the environment (Gibson, 1979) (Figure III.5).

What we conclude from the contribution of Gibson's ecological theory is that perception is a result from the optical flow that is generated by the objects and the environment and more interpreted while the perceiver is moving rather than an image that is interpreted by the human brain through the electrical activity that is received by the eyes as photoreceptors.



**Figure III.5.** Gibson's Ambient Optic Array. **Source:** Gibson (1966)

### III.2.3. Environmental Cognition and imageability

Cognition in the environment means the way individuals receive, store, arrange and call back information of the environment which may include; streets, locations, distances and even the way buildings are arranged. In order for the individual to effectively use and employ the registered information through his eyes, he may also relate it to past experiences or cultural preferences. This would be impactful in terms of the individual's behaviour as it will suit his preference on where to wander or the space he prefers to use in comparison to others (Carr, 1970). As mentioned, environmental cognition is based on how individuals understand the environment. While many studies focused on how the components of the environment are broken-down for human organisms (Montello, 2007). Psychologists considered the cognition of the environment liked more with the prior knowledge of the environment for individuals. In the other hand anthropologists see cognition as a process that is mean to form a meaningful environment (Rapoport, 1977).

All in all, cognition is the act of mental processing of the perceived, cognized and recalled sensory information in a certain environment, this would also include how the individual evaluate and idea of this information.

### III.2.3.1. *Cognition map*

Cognition or mental map, is the representation of the image that people hold in their mind when they think of a particular space or environment. The environment doesn't exist inside the head but rather a simplified sketchy image of it, which happen according the perception process and how the individual memorized objects and events he went through (Wohlwill and Weisman, 1981). Thus, in mind the information is just an abstraction of the actual environment. Kaplan also claims that the cognitive map is the collection and aggregated experiences that are registered in the mind of a person of the environment that happened in certain conditions. Assigning the term of 'map' to 'cognition' doesn't mean the physical elements in the environment but rather the mental pattern of information that exists in the mind of the perceiver. Contrary to the real world, Kaplan sees that the cognitive map represents familiar events, objects as well continuous spaces. He also claims that cognition map may serve as a prediction tool given that individuals need some kind of information to decide on what to go next from a certain location. Terence Lee presented the concept of 'schemata' which imply the abstraction of a real environment. He thinks that individuals form 'schemata' to help them differentiate the location of the environment (*whereness*) as well as its value (*whatness*). He then goes on to say that spatial schemata are formed by several layers of information about the environment, which create the same that we live in. Schemata play an important role in the wayfinding and navigation within the environment as it represents the set of knowledge frame that is gained and developed through past experiences to use in the future (Kaplan and Kaplan, 1987).

### III.2.3.2. *Imageability*

Kevin Lynch (1960) claims that imageability is an attribute that is linked to the physical space, this attribute would stimulate an image of the environment that is seen by an observer, he defines it as "that shape, colour, or arrangement which facilitates the making of vividly identified, powerfully structured, highly useful mental images of the environment". A well-designed city tends to be strongly imaginable, it would provide areas and public places that are easily recognizable by through traveller or by individuals who already lived close to these spaces. This notion plays the stimulate factor of the natural human ability to read or detect something and how it is composed from an overall pattern. Landmarks (which has been spoken of in different sections of this chapter) for instance, represent a key element for imageability. According to Lynch, landmarks can be any element however, what is important is their location and uniqueness in relation to their environment which make it as a reference of a space for

users. They act as an orientation points, or even a point of attraction in an urban setting. Buildings with unique properties are also considered as landmarks. They are usually characterized by large sizes, and complex shapes which make them distinguishable among other buildings (Appleyard, 1969; Evans et al., 1982). Other properties also can influence the image that a building paint, such as nature aspect, architectural style and pedestrian accessibility.

Imageability is also connected with the notion of 'sense of place'. Jan Gehl (1987) express the importance of the overall qualities in space in making a complete and unforgettable image of it, this consists of architectural design, climate and even the life in space itself which seen in the squares of some Italian cities for example. When all these properties are perfectly homogeneous together they form a space that is inviting and pleasant to be in.

### **III.3. SPATIAL EXPERIENCE**

During the activity of movement, individuals experience their environment, either when going from one place to another, or when only traversing a certain area. Experience notion itself is a compilation of different information provided by the environment, it consists of how it is perceived, sensed and evaluated (man-environment interaction). This could be achieved by using human senses for instance: touching, hearing, smelling and vision in order to feel and experience the space (Bada, 2012).

Experience is an important factor that must be taken into consideration in urban planning and design, it reflects the human needs and how the foresee their environment. According to Cullen (1966) sense of vision is the principal way to experience an environment, vision doesn't only help reading the environment but also to build an emotional connection between users and space. Therefore, the configuration and pattern of urban spaces (streets and squares) have their own role on providing a visual perception and experience as it was seen in medieval cities (Camillo Sitte, 1945)

Cordon Cullen (1961) in his book *the concise townscape* talked about the notion of 'serial vision' and how the environment is experienced through a series of scenes while walking or wandering in the city. He thinks that the scenery quality is linked to the hidden and unhidden parts of the environment which make straight streets have less attraction than other types given that they present a full view from the moment of entering the street (Cullen, 1968, p 8).



Alexander (1979) claims that the experience of individuals is not only related to the elements that are perceived in the environment such as buildings, walls and fences but how they are arranged together (patterns). The group of elements that are grouped together itself form a pattern by their organization and their placement in the environment constitute another pattern by itself. What he is trying to elaborate here is that the experience of individuals is related to the pattern and of these elements and how they are arranged with one and another. He later on clarified how the quality of experience for individuals is also related to the level of contrast between the elements and the features in the environment which make particular elements more appealing than others. He believed that individual experience the environment by the inside and outside of their body “the whole city becomes a plastic experience, a journey through pressures of vacuums, a sequence of exposures and enclosures, of constraints and relief”.

Experiences are determined between the man and its environment through the interchangeable relations of physicals and psycho-sensory aspects. Thus, whenever an individual experience and environment it affects him physically and emotionally (his perception and behaviour). Experience is the result from the stimulations from the environment as well as personal values. However, it also could be attached to the nature of a certain environment such as a previous experience, socio-cultural aspects or the age of the individual (Amedeo, 2009). Therefore, the perceived environment is a socio-cultural and a biological product (Carmona et al 2003).

Environmental psychology has tackled peoples experience in urban space by focusing on two approaches: semiotics and phenomenology. The first one is considered ‘passive’ where the individual only receive and reads the information provided by the environment. The second one is more of an ‘active’ experience where the individual interpret with the environment as he chooses and organize his actions (Bada, 2012). Phenomenologists such as Heidegger focused on the notion of ‘intention’ which treat the experience of individuals based on their consciousness and how it relates with the environment based on the structure. Semiotics approach however, focused on how individual read and decodes the information received.

Generally, the established studies in different fields first are mutually based on the effect of the environment on individuals and their feelings, as well as their spatial behaviour (their movement pattern and wayfinding). All these aspects hold an effect on people’s psychological existence, affection, emotional attachment and orientation in space (Cullen, 1966; Schulz, 1971). Moreover, these studies also focused on the process of perception of the environment by individuals.

The environment by nature consist of a wide variety of physical and social elements that could affect and stimulate individuals' sense of judgement and then their behaviour afterwards. These elements are experienced through the five human senses (vision, taste, hearing, smell and touch) (Bada, 2012). According to Kaplan (1987) the vision is considered to most important sense when it comes to the identification and organization of space that is dedicated for human use, while the other senses help enriching the perception of space. Schulz (1981) however, argues that vision act is not only a process of registration of light but also is a compilation of flowing structures that are organized in a meaningful pattern that stimulate users of space. therefore, vision represent an important factor for spatial experience and therefore it has to be taken under consideration in urban planning and design.

The Senses Considered as Perceptual Systems

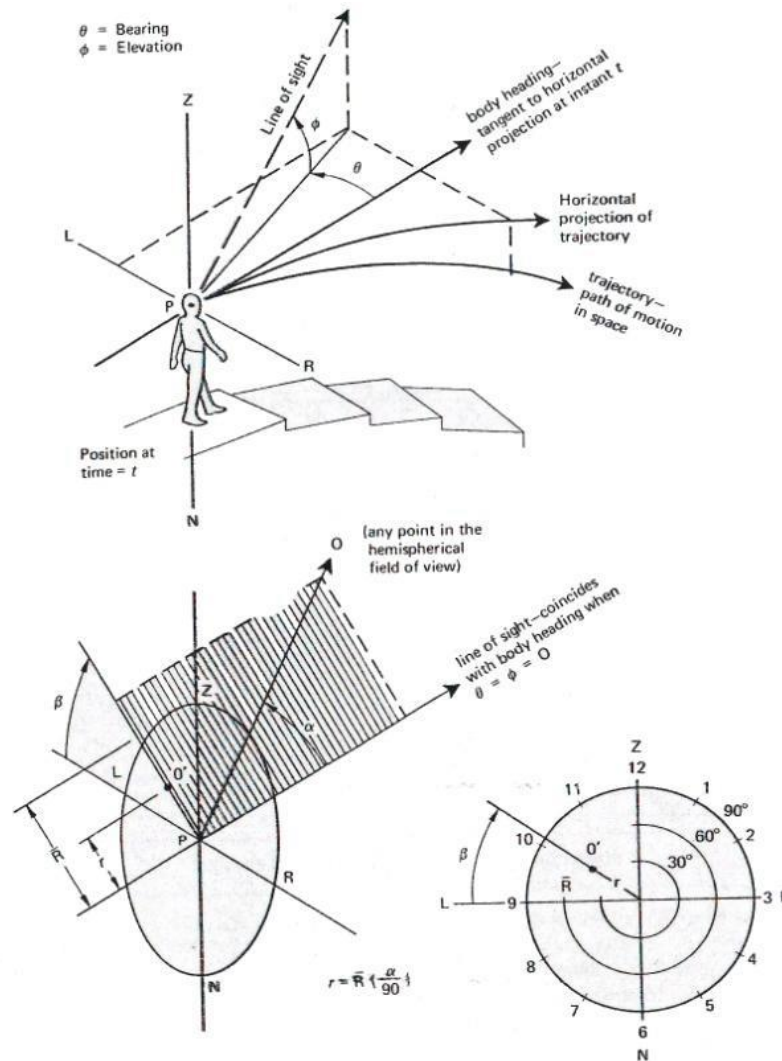
| Name                   | Mode of Attention   | Receptive Units                                 | Anatomy of the Organ   | Activity of the Organ   | Stimuli Available   | External Information Obtained  |
|------------------------|---------------------|---|--|---|---|--|
| Basic orienting system | General orientation | Mechano-receptors                               | Vestibular organs  | Body equilibrium  | Forces of gravity and acceleration  | Direction of gravity, being pushed   |
| Auditory system        | Listening           | Mechano-receptors                               | Cochlear organs with middle ear and auricle  | Orienting to sounds   | Vibration in the air  | Nature and location of vibratory events  |
| Haptic system          | Touching            | Mechano-receptors and possibly thermo-receptors | Skin (including attachments and openings), joints (including ligaments), muscles (including tendons)                                 | Exploration of many kinds   | Deformations of tissues, configuration of joints, stretching of muscle fibers | Contact with the earth, mechanical encounters, object shapes, material states—solidity or viscosity                                      |
| Taste-smell system     | Smelling            | Chemo-receptors                                 | Nasal cavity (nose)  | Sniffing  | Composition of the medium   | Nature of volatile sources   |
|                        | Tasting             | Chemo- and mechano-receptors                    | Oral cavity (mouth)  | Savoring  | Composition of ingested objects   | Nutritive and biochemical values   |
| Visual system          | Looking             | Photo-receptors                                 | Ocular mechanism (eyes, with intrinsic and extrinsic eye muscles, as related to the vestibular organs, the head, and the whole body) | Accommodation, pupillary adjustment, fixation, convergence, exploration | Variables of structure in ambient light                                       | Everything that can be specified by the variables of optical structure (information about objects, animals, motions, events, and places) |

Figure III.6. Perceptual Systems. Source: Lang (1987)

Experience of a space or an environment is usually linked with the act of movement from one area to another. Same with Schulz (1971) as he claims that the experience of individuals is linked to a space that is formed of basis of a path and a goal, which indicates the movement from and trough space. Thus, the experience of individuals is related to these two aspects. Schulz (1971) defines goals as the objective place where individuals could live and have a

meaningful experience. Paths in the other hand are considered to be the means on which they experience the environment. Moreover, a path doesn't need to be necessarily guided towards a goal or a terminal point but only as a selected favoured route to be taken.

Thiel (1961) for instance has explored the individuals' experience in an environment, more precisely, he focused on the sequential experience in a physical environment. Despite the important role of all senses in experiencing the environment, however, his study has investigated the experience only through the vision sense. In his investigation, all the elements of the environment (either people or physical objects) are considered as properties for the experience of the environment, he assigned (P) for the objective person, (H) for people, (S) for space, (F) which is the furnishing of space, (EN) for the environment and (M) for motion. He sees that the person who is experiencing space while in motion, he needs to be able to have choices and orient himself on where to move in space. As movement is an important factor in the experience of space, he explains that motion can be described by direction, time and distance, due to the fact that movement over time can occur in different positions of space apart from the initial location. According to Thiel (1961), there are three types of space; primary, secondary and subspaces. Unlike subspaces, primary space must be more explicit, while secondary spaces are considered to be larger. In addition to that, he emphasizes that the secondary space topped or overlaid with a view. All these types of spaces by their very nature are occupied by the person who is experiencing the environment (P) where all persons are able to recognize the elements that determine the spaces (Figure III.7). Along all of this, he also presented the term of 'event' where he described it as "the point at which any uniform, or uniformly varying, attribute such as rate, direction, slope, curvature, or distances changes" (Bada, 2012). Events take place when motion moves, departs or returns from a path, where any alterations in these motions can affect the occurred event.



**Figure III.7.** Representation of the man's visual perception of space by Thiel. **Source:** (Prohansky, 1970).

In an explorative attempt, Gibson (1944) tried to study how spaces is visually experienced by individuals. He started by splitting the space of experience into two types; local space and aerial space. Local space is defined as the space that is enclosed and limited by physical elements such as walls. Aerial space however is not limited by certain element but rather extends to the visual horizon, its bounded by the observer surroundings (sky and earth). Moreover, these two types of spaces are also linked by three categories of space; the merge, the port, and the end. The merge represents the blending of two spaces without a clear limitation or a strong point of junction between one another. A port appears when traveling from one space to another and a contradiction appears. While the end space is considered whenever there is no port neither a merge in the junction of spaces. He then adds that human perceive space through the three

dimensions, and that only half of the visual world is perceived through human's field of vision. This field of sight represents the 'scene' or 'environmental display' (Bada, 2012).

It was mentioned however how physical properties of space alone are not enough to figure out the lived experience by individuals in a street for instance, because they do not comprehend their general perception of the environment, especially with perceptions that have complex and deeper levels of connection with physical features. In the literature of urban design and planning, it was pointed out how the walking environment is affected by several perceptual qualities (Handy, 1992; Ewing, 1996). Other domains also showed their effect on this topic such as, landscape architecture, environmental psychology and other visual preferences (Ewing, 2000; Ewing et al., 2005a). Conditions that compromise the activity of walking could lead to many problems such as social segregation which consist of social, economic and physical division of groups and individuals.

All in all, movement is considered as an important way to experience space, it exhibits the experience that the one already had. As mentioned earlier this does not consist on the element that are perceived in space but also on how they are connected together which provide a pattern that represent the lived experience (Tuan, 1977).

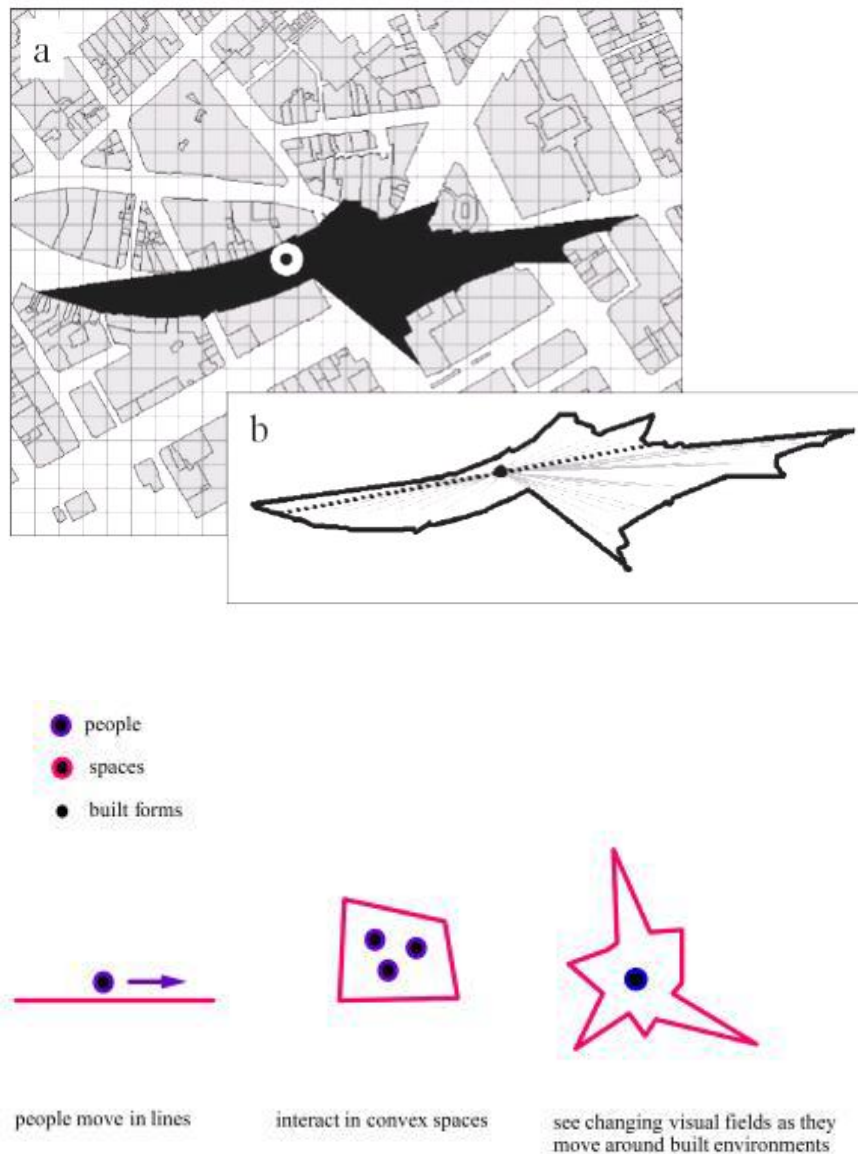
#### **III.4. SPACE SYNTAX, MOVEMENT AND SPATIAL EXPERIENCE**

In space syntax theory, it is believed that people's behaviour is affected greatly by space, such as movement and spatial use. Space syntax considered space not only as a single unit but it also as various parts that are connected together, and this relationship between them is what defines the property of space, this called 'spatial configuration'. Hillier (1996) defined it as "A set of relationship among things along things all which interdependent in an overall structure". The most important thing here to mention is that Hillier claims that users' spatial use is related to the visual proportions of space which he called 'isovist', he also thinks that the space for users is not restricted only to the properties of a particular space, but rather to many spaces and the relationship that exists between them which makes them as a unit (a single system) (Hillier, 1996, 2000).

When it comes to proceeding analyses with Space syntax method, there are three basic approaches to represent space (which will be developed with more details in the next chapter). One is the 'convex space' which is a bidimensional of urban or architectural space, this representation consists of dividing space into small convex or polygon entities, as few as

possible, and the map obtained is used to locate the fields of possible social interactions. 'Axial space' in the other hand is a one-dimensional representation of urban space. It is made up of straight lines representing the longest and least numerous longitudinal axes that cross the urban space, they connect between all the convex spaces, they extend as far as possible that there is at least one visible and directly accessible point which means they are linked more with visibility and movement. Hillier (1994) sees that "people move in lines, and tend to approximate lines in more complex routes, individual stops to talk to a group of people, the group will collectively define a space in which all the people the first person can see each other, and this is a mathematical definition of convexity in space". The last type is 'isovist' which represent the relation between space and vision, here space is defined as a set of visible surfaces, they represent points of the environment that are visible from any given point of view of the same environment, Hillier claims that the shape of these surfaces change depending of the movement of individuals in space (Figure III.8), thus, it is related to the individual's perception of space and his experience in the environment.

Hillier (1996) argues that movement is affected by the spatial structure (urban grid) and visual properties, he thinks that moving from one place to another (origin point and destination) could lead to generating other optional activities, he called it the 'by-product effect'. Hillier believed that there are underlying powers that generate movement in the space rather than the ordinary linguistic concepts such as hierarchies and regularized geometries. After they studied the implications of the physical structure of space, they coined the concept of 'natural movement' and explained how movement is generated by the spatial configuration of the urban space (Hillier et al., 1983). As a matter of fact, 60% to 80% of research that correlated movements in urban spaces with the integration value had been accounted (Peponis et al., 1989; Hillier et al., 1993; Hillier & Iida, 2005; Penn et al., 1998), which showed how the urban network alone is capable to be a source for predicting of movement generated while ignoring secondary factors.



**Figure III. 8.** Representation of the relation people with space which shows the changing in the visual field of the moving individual. **Source:** Hillier (1996).

In his way to explore more of a clearer way to represent the experienced space from the point of view of a perceiver, Benedikt (1979) presented the concept of ‘isovist’, he defined it as “the set of all points visible from a given vantage point in space and with respect to an environment” (Benedikt, 1979: 47). He thinks that the individual’s experience can be interpreted through several isovists (either by fields or linear isovists). In this approach, there are several measurements in isovists that help studying perception and behaviour of users such as circularity, area and perimeter. While moving in space, the individual forms a changing field of vision (isovits) which contribute to more diverse values (Figure III. 8), by using this it would

indicate the properties of space which also learn to different behaviour for perceivers. Wiener and Franz (2005) for instance studied the experience in space and the role of isovits in predicting the behaviour of individuals through space parameters' values. Dalton (2003) also has studied the implication of visibility on people's pattern of movement in space where he used visibility graph analysis (VGA). He uncovered that moving individuals that stop moving in a certain location is not random but rather is linked to the fact that they seek for more visual information more precisely in junctions, its where observers and isovists make their decision on where to go next. Unlike isovists, Turner thinks that there is a need of more than one isovist is the same time given that spatial experience and the spatial use by individuals is linked to interplay of different isovists. Therefore, he presented a more enhanced version to interpret visual properties of space (VGA) through Depthmap software. Unlike the other types of analyses, VGA analyses projects grid into the studied area, every cell of the grid interprets values that measure visibility between every other cell in the system, thus it provides all visual properties in space.

## **CONCLUSION**

This chapter revolved mainly around understanding the spatial experience of individuals in space. Movement is considered as one of the interesting activities in which a person can perceive his environment. By tackling several concepts related to movement (accessibility, connectivity, way-findings...), we saw how the physical environment can provide cues and orientations to navigate through the environment. One of the important influential concepts mentioned however was 'walkability'. Lately, there was a large interest towards pedestrian's movement in the city as it contributes to many positive effects in the urban space as well the formation of sustainable mobility for future cities.

Movement for men and women is considered different in term of their spatial use and the itineraries they take, given that many other factors present themselves as obstacles such as insecurity which would limit their movement in particular spaces. Lawton (2010) also claimed how both genders perceive the environment differently which would reflect on how they navigate through space, and therefore they would experience the city differently.

The process of perception implies how individuals acquire sensory information about the environment and its physical elements. This was further explained by environmental perception



as in Gibson's theory, where he mentioned how movement can contribute to changes in terms of the received information from the environment

Many scholars stressed the importance of spatial experience and interaction of man-environment. Experience depends largely on the cognitive aspect of the environment, as it focuses on how individuals receive, organize and store an image of it in their mind. Cognition also focuses on the emotional attachment of individuals to their environment, this would also overlap with their past experiences along with many others, to build a simplified image of that environment in their mind. Acquiring this information help individual make up their mind on a certain space (how they feel about it) as well as their decision making in the future and how they prefer to navigate through spaces and streets.

The theory of space syntax has also addressed the behaviour of people and how they navigate through space depending on their spatial experience, this was mainly in relation with the physical structure of space. The overall approach in space syntax is the relation that exists between one part (or element of space) in comparison with the rest of others in the same area of investigation. Hillier (1996) claimed that individual's spatial use is affected by the visual information that is provided by the environment (isovist), this effect is not only related to a single space but rather it is dependent of the relation and interconnection between the other spaces that constitute the whole system (spatial configuration). This implies that during movement, the experience of individuals changes according to the visual fields that are obtainable by them at a given spot. In the next chapter the theory of space syntax will be further developed to include more details and aspects that are related to this thesis.

# CHAPTER IV

## SPACE SYNTAX: A THEORY AND AN APPROACH

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“It is the fact of space that creates the special relation between function and social meaning in buildings. The ordering of space in buildings is really about the ordering of relations between people”

- Hillier & Hanson, 1989

## **INTRODUCTION**

This chapter explores an important part of this thesis which is space syntax theory. One of the major concerns for architects and urban designers is the relation between the physical space and the behaviour of users in it, how this space is lived, felt and perceived. Space syntax theory comes in to present an analysable physical environment through a set of tools and representations of space that help interpreting many socio-spatial phenomena, as well as the relation of people to their space. Accordingly, the first section of this chapter presents space syntax theory in many aspects, going from its evolution, how it is represented, and how it is usable and interpreted.

Space syntax however, as shown in many studies, is not fully efficient by itself, but rather requires a combination with other qualitative approaches which could lead to a better understanding in some cases. Therefore, the second section provides several approaches that were usually used alongside space syntax.

### **IV.1. WHAT IS SPACE SYNTAX?**

Initiated in the 1970s by Bill Hillier alongside with his colleagues in UCL, Bartlett School of Architecture. In brief, space syntax is a theory and an approach that analyses and deals with the relationships that exist between spaces and different parts of space. In more in depth, space syntax is a compilation of tools and techniques that are used separately and together to answer for certain socio-spatial phenomena, or to help with future design and urban planning in general. Basically, space syntax method studies the spatial configuration of the built environment. In anthropological studies, it was clear how space syntax worked well in several cultures in understating the different social relations and how physical elements such as buildings affect this relation in different settlements (Hillier and Hanson, 1984).

In urban studies, it was stated that in order to apply space syntax method, there are four things to keep in mind. First is that the spatial units are well determined and clear. Second, in space syntax, cities are analysed by its structure network that is created by the pattern of placement and orientation of buildings, this 'grid' helps studying streets and how every street is connected to the other streets in the system. Third, by using space syntax we gain access to many patterns of functions which are considered a network effect, these can be land uses pattern, areas segregation, crime locations, the pattern of movement flows either pedestrian or vehicular and

so on. Finally, by using space syntax in treating many phenomena, there are now many theories that explain the effect of structure's network on economic, social and cognitive aspects of the city and the way they helped forming certain urban spaces. Space syntax theory has become more and more known for researchers and scholars around the world, it has been used in several spaces and regions which constituted a large database of many cities that were studied by the same approach (Hillier et al. 2007; Van nes and Yamu, 2021).

As mentioned space syntax approach calculates the relationship of every space (street, public space...) in comparison to its environment. In other words, space syntax measures the potential through-movement (know also as betweenness) as well as the to-movement (known also as closeness) between the elements (axes or segments) of space in relation to all others. Both of these potential movements that are calculated by space syntax approach exhibits different aspects of accessibility in the streets. Moreover, they are both can be measured using three different types of distances; geometrical, topological, then there is the metric distance. The geometrical distance measures the city's network (the system of streets) by the least change of angle. Topological distance in the other hand measures the city's network with the fewest-turn paths in the system. While for metric distance, it calculates the system of city's network by its shortest-length of paths. In addition to this, every single type can be measured at different radii between the different segments of axes in the system of streets, these radii are also determined by the least changes of angles, fewest turns and the shortest length (Hillier and Iida 2005).

Space syntax is also considered as an effective tool when comparing the condition of a certain area before and after urban restructuring such as pedestrianization processes for instance (Topçu et al., 2007). However, due to this tool being only useful in analysing the physical structure of cities, the results need to be further interpreted by other methods in correlation with space syntax in order to understand certain people's behaviour and social activities.

All in all, space syntax helps with understanding certain problems in cities, thus, it can serve as a guideline to design a better, vital, and safer cities for people. Since many decades, there was several areas and neighbourhoods in the city that suffered from different issues around the world. By taking space syntax as an approach to deal with these issues, it showed how spatial properties can help creating a better environment for users, by showing the important role of urban space and its components in a scientific approach through spatial analysis tools to evaluate them and what causes these spaces to function in a certain way.

## IV.2. THE EVOLUTION OF SPACE SYNTAX

As for many researchers, space syntax initially was known from the book of Bill Hillier and Julienne Hanson (*The social logic of space*). Since the appearance of this theory, many other tools, representations and related theories have been introduced to cope with the latest issues and help interpret architectural and urban spaces better the ones exhibited in Hillier's book *Space in the machine*. Although both of these books were seen as the foundation of space syntax theory, many other researchers have come forward to develop this theory even further, introducing even more in-depth analyses such as Alan Penn, Alasdair Turner, Laura Vaughan Ruth Conroy Dalton and so on.

In the beginning, space syntax was tested in small areas and buildings' analyses since these spaces were considered as a single cell of space which was fluent to analyse. Later on, however, with the development of technology and computer science it became easier to analyse at larger scales (urban spaces) such as large cities and often whole regions (Hillier and Hanson, 1984).

Space syntax focused more on studying the topological relationships which consisted of the calculation of syntactic steps, it explained the relationship between streets by the number of directional changes. After that, the angular analyses was presented in which it was used to measure street segments with the metric radii. As mentioned with the development of computer power, it helped analysing larger areas, which even contributed to the appearance and usage of the geographic information system (GIS) (Van nes and Yamu, 2021).

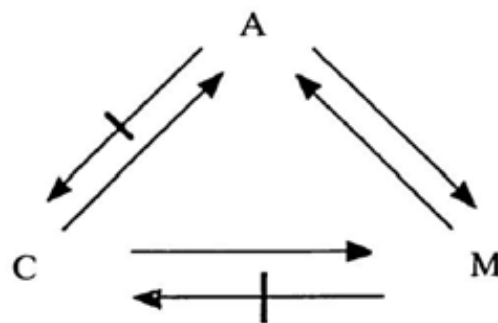
## IV.3. SPACE NETWORK AND SPATIAL CONFIGURATION

The network of urban space is determined by the streets and public spaces, where the pattern of these streets influence the movement of people and how they navigate through the urban space (Puckett, 2009). For instance, Marshal (2005) explained how the grid network of streets could provide a better accessibility than other types of streets' structures. Unlike the tree-structured pattern of streets, the grid pattern of streets offers many choices of itineraries with high accessibility potential (which was further explained in chapter 1). With this in mind, in some cases where people don't have prior knowledge to a certain environment, they tend to make their decision based on the visual information of space, this happens when they are in a hurry or trying to escape from a certain situation rapidly for example (Puckett, 2009, p. 22).

### IV.3.1. Spatial configuration

Contrary to other urban network theories that revolve around streets pattern and composition, the theory of space syntax focuses more of the structure of streets and the relation between them (spatial configuration). It calculates the mathematical relationships between different spaces (Van nes and Yamu, 2021). There were several scholars such as Jane Jacobs (1960) and Jan Gehl (1971) who contributed to a better understanding of the effect of the built environment along its physical properties on people’s behaviour and the social life and general. Jane Jacobs for instance in her book *The Death and Life of Great American Cities* talked about the importance of the physical attributes and how they help forming better liveable and safe cities such as mixed-use functions, the clear separation between private and public spaces and so on. While Gehl (1971) focused more on the type of activities (mainly optional activities) in the spaces between buildings which are largely related to the physical properties of the environment. Both of their works implied how the level of urban dynamicity is related to the quality of the urban space. Likewise, space syntax theory works with the concept of space that is generated by the urban structure and how their connexion is what influence the liveability of streets and neighbourhoods in the city.

Despite being different from other morphological approaches that focus on the physical shapes, space syntax was often seen as a morphological approach (Whitehand, 2018). Space syntax however, focuses on the spaces between the physical elements and most importantly how they are connected in relation with all the surrounding environment. In any case, that didn’t mind the combination of space syntax with other morphological urban aspects (Van nes and Yamu, 2021). Space syntax provide a set of tools to describe and measure the spatial relationships between the physical environment which in turns form and shape the movement and the socio-economic life in the city (Figure IV.1).



**Figure IV.1.** Attraction (A), Movement (M) and Configuration (C) relationships.

**Source :** Hillier, Penn, et al. (1993).

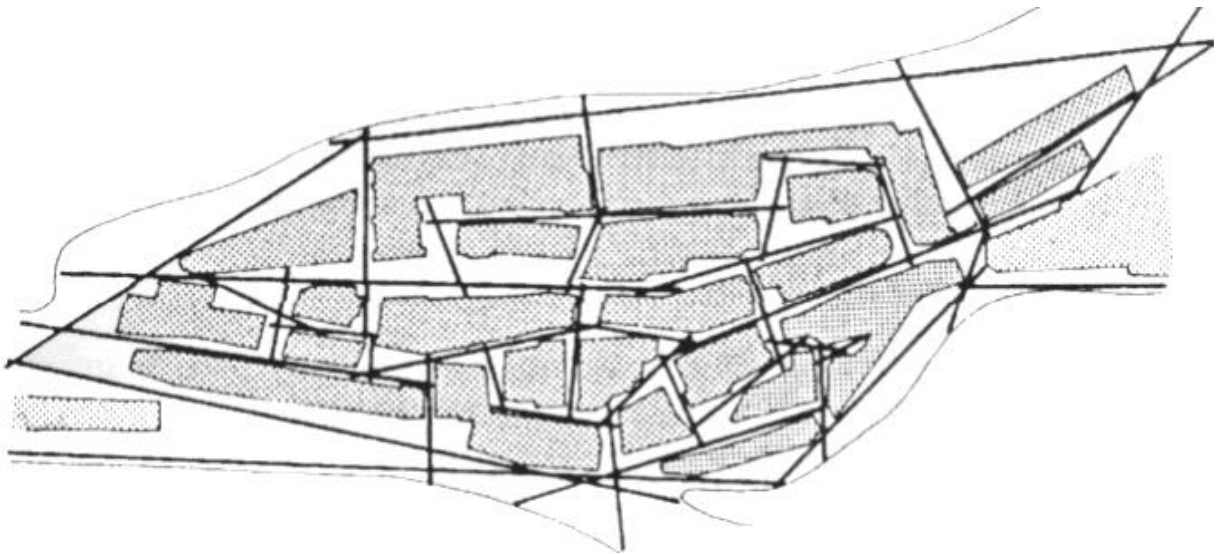
There is a complementary relationship between the built environment and the social life of people in the city. When people's activities are present within a particular space, there is a possibility for these activities to influence the spatial structure and organisation. This implies that social activities can be linked to the physical structure and explained in comparison to the built environment. Same goes for the physical space and how it would affect the behaviour and activities of people (Hillier, et al., 1993).

Bill Hillier talked about the 'extrinsic' and 'intrinsic' spatial attributes. He sees that extrinsic attributes define the way different parts of space are linked together. These can be seen as the configurative regulations of space, where the space that is shaped by these regulations are groups or parts of spaces. Therefore, the most important thing here are the interrelation and the topological aspects of these spaces, where the level of correlation that is linked to the properties of a certain space in comparison to others is called *Configuration*. Hillier states that urban spaces are only considered extrinsic entities, and that the relation that exist between them is the superior aspect. The activity that is conducted in a space can be seen either as a type of occupation or movement, space's extrinsic attributes help defining the form of the built environment as well as the existed functions (Hillier, 1999). Although extrinsic properties are considered as the invisible relationships of the structure, intrinsic properties in the other hand are visible and represent all the physical characteristics of space such as mass, pattern, volume, size, texture and shape. Generally speaking, intrinsic properties are exhibited in space by their geometrical attributes, as they explain the relation of the social aspect through the built environment (Hillier, 1999). To sum up, in urban space, both terms of intrinsic and extrinsic properties help understanding the difference between the way built-environment is seen at first sight and the hidden structure of the urban space.

### **IV.3.2. Representation of Space syntax**

In space syntax, the representation of space was seen as an obstacle especially in the urban space, this also was due to the fact that Bill Hillier considered space as a system with several interrelations between one part and others in the system as further explained in the previous segment (Bada, 2009). Therefore, Hillier has suggested representations for the space that expressed the large system and the way it is connected. These representations were the axial map of space, the convex space, and the isovist representation.

Hillier (1996) defines the all-line axial map as “a set of lines made up of all lines drawn tangent to vertices that can see each other”. The Axial map (Figure IV.2) is a one-dimensional representation of urban space. It is made up of straight lines representing the longest and least numerous longitudinal axes that cross the urban space, they connect between all the convex spaces, they extend as far as possible until there is at least one visible and directly accessible point, which means that they are linked more with visibility and movement (Hillier, 1994). Marshall (2005) sees the axial lines as a result of the geometry characterises of space (the network of streets). The axial map is interpreted through different configurational parameters, where every axial line holds its own value that represent its importance compared to the other axes. Besides plazas or squares, most of public spaces are considered ‘linear’ such as roads, streets, boulevards and paths in general. Which means that public spaces and the elements that constitute the whole system can be represented as axial lines displaying the movement routes. The axial line represents mainly the line of sight of individuals which also could play a factor in the movement pattern (Van nes and Yamu, 2021).

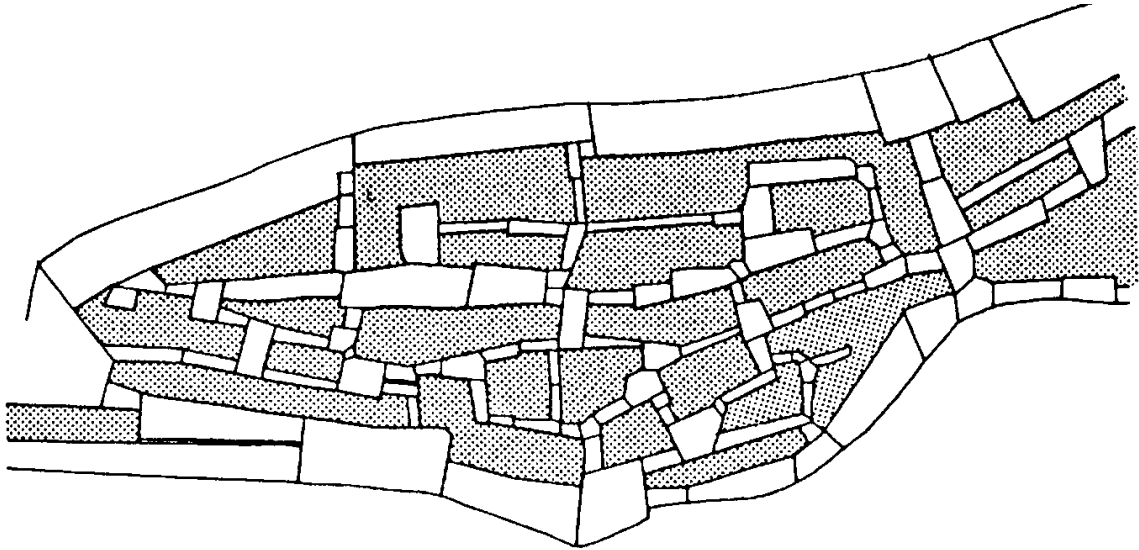


**Figure IV.2.** An example of an axial map of a small French town in the Var region. **Source:** Bill Hillier (1984, p. 91).

The ‘convex’ map which is a bidimensional representation of the urban or the architectural space, this representation consists of dividing space into small convex or polygon entities as few as possible, the map obtained is also used to locate the fields of possible social interactions. It is the most space that provide accessibility and visibility from every other point. The convex map main effect lies in its ability to capture the sociologically relevant relationships embedded



in space. Same as the axial map, it is possible to perform configurational measurements on these convex features using spatial syntax software, such as the Depthmap. Figure IV.3 shows an example of a convex map (Hillier and Hanson, 1984, p 97).

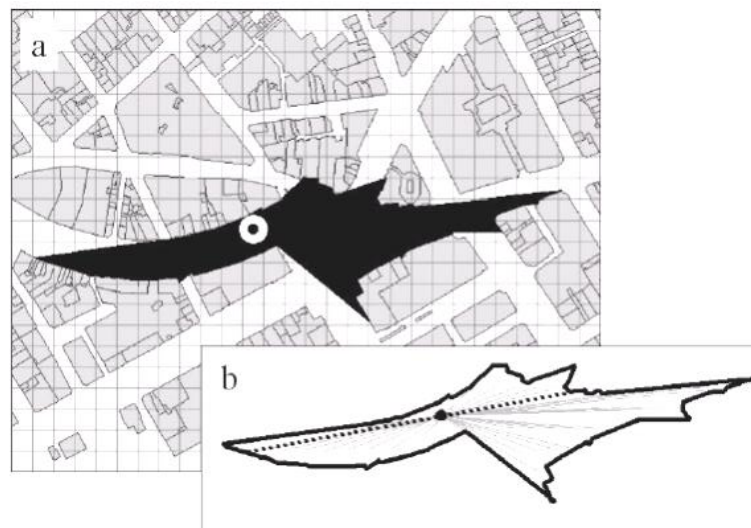
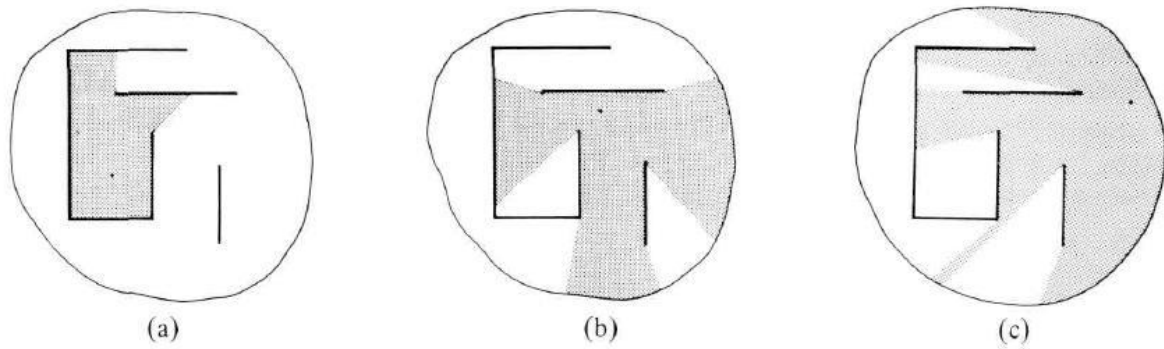


**Figure IV.3.** An example of a convex map of a small French town in the Var region.

**Source:** Hillier (1984, p. 92).

Developed by Benedikt, Isovist space is defined as the total visible points of space from a given location in the environment (Benedikt, 1979, p 47). This map (Figure IV.4) represents the space that can be reached directly from the position of the observer, it implies the space that is distinguished by the observer, and often it represents the whole space seen within 360 degrees field of vision, it also could be the changing field of vision whenever the observer is moving in space (Mazouz, 2006).

All the representations mention above from space syntax help interpreting space in different manners, which consist of analysing the visibility properties of space that belong the whole system, these analyses and map representation can be easily achieved through many softwares currently, but one of the most known is Depthmap.



**Figure IV.4.** An example of the isovist map that is generated by different points of view in different scales. **Source:** Benedikt (1979, p. 50).

## IV.4. SPACE SYNTAX TYPES OF ANALYSIS

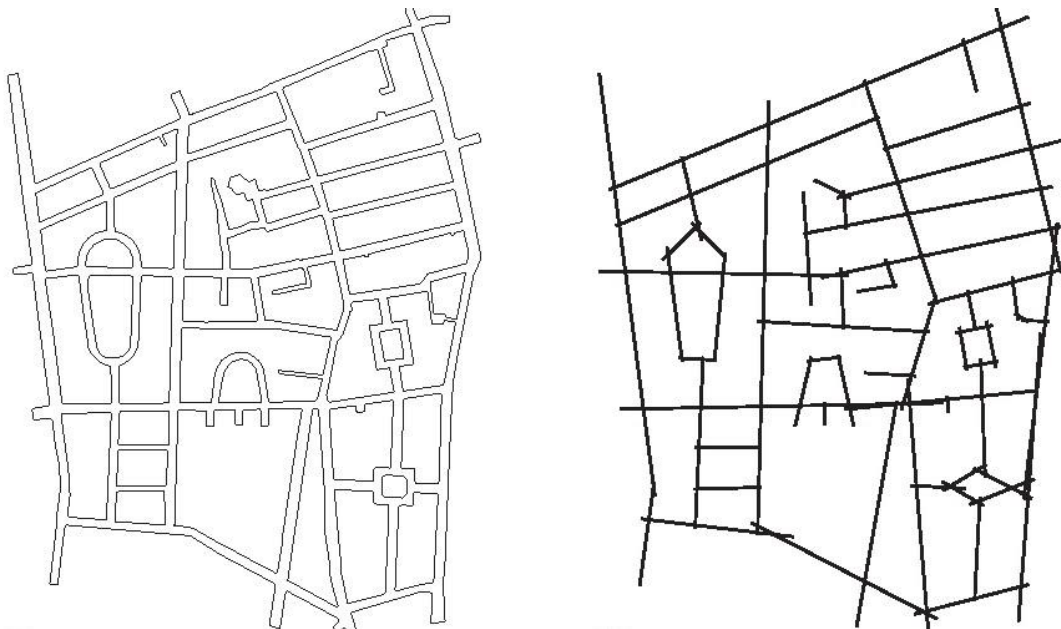
### IV.4.1. All-Line Axial Analysis

An axial map represents all accessible spaces through the continuous sightlines in a built environment. In axial map the space represents the physical accessibility as well as the visual continuances (Marcus 2007). The axial map is produced through modelling the type of public spaces mentioned earlier with the same logic (by an axial line). In the axial map the streets width is not taken into consideration as it only plays a role in defining the length of the axial lines from the streets (Hillier, 1996).

In axial map analysis, we calculate the integration relationship between each sightline and others in a single system. Axial analyses in space syntax theory interprets the level of movement that is generated by the interrelation between axes. For instance, streets being only

accessible for pedestrians or only dedicated for public transportation is not taken under consideration here. Thus, in space syntax, streets (with their different types) are treated similarly in the axial map. Streets that incorporate services such as train and metro lines, are often regulated in terms of their frequencies of their movement. However, the point of interest here are stations and stops of public transportation which affect the movement of users by offering a better accessibility in their environment or by denying it (Van nes and Yamu, 2021). Drawing an axial map can be achieved through different software that are specialized in drawing through *.dxf* format. Maps can be exported from different sources that provide urban maps such as Google Maps, and then imported into software that help drawing the axial lines of the urban space, several tools (software) can be used here such as AutoCAD, Geographic Information System (GIS), ArchiCAD and so on, or automatically generated by Depthmap software.

When drawing axial maps there are some guidelines to follow. For instance, all type of paths, streets and roads are represented with the similar fewest and longest axial lines. Moreover, at directional changes and curved streets, axial lines need to be intersected well despite stubs (the truncated remnant of axes) being messy to look at, as it is more important to have axial maps fully connected to avoid any issues in the analyses later on. Figure IV.5 shows a representation of an axial map.



**Figure IV.5.** A representation of an axial map (right) from the urban grid (left).

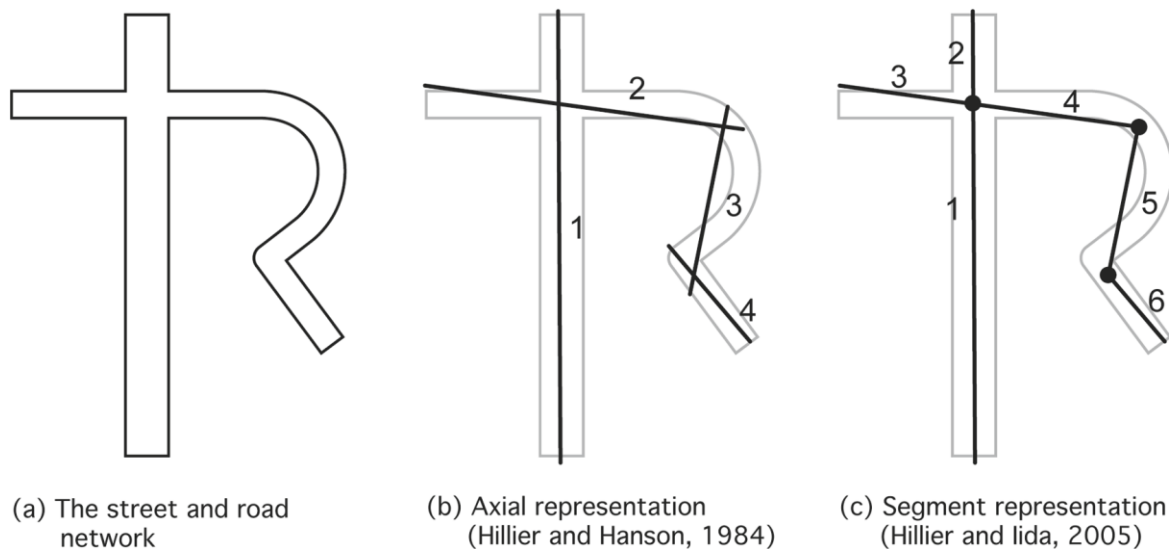
**Source:** Turner et. al (2005)

#### IV.4.2. Angular Segment Analysis

Segment map is where the axial map is split up into smaller elements (segments) between every intersection of streets (each axial line is divided into segments). In angular segment analyses, each street segment is calculated between each junction as well as its angle relationship to the other segment.

A 'junction' is when two axial lines meet or intersect. In a curved street for instance, compared with the axial map, segment representation is modelled with smaller segments that connect together at the end, while in axial maps a curved street is modelled with several axial lines that cross each to form 'stubs'. These types of streets that are constituted of several segments are usually analysed as a single entity. In the angular segment analyses, the interpreted segment by its own considers all the possible trips in a system from the origin and destination (Turner, 2001).

Figure IV.6 shows an example of the different types of representation from axial lines into segments from streets network. Here, in the axial map, the map is a compilation of four axes. When later on transformed into a segment map, these axes turn into six segments instead (Van Nes and Yamu, 2021).

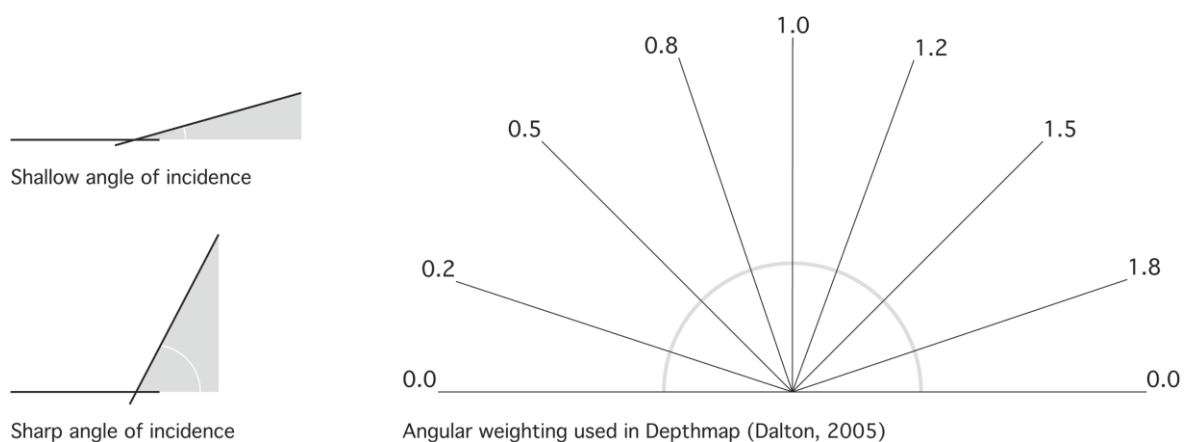


**Figure IV.6.** The different representation of a street network, (b) axial map, (c) segment map.

**Source:** Van Nes and Yamu (2021).

Later on, in angular segment analyses, Ruth Conroy Dalton had a large contribution to the creation of angular choice concept or as known outside of space syntax studies as through-movement. In her research she explained how people's itineraries are affected by the angle and the deviation degree of their routes, as they tend to take linear paths as long as possible while avoiding any direction changes (Dalton, 2001, p. 47.11). According to Dalton (2001) there are three types of turns that people prefer to take in the urban space: right angle, fork and no turn. The angles between street segments and how they are interpreted are an important factor in segment analyses. Because people's orientation in space is largely affected by the built environment and how 'abnormal' angles can obstruct their navigation in the city. Another thing is that people tend to take linear routes as much as possible with shallow turn going to their destination (Turner, 2001).

Dalton (2001) states that people "follow their nose", this implies how important is the line of sight for them to navigate in the urban space in different circumstances. Thus, analysing urban space through angular segments is an important factor in order to understand the people's behaviour. Angular relationships of streets' segments contribute to the way people travel and navigate through the urban space. In directional changes, people usually choose routes with angles close to  $90^\circ$  and  $180^\circ$  between the different used streets. Rarely, buildings with smaller angles such as  $30^\circ$  and  $60^\circ$  tend to hinder the movement of people, where they lack orientation's clues and get lost. Conroy Dalton also claims that people choose routes with the least angle changes towards their destination despite the selected route being the longest. This implies that people avoid the difficult aspect of wayfinding and the complicated composition of the urban grid in any cost even if it comes to taking longer routes (Dalton, 2001).



**Figure IV.7.** Angular weighting of street segments **Source:** Van nes and Yamu (2021), (Redrawn from Dalton, 2005)

In angular segment analyses the in-between turns are estimated on a scale between 0 and 2. The 'cost' of these turns are also called a 'weight' where each segment's connection has its own relevant weight in the segment map. Figure IV.7 shows how Depthmap software deals with angular weighting of segments. Here shallow angles that are close to  $180^\circ$  for instance are represented by the value of (0) zero, while sharp angles such as or close to  $90^\circ$  are weighted by the value of (1) one (Van nes and Yamu,2021).

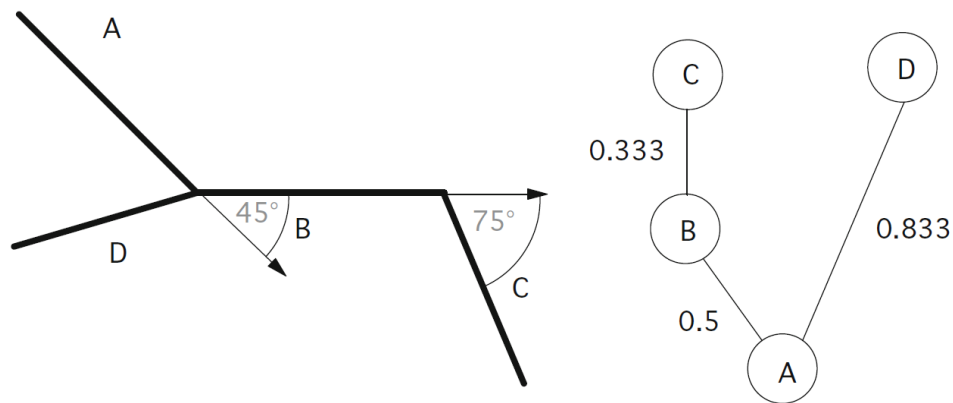
Hillier and Iida (2005) explained profoundly the way angular segments are connected and how their cost value is weighted in the segment graph. The first case is when a segment is connected with another segment in a straight direction (without a turn), this would cost a value of (0) zero steps. The second case is when a segment has a  $90^\circ$  connection with the next segment, here the segment's turn costs (1) one step. Finally, when the segment has a turn of  $180^\circ$  in the opposite direction it cost (2) two steps.

Adopting the approach of segment analyses and the angular mean depth calculation was considered the stepping stone for more advanced calculations in the future which are the angular integration and the angular choice analyses (Van Nes and Yamu, 2021). In this type of analysis, the angular choice and the angular mean depth help recognizing the most important streets in terms of their usage by people in the network of cities, where the main routes for instance are usually the ones with the least angular deviations in comparison to other streets (segments). In other words, angular choice analysis underlies the hierarchy of streets in the city, what people prioritize and how they orientate themselves.

In segment analysis there are three kinds of measures: angular analysis, topological analysis and metric analysis, the difference from one to another is the distance type when calculating the values between each segment. It is important to mention that in the segment analysis the variable of 'mean depth' is calculated rather than integration in the metric and topological distances, by a simple formula that is the total nodes divided by the mean depth measure for each line (Turner, 2005).

In angular segment analysis, Turner (2005) explains that the calculation of the segment depth is done by "the sum of the angles turned from the starting segment to any other segment within the system". Here all the turns (changes of directions) are weighted in comparison to their angle. In order to calculate the angular choice, the start point is to calculate first the mean angular depth, in which this case is the relation of each segment to all others segments in the system. In Figure IV.8 Van Nes and Yamu (2021) presented an example on how to calculate

the angular mean depth. The graph showed below is a compilation of four street segment with different angles between each other. For instance, the depth value in the first segment (from A to B) is 0.5 because angle between this segment and the other is 45°. While the angular segment depth between A and C is the aggregate values between them which is 0.833 with an angle of 30°. The angular segment depth between the segments A and D is 0.833 as well given that the angle of incidence is 75°. Figure IV.8 also shows the formula to calculate the numerical depth in a justified graph.



$$\begin{aligned} \text{Angular mean depth of segment (A)} &= \frac{\text{Sum of the angular weights from segment (A) to (B),(C) and (D)}}{\text{total number of segments} - 1} \\ &= \frac{(B) 0.5 + (C) 0.833 + (D) 0.833}{3} = 0.722 \end{aligned}$$

**Figure IV.8.** The relationship between segments in angular segment analysis along their justified graph. **Source:** Van Nes and Yamu (2021).

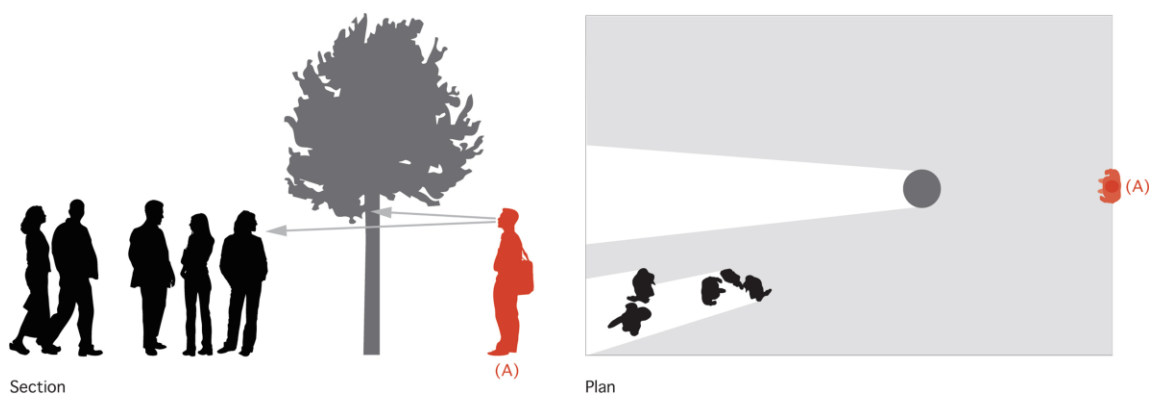
To sum up, segment analysis revolves around the turns and the direction changes when moving from one place to another or navigating through space, where the idea behind it is the least directional changes (Turner, 2000). This approach of analysing urban space, helps largely with predicting how people orientate themselves and how they make decisions in the analysed network system. This also could be linked to the cognitive aspect and how people visualize their routes in terms of their pattern.

### IV.4.3. Isovist Analysis

Visual information provided by the built environment is an important factor for people who are wandering in the city and trying to orient themselves from one space to another. When people are moving in a certain area where they are not knowledgeable about, they tend to seek for different source of information (mainly visual) about the space to help them figuring out their next route or destination, here a 180° field of view is considered enough for people to gain information about the environment, while other prefer to take an overview in all directions (a 360° view) (Van Nes and Yamu, 2021).

This panoramic view is also called an ‘isovist’ when performed from a certain location. The concept of ‘Isovist’ was first introduced by Tandy (1967). However, this concept was mostly known from Benedikt (1979) who presented this concept along with a group of analytical measurements. He describes ‘isovist’ as a “(...) the set of all points visible from a given vantage point in space and with respect to an environment” Benedikt (1979, p. 47). As explained earlier, it’s the record of what is can be seen from a certain point in a 360° angle. Isovists are the definition of space and how individuals perceive, move and interact with it (Turner et al. 2001).

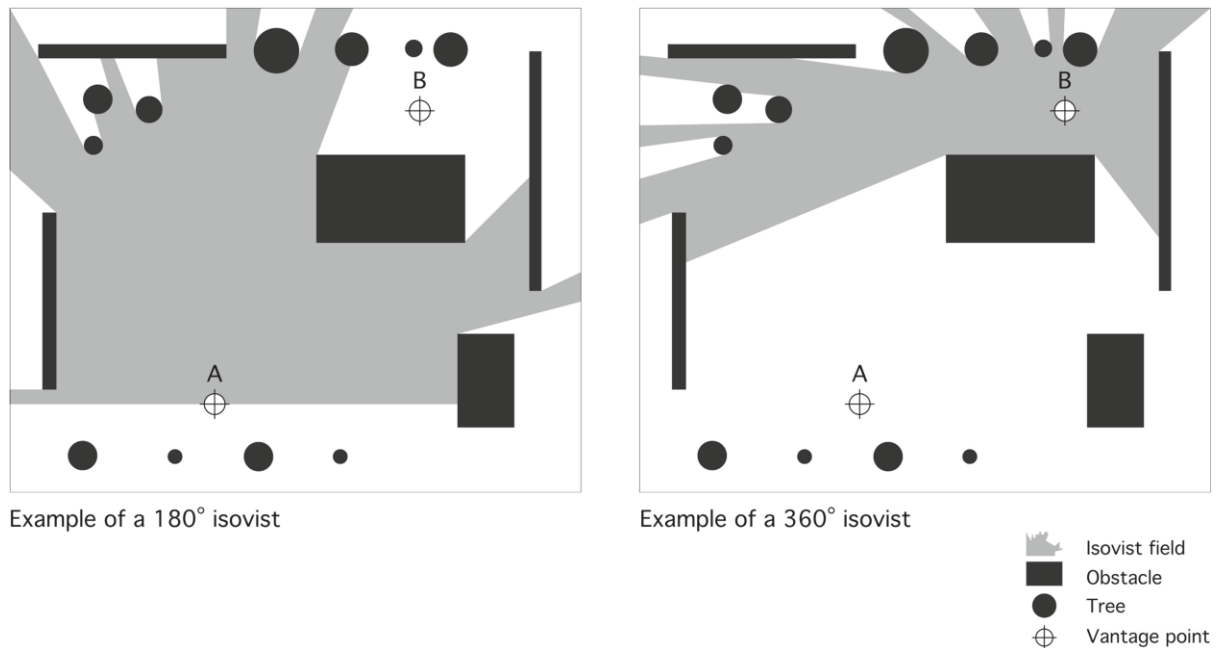
Many aspects can interpret with the visual field of a person and how the isovist is formed such as; vegetation, subjects and other object in open spaces. Moreover, during movement the field of this isovist changes more depending on the new visual barriers, which will picture a particular visual field sequence when walking through urban spaces. Figure IV.9 shows a simplified illustration of a person’s (A) isovist field by showing how the tree and people interfere with his visual field from the point where he standing, and this goes vice-versa for the people’s visual field. This type of analyses is used mostly on a local scale (neighbourhood) Van Nes and Yamu (2021).



**Figure IV.9.** A representation of an 180° isovist field from a person’s point of view (A) in both a plan and a section. **Source:** Van Nes and Yamu (2021).



Isovist analysis is very efficient when it comes to the examination of a new urban structure changes and how people will perceive the environment from a certain location. Moreover, it is also useful for picking the most optimal locations of land uses to take full advantages of the existing public space. All in all, Isovist represents the shape of the area of a person vision and how he perceives an environment from a certain location. Figure IV.10 shows a more detailed illustration of isovists from two different points with different visual fields.



**Figure IV.10.** A representation of two isovist fields from two vantage points (A) and (B).

**Source:** Van Nes and Yamu (2021).

#### IV.4.4. Visual Graph Analysis

Compared with the isovist analysis which revolves around the information provided from a single point, visual graph analysis (VGA) interprets all the available isovist fields taken from multiple points of observation in the same time. Visual graph analysis help connecting the urban space through its inter-visibility aspect.

Visual graph analysis method is based on a raster representation which is made up of small pixels. In this representation, each one of these pixels or ‘cells’ are calculated in relation to the other cells in the analysed grid to study the topological visibility, it is also important to mention that the analysed part is the centroid of the cell. This type of analyses as other space syntax

methods ignores obstacles like fences and walls, it analyses the topological relationship between every cell in the system in terms of the visibility presence in the studied area (Turner, 2007).

VGA has given a more developed approach to analyse convex space rather than being drawn and analysed manually earlier before. VGA has given a more developed approach to analyse convex space rather than being drawn and analysed manually in earlier before. According to Hillier and Hanson (1984, p. 98), a convex space is “one space where all points within this space are visible to one another”, here space is divided into the fewest convex spaces. Compared to the other space syntax type of analyses, VGA representation is raster-based and the more detailed and numerous the ‘cells’ are, the more results tend to be accurate.

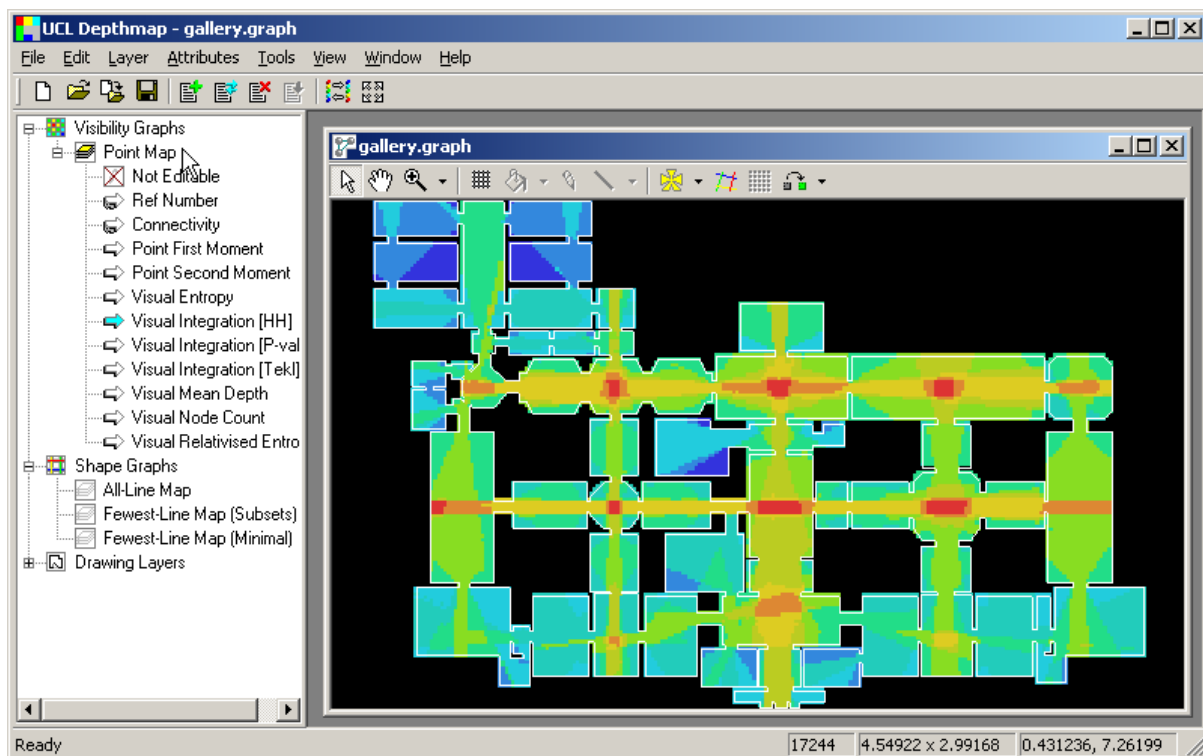
Visual graph analysis indicates the parts where it is easy or difficult for people to orientate in the urban space. This can also contribute to the understanding of the logic behind the distribution of stationary activities and where people chose to make social interactions in urban spaces. In VGA analyses, the same parameters are used in the interpreting of the graphs as the axial maps such as integration.

This type of analyse can be used to show the most strategic point in terms of visibility, at the urban level for instance, the monuments in public squares needs to been attractive to all users of that space square (Yamu et al. 2021). At the architectural level however, visibility analyses can help choosing the optimal location for fire staircases and emergency exits, or rather to help with the distribution pattern of stores inside a shopping mall in order to dictate which location has the best moving shoppers (Van Nes and Yamu, 2021). Along many other aspects that VGA helps with, it also can connect the interior with the exterior space by predicting the segregated spaces in terms of visibility which could be dangerous spaces for criminal activities, this was seen in the concept of ‘eyes on the streets’ by Jane Jacob as well as Newman’s ‘natural surveillance’ concept.

Since the emergence of visibility analyses and its impact on how people experience space, researches only relied on two-dimensional analyses as they abandoned the full picture (three-dimensional vision). Culagovski et al. (2014) however, initiated the first step towards using 3D visibility graph analyses where he changed the two-dimensional grid system that was usually used to a rectangular Digital Elevation Model, he called it (DEM), he explained it as the “three-dimensional input model is represented as a grid of squares with associated elevations. For each square of the grid, a line of sight analysis is performed with each other grid square. By

treating each square as a node, and each line of sight as an edge between two nodes, a three-dimensional visibility graph can be constructed” Culagovski et al. (2014).

Compared with the other type of analyses in space syntax, DEM has adopted some of the measures that were used from the graph theory, this includes: integration (closeness); choice (betweenness); centrality degree which interpret the most visible location from a chosen local point; and finally, the clustering coefficient which calculates the number of connected nodes in a system (Hillier and Hanson, 1984; Watts and Strogatz, 1998).



**Figure IV.11.** A representation a Visibility graph analyse in Depthmap software.

**Source:** Turner (2007).

This new method however, was considered not efficient enough from time consumption point of view, as old 2D VGA analyses were seen as more efficient in terms of time as well as the results obtained and their correlation with the behaviour of people and their social life (Van Nes and Yamu, 2021).

#### **IV.5. THE RELATION BETWEEN SPACE SYNTAX ANALYSES AND HUMAN ACTIVITIES**

The previous part of this chapter has presented the different space syntax methods and how they are used to interpret the properties of the built environment. However, these types of analyses become more efficient when coupling together with other empirical data (mainly socio-economic activities), which would provide more useful results and understanding in terms of the relationship that exists between the space and the society.

Nowadays, researchers and urban designers pay more attention towards the benefits of using evidence-based analysis because of their impact and precision on the solutions obtained for particular urban areas and how they should work. To have an idea on the relationship that exists between space and society, it is necessary to rely on well-defined spatial terms, possessing various operational analysis tools, and finally, the capability of correlating the socio-economic data with the results obtained through spatial analysis (Hillier and Hanson, 1984, p. 90). Using qualitative approaches together with quantitative ones become a necessary when it comes to urban planning and design, because of the benefit they have shown in treating different aspects of the same problem efficiently (Van Nes and Yamu, 2021).

Compared with quantitative research, qualitative approach focuses more on answering queries about experiences and interpretations to name a few, and the data gathered in quantitative approach are mostly from field observations interviews and so on. Moreover, quantitative research focuses on probability and predictability whereas for the qualitative approach, it focuses more on subjectivity. We can easily say that both qualitative and quantitative data can be well integrated with space syntax values. In one hand, with a place-tied quantitative approach such as people's count and shopping location for instance, space syntax can correlate these data along with its numerical values. Qualitative approach correlation in the other hand can be achieved through different statistical test such as scatterplots and other mathematical diagrams. This section provides the most common approaches that are used together with space syntax (Van Nes and Yamu, 2021).

## **IV.6. EMPIRICAL DATA COLLECTION : OBSERVATIONS TECHNIQUES**

Research queries do not only give us an idea about the methods needed but also the type of data selected and needed to be collected. Moreover, these data can also be refined to cope with data collection. Data can be gathered through different source such as, online research, experiment, field work and so on.

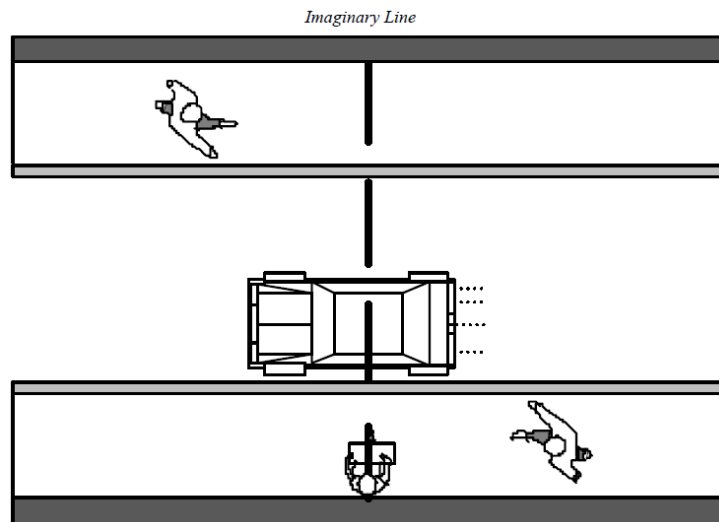
Observation is key in order to explore and learn about the environment without the need to engage with people and their intentions. The activity of individuals in city creates to somewhat a global pattern of movement and use of space. therefore, observation can provide more clues and how impactful the built environment can be for individuals (Grajewski and Vaughan, 2001).

### **IV.6.1. The gate count method**

The gate count method is the most dependable method from all observing techniques. It provides researchers with various data that can be exhibited in different representations (statistically and graphically), however, it must be conducted precisely as well as in a plenty of locations or observation points to be efficient. Moreover, it can be used either in urban spaces or the interior building spaces. This method is mostly useable to register the moving people and/or vehicles in certain points, and it is not fitting to count the stationary activities (Grajewski and Vaughan, 2001).

The method of the gate count begins by choosing a number of locations on streets for instance. These locations need to cover spaces from poorly used to well- used in the space case of study, and there should be not lower that 25 observation gates. It is also advised to take as more gates as possible in order for the results to be more accurate in terms of the patter of movement in the studied area (Grajewski and Vaughan, 2001).

The gate count method is conducted in every single gate by making an imaginary line that crosses the streets perpendicularly (Figure IV.11). From here, only people or vehicles that are crossing this line must be counted for at least 2.5 or 5 minutes straight, it is also important to mention that the timing needs to be precise (by seconds) which could be achieved by using a stopwatch. it is advised to take five minutes of observation time in the areas with low flow of movement such as suburban, whereas 2.5 minutes in dynamic areas or streets in busy cities. Later on, this counting would be multiplied up to one-hour rate (Grajewski and Vaughan, 2001).



**Figure IV.12.** A representation of how gate count method is conducted in a street.

**Source:** Grajewski and Vaughan (2001).

The number of observed people or vehicles may be registered on a prepared table (Figure IV.12). For example, putting down a line for each one passes the line and that's more efficient in terms of time and effort (rather than counting in mind), which may also help keeping the count going even during high densities. Moreover, in this method it is possible to assign different categories for counting at the same time such as; moving man and moving women, and what controls the number and type of categories is the nature of the study (Grajewski and Vaughan, 2001).

| Gate Number | Time  | Moving Men | Moving Women | Moving Teenagers | Moving Children |
|-------------|-------|------------|--------------|------------------|-----------------|
| 1           | 12:05 | W//        | //           | /                |                 |
| 2           | 12:12 | W / / / /  | W /          |                  | //              |
| 3           | 12:17 | /          | //           |                  |                 |
| 4           | 12:22 | W//        | W / /        | W /              | //              |

**Figure IV.13.** example of the prepared table for gate counting with multiple categories.

**Source:** Grajewski and Vaughan (2001).

All the observation gates should be counted either at the same time or one after the other at the time period of the day. Vaughan (2001) explain that the normal observation time should be: 8 am - 10 am (morning rush-hour); 10 am - 12 noon (mid-morning period); 12 noon - 2 pm (lunch-time peak); 2 pm - 4 pm (mid-afternoon period); 4 pm - 6 pm (evening rush-hour); 6 pm - 8 pm (early evening); 8 pm - 10 pm (late evening). These periods however, are not obligated to be used as a whole, instead it is better to adjust them depending on the case study and the queries, where sometimes it is enough to count only one period during the day. The days of observation also should be chosen to be in the same type of days Monday, Tuesday, Wednesday and Thursday or rather, Saturday and Sunday, but could also be flexed depending on the research questions (Grajewski and Vaughan, 2001).

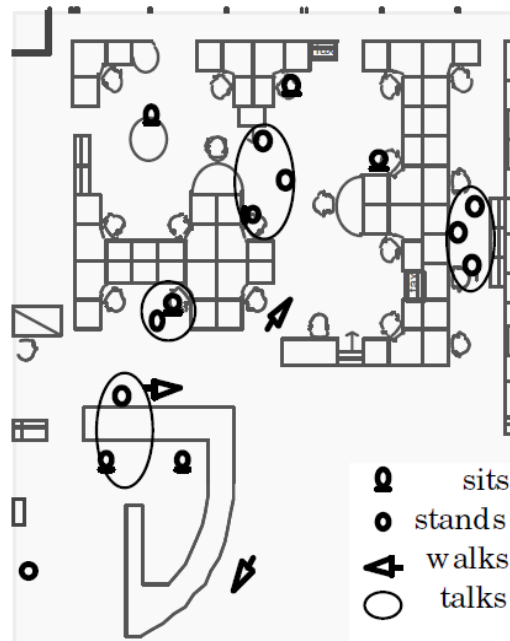
#### **IV.6.2. Static snapshots**

Compared with the gate count method this method is more dedicated towards the interior spaces of buildings as well as the observation of activities in public spaces and squares. This method is used to register both of the moving and the stationary activities, and it is considered efficient when comparing these two types of spatial use together. The positive side of this method is that it provides more of a readable representation for the reader to follow and understand clearly. It is also useful to observe people and vehicles (moving or stationary) (Grajewski and Vaughan, 2001).

This type of observation is conducted by using a large-scale plan of the area, moreover, it is also advised to take a pre-tour in the area before starting the observation in case the plan is out of date and needed some adjustment such as the accuracy and the location of some objects in the building. This plan is the tool to record the activities in their exact location. The best way to do it is to figure out a route that provides vision over all the spaces to be observed. In case of the area been too large or vision-obstructed to be observed as a whole, it is better to subdivide the area into smaller spaces by using the convex representation to also help with the spatial analyses later on (Grajewski and Vaughan, 2001).

The observer needs to walk in the observation area from one part to another to make a mental snapshot indicating where and when the activity was occurred. In addition, it is necessary not to register the individuals who entered the area after starting taking the mental snapshot neither the ones standing behind the observer. The recording of the observed activities is done on the plan by using a coding for each category of activities such as; walking, sitting and standing. An example of snapshot observation is shown in Figure IV.13 where each category of people

is recorded by using a coding, the circle around certain group of people indicates that these group of people are talking. Snapshot observation might differ according to the location of observation where other categories might be included such as 'recruitment' in office buildings where a walking person is invited to a seated person. In shops for instance other categories might include male and female shoppers (Grajewski and Vaughan, 2001).



**Figure IV.14.** A diagram that shows a single round of snapshot observation

**Source:** Grajewski and Vaughan (2001).

To perform other observation rounds, separate plans need to be used either for different floors of a building or different period of observation. In general observation inside buildings should be conducted throughout the day, where two snapshots should be made per period of time over two working days. It is also useful to use multiple observers in a single area (four) to cover all the parts needed. The same goes for the observation in urban spaces, where there needs to be a planned route to cover all the parts in the area to be observed, either the subdivision of a square into different parts or either the selection of streets (Grajewski and Vaughan, 2001).

The difference between this method and the gate count one, is that the snapshot allows recording both stationary and moving people, however, the negative side here is that this method can cope with the large flows of people in the same time. Moreover, this method is



beneficial whenever counting the activities and the occupations in public squares, however, it also falls short in regarding exact numbers (Grajewski and Vaughan, 2001).

#### **IV.6.3. People following: itinerary routes**

This method has become more important to observe movement especially in specific location that are considered a ‘movement distributor’ such as a shopping mall or a bus station. It is mainly used to investigate many aspects; how movement is generated from a particular point or location; how one route is connected with other routes in a single area; and finally, to investigate the average distance that people walk from a certain location (Grajewski and Vaughan, 2001).

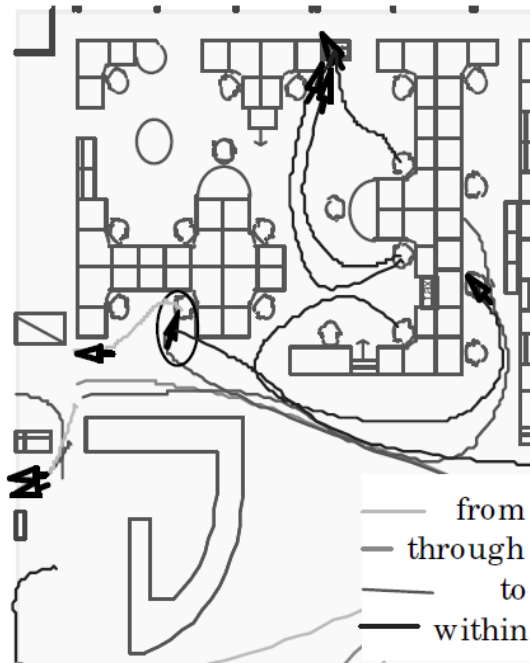
To conduct this type of observation, it is enough to have a plan of the investigated area with the location of where you are starting to follow people itineraries, in this plan you draw the routes which people took from the source location. It is important to be caution when following people during their itineraries and not to get too close to them which will make them not act natural, therefore will ruin the results of the study. Concerning the amount of people that you should follow, it is advisable to take between 25 to 50 samples in each period of time where they should be from different categories (male, female...etc). for the timing, it is better to follow people for ten minutes after they have entered the observation location, it is useful to investigate the pattern of movement in some locations such as malls and museums where many attractions can affect their movement (Grajewski and Vaughan, 2001).

#### **IV.6.4. Movement traces**

Used either in urban spaces or inside buildings, this type of observation is usually used together with the snapshot method to register the exact movement routes that people take from one space to another. It is also conducted when there is too much complexion in space composition to use the gate count method (too many gates to observe at the same time). Instead we use it to trace the movement of people after they finished moving in the same location where gates should have been observed (Grajewski and Vaughan, 2001).

This method is conducted similar to the snapshot method in terms of the routes taken while enclosed spaces are ignored. Here the area is observed between 3 to 5 minutes to register the movement of individuals and tracing them in the plan of the observed area. It is important to mention that the route needs to be precise and shows the last point where the individual was seen by an arrow. The observer can also include the (from, to, within and through) of each

route by using different colour pen which would help increasing the legibility of the plan. Figure IV.14 shows a sample of the same used plan on snapshot method with the traces' movement of people



**Figure IV.15.** A diagram that shows a single round of movement trace observation.

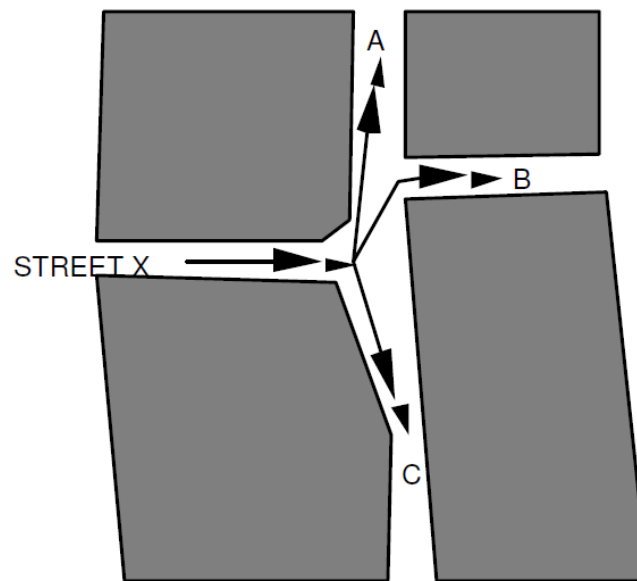
**Source:** Grajewski and Vaughan (2001).

Similar to snapshot method, this method is also conducted twice during each period of time in the observed area. If this method is used together with snapshot, it is best to do a movement trace before and after snapshot observation. The negative side to this method can be linked to the location of observation where in larger rooms it becomes harder to follow people from one place to another contrary to small size rooms.

#### **IV.6.5. Directional changes**

This type of observation is exclusively used to observe moving vehicles and people either in urban spaces or interior spaces. The main objective from using this method is to register the high density of movement flows in streets' junctions and how they split, in other words, it is used to explore the way movers diverge from their original route at each junction, this would also include the people who leave certain locations with high flows such as stations (Grajewski and Vaughan, 2001).

Like other methods, this method also requires a plan of the investigated area (junction) and then marking all the possible directional changes that the movers might take. These directions can be named with letters or numbers (A, B, C...etc). The next step is to choose a pedestrian or a vehicle that is approaching the junction from afar, where it should be tracked until it is clear on what direction it went for, from that, the individuals or vehicles taking the same direction can be recorded in a sheet for each direction (Grajewski and Vaughan, 2001).



**Figure IV.16.** The possible direction changes from Street (x) into A, B and C

**Source:** Grajewski and Vaughan (2001).

Choosing an element to be observed should not be bias, that's why it is better to be picked a bit far from the junction, because in some cases it becomes obvious and logic where people are headed from certain locations. In this type of observations, it is better to at least follow over 100 individuals for each selected category. It is also advised to count the number of people coming in and coming out of the junction through the gate count method before and after doing the directional changes observation (Grajewski and Vaughan, 2001).

Due to the long time it takes to observe a single junction, it is better to be conducted with several observers to cover multiple junctions simultaneously, because observing the pattern of movement for individuals might changes if there is a large gap in observation periods, for example their behaviour between afternoon and rush hour periods. If ever the observation was done by a single observer, it is necessary for the observation to be carried out either in a single time period or to be continued in the next day at the same period of time. Usually it is better to

follow the observed individuals until it's obvious in which direction they are headed, However, in some cases, all directions from the junction point can be visible, thus they can be observed while being in a stationary position (Grajewski and Vaughan, 2001).

#### **IV.6.6. Surveys and land use maps**

One of the most important ways of representing a large factor (that could affect the liveability of an urban area) is the land use map. Some researchers for instance have always questioned the attractiveness of the Leadenhall Market in the city of London. With a representation of retail facilities in this area, researchers have finally turned this type of intuition into an objective statement (Grajewski and Vaughan, 2001).

This type of observation could be conducted simply by visiting the area of investigation to perform a survey for the pattern of land use, multiple categories can be used here such as: commercial, educational, residential, industrial and so on. This would later be coupled with other approach to see whether the pattern of land use would affect the liveability of a particular area over other areas.

### **CONCLUSION**

In recent years, space syntax theory has become more recognized among researchers. It is now used in various fields such as: Urban planning and design, transportation, people behaviour analyses and so on. The multiple representation and types of analyses in spaces syntax gives more reading for several socio-economic phenomenon. They are used to treat several issues within different scales from the interior space and to large urban areas and regions.

By correlating space syntax with other observation approaches, space syntax tends to express the relationship that exists between society and the physical spatial structure, in fact it helped on the interpretations of several socio-spatial phenomena such as; urban movement, crime and social segregation. Hillier and Hanson believed that there are underlying powers that generate movement in the space rather than the ordinary linguistic concepts such as hierarchies and regularized geometries. The next chapter will be the beginning of the practical part of this thesis.

# CHAPTER V

## PRESENTATION OF THE CASE STUDY AND RESEARCH METHODOLOGY

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“There is no one best way of conducting such a case study, rather the method needs to be chosen to suit the specific circumstances of the research”

- David Barnes, 2001

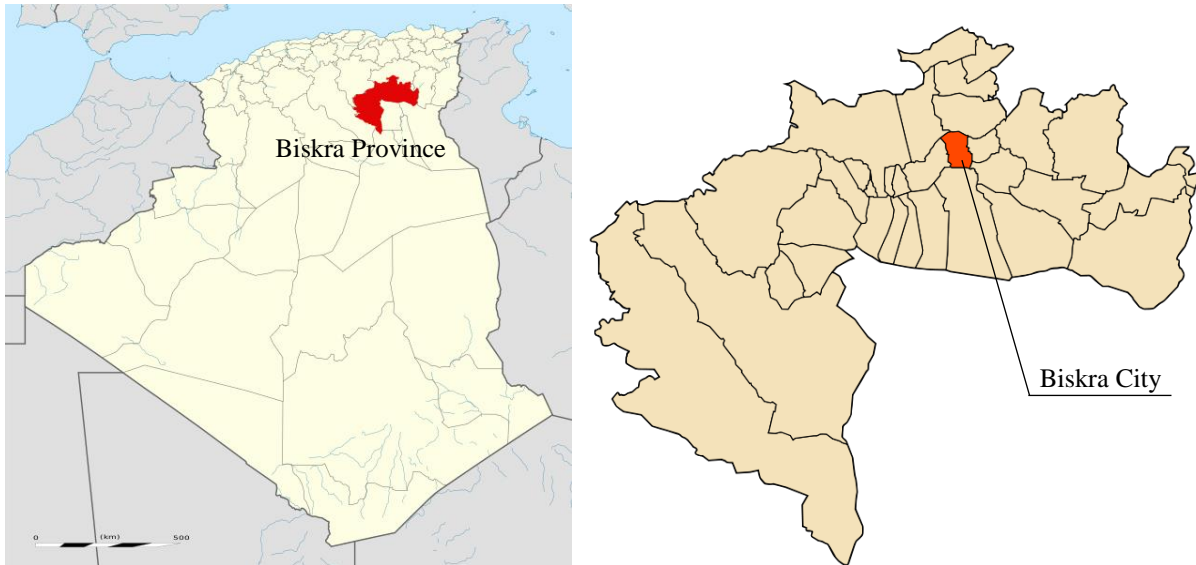
## **INTRODUCTION**

When investigating a case study, many variables could affect or be determinants to analyses, and putting a spotlight on these factors is necessary for the results to be interpreted. Hence, the following chapter will begin first by introducing the city of Biskra and by going more in depth into different data such as climate, demographic and geographical characteristics and even culture. In space syntax theory, it has been pointed out that organic cities' morphologies are related to their 'natural' growth process over time, where underlying natural and economics forces have contributed in this creation, and all of this is to facilitate the movement in the parts of the city (Hillier, 2001; Strano et al., 2007; Ortiz-Chao, 2008). Thus, this part also speaks about the urban structure and the development of the built environment of Biskra city over time, as this development was influenced by several factors. Later on, we will focus on the existing attractions and their classification in the studied area, i.e. commercial centres, landmarks, plazas ... etc, as they are considered to be an important part in the study. This part will be finished by setting up the study cases that have been chosen for this study which are; Biskra city as a global scale, two districts (city centre and El-Alia) for macro scale and six local areas at the micro scale.

The second part of this chapter will be about the research methodology adopted in the study, several correlations would be conducted back and forth from qualitative to quantitative methods and principally by applying space syntax method in order to investigate the major determinants for the problem of social segregation between men and women in the usage of urban spaces (movement). Theses analyses will be conducted on a methodological procedure to finally reach to an understandable relevant result to conclude whether the problem is related to the urban structure or to a cultural aspect instead.

### **V.1. THE CITY OF BISKRA**

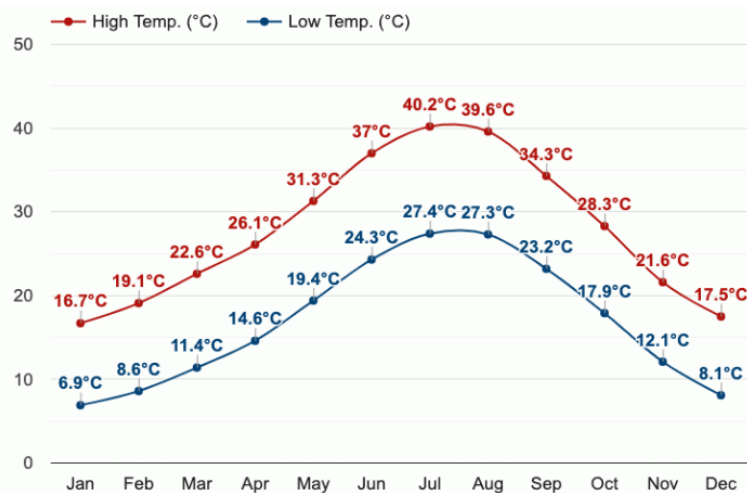
Biskra is a Saharan city that characterizes by its hot and arid climate in most of the times. It is located in the north-east of Algeria in about 400 km south from the capital Algiers with a surface of 21.509,80 km<sup>2</sup>. Biskra city is also the capital of Biskra province and nicknamed by "The gate of desert", "The Queen of the Zibans", and "The Saharan Nice" due to its notable position and for being the beginning of the Sahara.



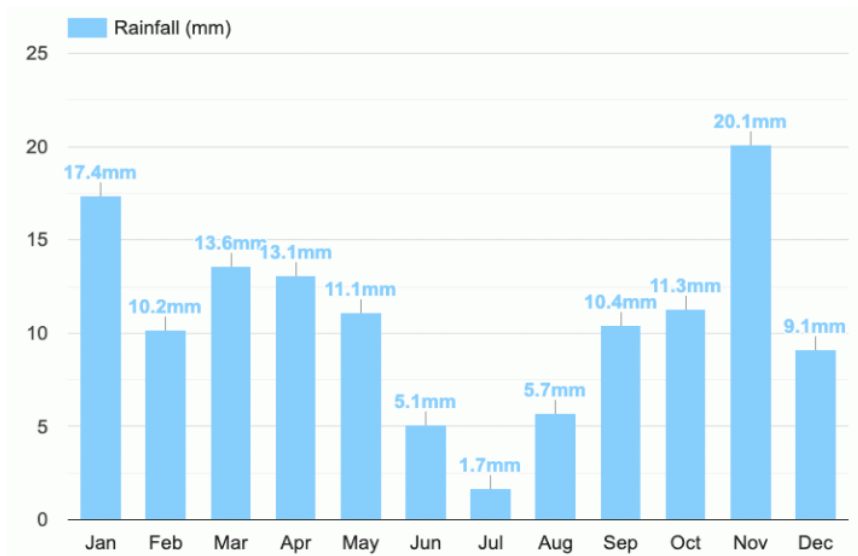
**Figure V.1.** The geographic location of Biskra in Algeria (left) and within its province (right).

### V.1.1. Climate

Biskra city is known by its mild to semi-severe winters and hot, dry summers with an average annual temperature of 22°C, where the average highest temperature is reached during the month of July with 40.2°C, the lowest temperature registered during winter is 6.9°C which was on January. Winds are common during two times of the year: relatively wet northwest winds during winter, and sand winds during spring. Those of summer (south-east / north-west) are called (sirocco) and they are rare dry-hot winds. Concerning the precipitation, it was recorded that the most rainfall is in the month of November with a total of 3.8 rainy days to aggregate up to 20.1mm of precipitation, while the driest periods is registered during the month of July with an average of 0.6 days of raining (1.7mm) which considered to be really low. (<https://www.weather-atlas.com/en/algeria/biskra-climate>).



**Figure V.2.** The average annual temperature in Biskra city, Algeria



**Figure V.3.** The average annual rainfall in Biskra, Algeria.

### V.1.2. Geography

Characterized by a fragile physical environment, Biskra city is installed at the foot of the mountain ‘Djebel Boughezal’ and traversed in the middle by the river of ‘Oued Sidi Zarzour’, which takes source from the mountain of ‘Aures’. Aside from the topography of the mountain that surrounds the city, Biskra has been established in a very flat surface (a huge area of plains) that represents 80% from the total surface of the province.



**Figure V.4.** A satellite view showing the geographic location of Biskra city. **Source:** google earth (2020).



### V.1.3. Demography

Biskra has been through many events and periods that affected the growth of its population, and we think that examining this change is important to this study because it is related to the development of attractions in the city as well.

According to the RGPH, in the years between 1966 and 2008 (post-independence period), Biskra city has known a massive increase of population going from 52519 to 200654 inhabitants which represented 27,78% of the total inhabitant in the whole province. Starting with the period between 1966-1977, with an increase rate up to 5.20%, the number of inhabitants has grown strong due to the rural migration and most particularly to the better living conditions after the colonial period. After that, the total number of inhabitants has kept on increasing in the years between 1977-1987 by a rate of 3.93% and with Biskra being promoted to an administrative centre of the province in 1974, it provided a more economic importance in its region. Eleven years forward (1987 – 1998), the city of Biskra has registered a total number of 176145 inhabitants, to increase even more than it used to be. In the period of 1998-2008, the increase rate has suffered a decrease from the previous period going from 2,92% to 1,31% which was accompanied by a declining on birth rate and changes in cultural aspects such as late marriage.

**Table V.1.** Population growth in the city of Biskra (RGPH; 1966, 1977, 1987, 1998 and 2008).

|                           | <b>1966</b> | <b>1977</b> | <b>1987</b> | <b>1998</b> | <b>2008</b> |
|---------------------------|-------------|-------------|-------------|-------------|-------------|
| <b>Inhabitants number</b> | 52519       | 87200       | 128281      | 176145      | 200654      |
| <b>Increase rate %</b>    | 5.20        | 3.93        | 2.92        | 1.31        |             |

### V.1.4. Cultural overview

Throughout time, Biskra has been a centre for different cultures and activities (economy, education, agriculture...). Due to its strategic location which was a connexion link between north and south, east and west, Biskra has been set up as a centre for commercial exchange and transit between vicinity regions, historians even used to name Biskra as ‘Vecera’ which was a Romanian name that meant ‘station’, while some others have debated that its name was actually ‘Ad-Pisciname’ which derived from the thermal springs that exist in Biskra.

Long ago, Biskra had been reigned first by Romans then Vandals and after that by the Byzantines, these have left remnants that still until now testify to the importance of the city and its distinctive urban character. Leading the Muslim conquest of Al-Maghreb during the seventh century (663 AD), the commander 'Okba Ibn Nafie' managed to open Biskra and expel the Roman garrisons from the region, which made this event a significant shift in the history of the region politically, economically, socially and urbanely. After the conquest, the city had several states and successors such as: the Zirids, the Hellalians, the Hafsids, the Zayyanids, and the Ottomans from the 16th to the 19th centuries. Until the French colonization in 1830 which made Biskra as a starting point for extensions toward south. (Côte, 2005 p27-28)

During the medieval period, Biskra was characterized by an Islamic character in all aspects, and when talking about the culture in Biskra city, it is necessary to mention that Algeria is an Arabo-Islamic country as this information plays a huge role on the differentiation and the density in the urban spatial use between men and women later on in this study.

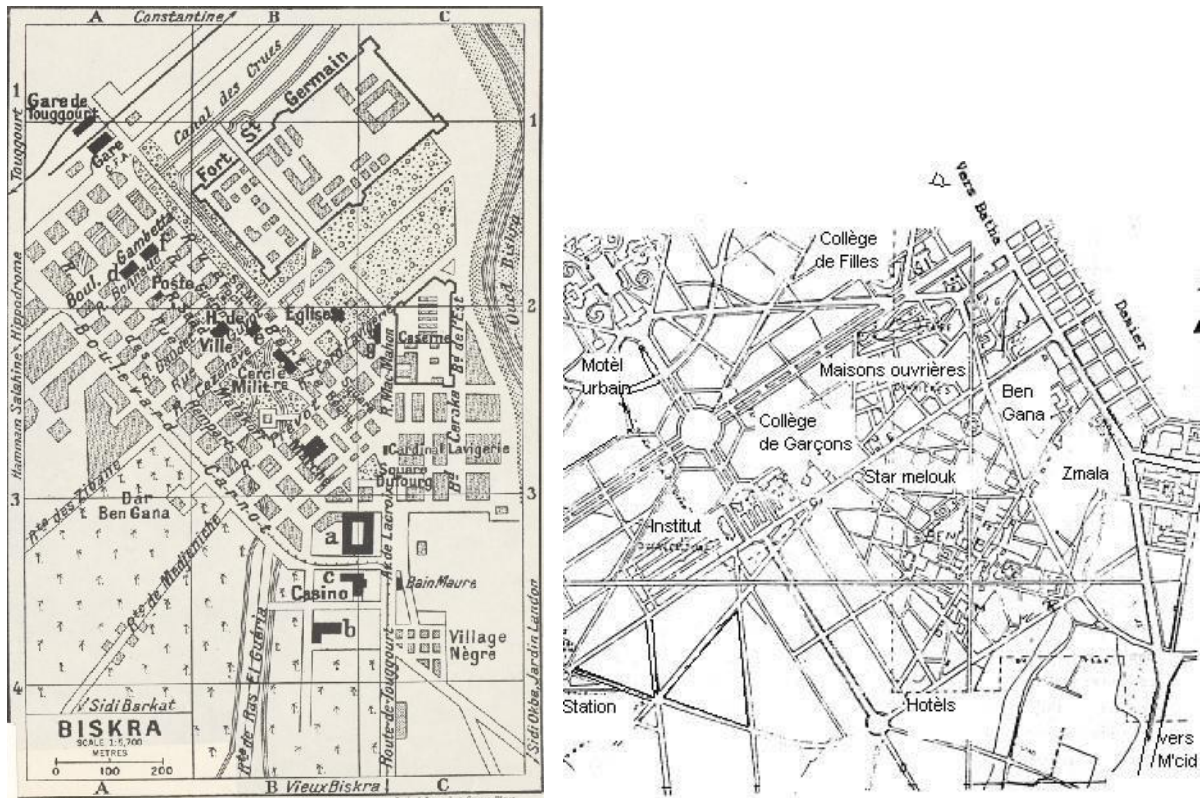
#### **V.1.5. The growth of Biskra City**

Passing by different civilizations and revolutions alternated from the Roman era, the Islamic conquest to the French invasion and then independence, Biskra city has known major changes on its built environment during these periods of time.

The first core of the city is traced back to the Ottomans era (1541), where they installed a military fort enclosed with three doors (Bab Dharb, Bab El Mekbra and Bab El Feth) and surrounding themselves by palm trees. Later on, this disposition had changed due to a plague epidemic which led inhabitants to relocate into the palm trees gardens, this new disposition was a compilation of seven villages (M'cid, Kora, Gueddacha, Medjniche, Ras El Gueriah, Bab Dharb, Bab Elfath), where the water streams and streets (alleys and dead ends) worked as the overall structure for the settlements at the time (Zerdoum, 1993). According to D. Grandet (1992), this type of streets was similar to the Islamic cities in which they played a role for privatisation and separation from public spaces.

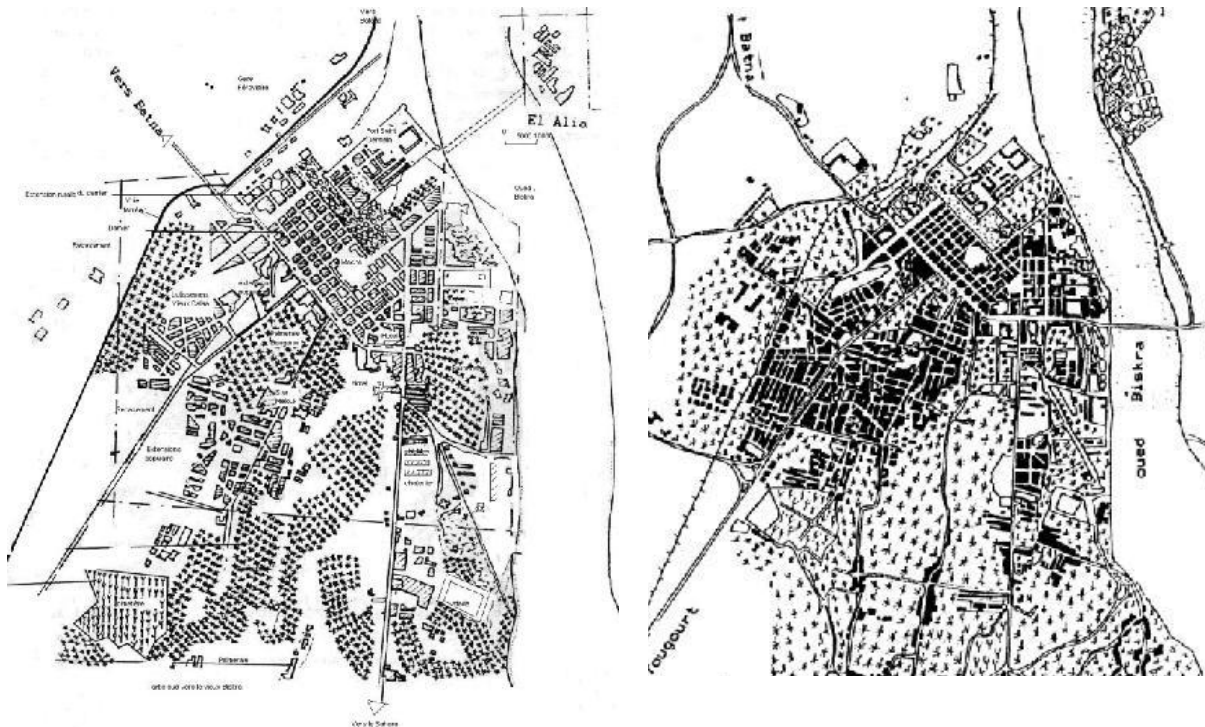
Moving on to the colonial period (1844-1962), the French began their first establishment from the north of the palm grove by implanting the fort of Saint-Germain which appeared to be the core for a European city, the choice of this location was to take advantage of the water sources (Oued Biskra) and also to detach from the ancient city. This period was also the appearance of the colonial quarter as an extent from the fort with several facilities such as (the railway station,

the hotel of the Sahara, the city hall, shops...). To be different and separated from what existed before, this quarter had an orthogonal structure designed on a basis of a gridiron layout which produce a set of regular plots and open spaces (Bada, 2012).



**Figure V.5.** the colonial quarter of Biskra city (left), Dervaux's Plan, the proposed layout for Biskra in 1932 (right). **Source:** Bada (2012)

In 1932, Biskra knew its first planned layout with the application of (Plan Dervaux), this layout's primary objective was to create a connection between the native city and the colonial quarter, by reorganizing the city and improving the mechanical flow in it. Moreover, the urbanist had the idea to transform the whole city into a touristic destination by establishing different leisure and commercial facilities (casinos, gardens, spas...) (Courtilot, 1979), however, this plan was never finished due to unwell land management and many other difficulties. Then comes the Plan of Constantine (1958-1962) in which it was the appearance of the social housing for the first time.

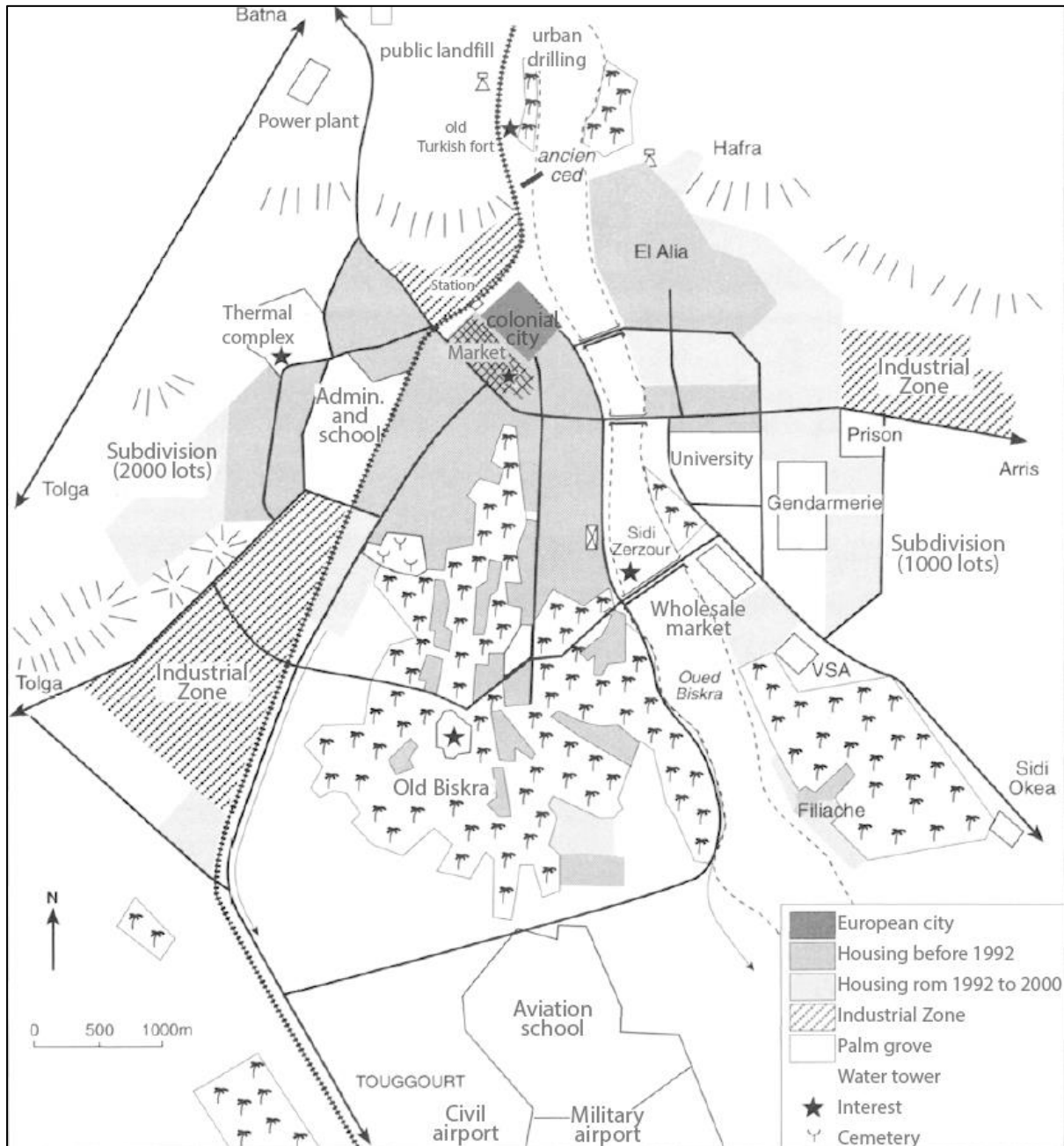


**Figure V.6.** The plan of Biskra in 1952 (left), the plane of Biskra in 1972 (right). **Source:** DUC (1972)

Post-independence (after 1962), Biskra had a significant demographic growth which caused an uncontrolled city growth mainly toward east and west. With no instruments or planning to guide this extension, Biskra continued on the densification of its urban fabric around Zaatcha Boulevard and Hakim Saadane Boulevard (main streets now), moreover, there was the appearance of illegal neighbourhoods in El-Alia (late development), all this growth at the peripheries of the old core and the colonial district was a reason for the connexion between the native city and to colonial quarter. After 1973, many tools were introduced, not only to control this anarchic urban growth, but also to respond to the increasing needs for housing, one of them was new urban housing areas ‘ZHUN’ (Farhi, 2002).

Currently, Biskra’s structure is a compilation of three different types of urban fabrics: the gridiron fabric, which was a result from the colonial period, the irregular fabric coming from the extension of the ancient core (old seven villages), and finally the post-independence fabric. The colonial quarter is characterized by its orthogonal structure that generates several well-structured streets and open spaces (gardens and public spaces), part of this quarter is merely commercial (Soug) while the other part is mostly residential. The old core represents a part of the city centre and it is characterized by its narrow and compact streets with an irregular pattern

of composition. In the other hand, the post-independence fabric is to somewhat controlled by the spatial organization and also a combination of a shapeless and sometimes a look-like gridiron fabric. Right now, this urban fabric actually represents the general structure's pattern of the city (Bada, 2012).

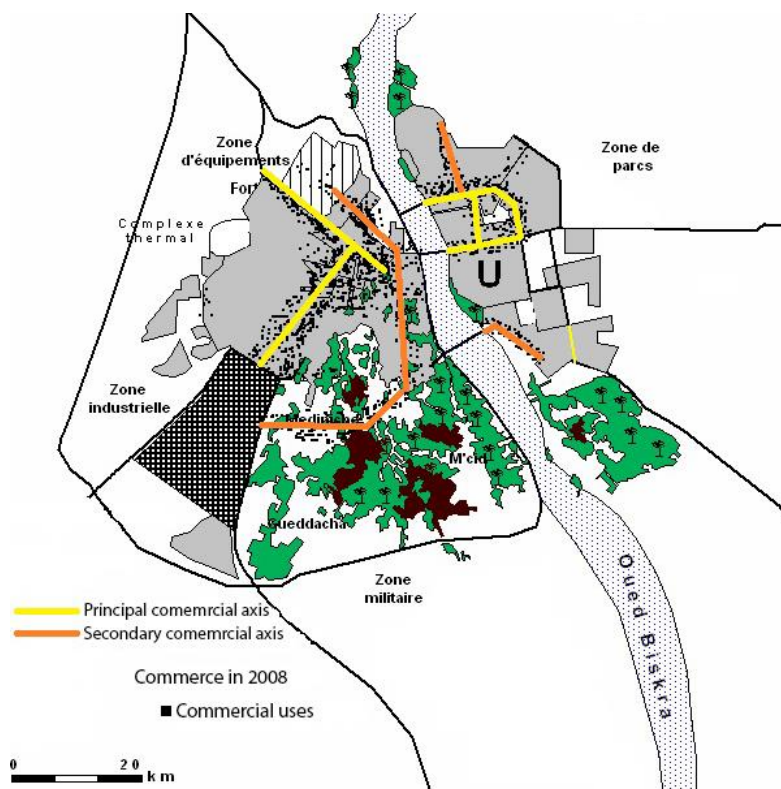


**Figure V.7.** Agglomeration of Biskra in 2001. **Source:** Farhi (2002)

### V.1.6. Retail and commercial activities

The choice of retail location is considered as an important decision for retailers in order to enhance their chances of success in work. There are many factors that can affect the location selection such as the cost of land/rent, the accessibility, and the pedestrian flow (Brueckner, 1993). Type and location of economic activity (shops types) in Biskra city is an important part of this study, and before giving an overview about it, it is necessary to define commerce in general. According to Metton (1991), commerce term is designed to any physical or moral activity that is dedicated to sell a product or a service, it is also called ‘distribution’, which means the process from when products are made until they are eventually consumed, this activity is carried out in specific locations such as stores. In a broader sense, this exchange of products also implies a social relationship that exists between traders. Retail in the other hand, involves on buying goods in large quantities and then on reselling them in smaller quantities.

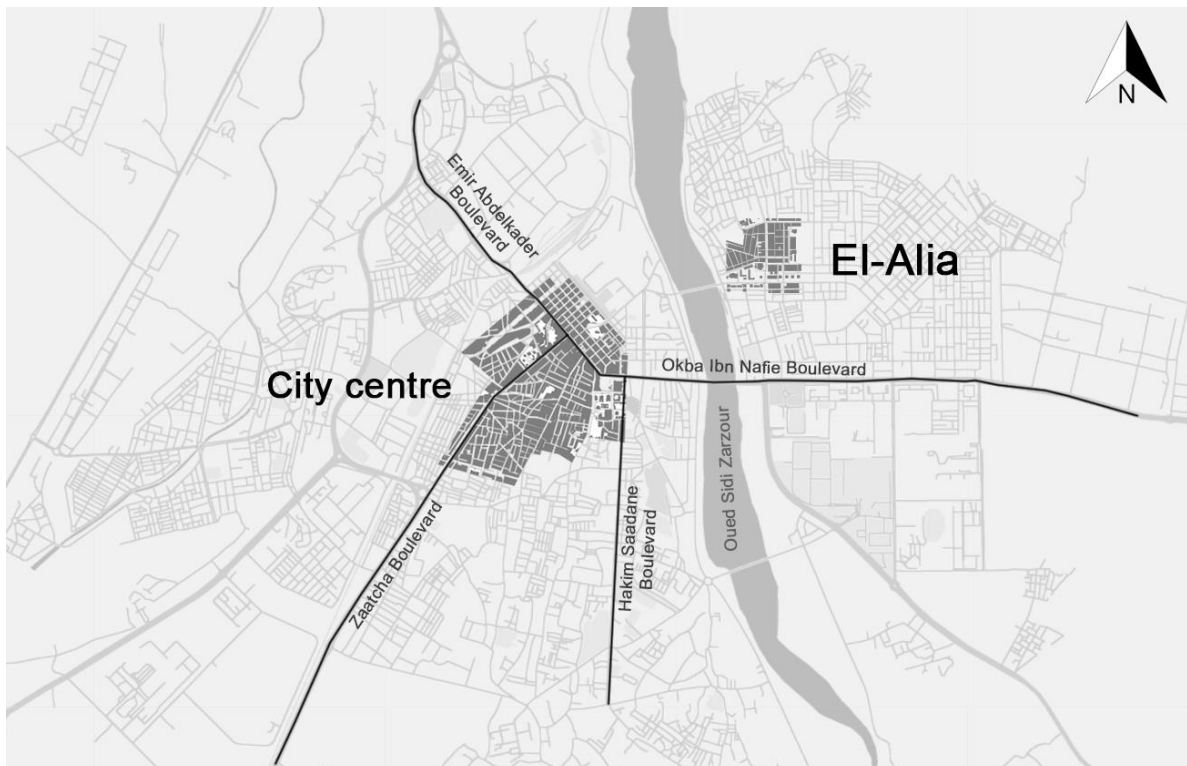
Looking into the tertiary sector (the third of the three economic sectors), which is the part that matter in this study, it actually takes 70% of the working population in Biskra, poured into retail activities such as clothing, cigarettes, traditional local products, etc., with over 12000 retails commerce in the whole province including restaurant and other services activities, 6000 (50%) of them are concentrated in the capital (Farhi, 2002).



**Figure V.8.** Commercial land use in Biskra city (2008). **Source:** Lekehal (2015).

## V.2. THE CASE STUDY: SELECTION OF THE STUDY AREAS

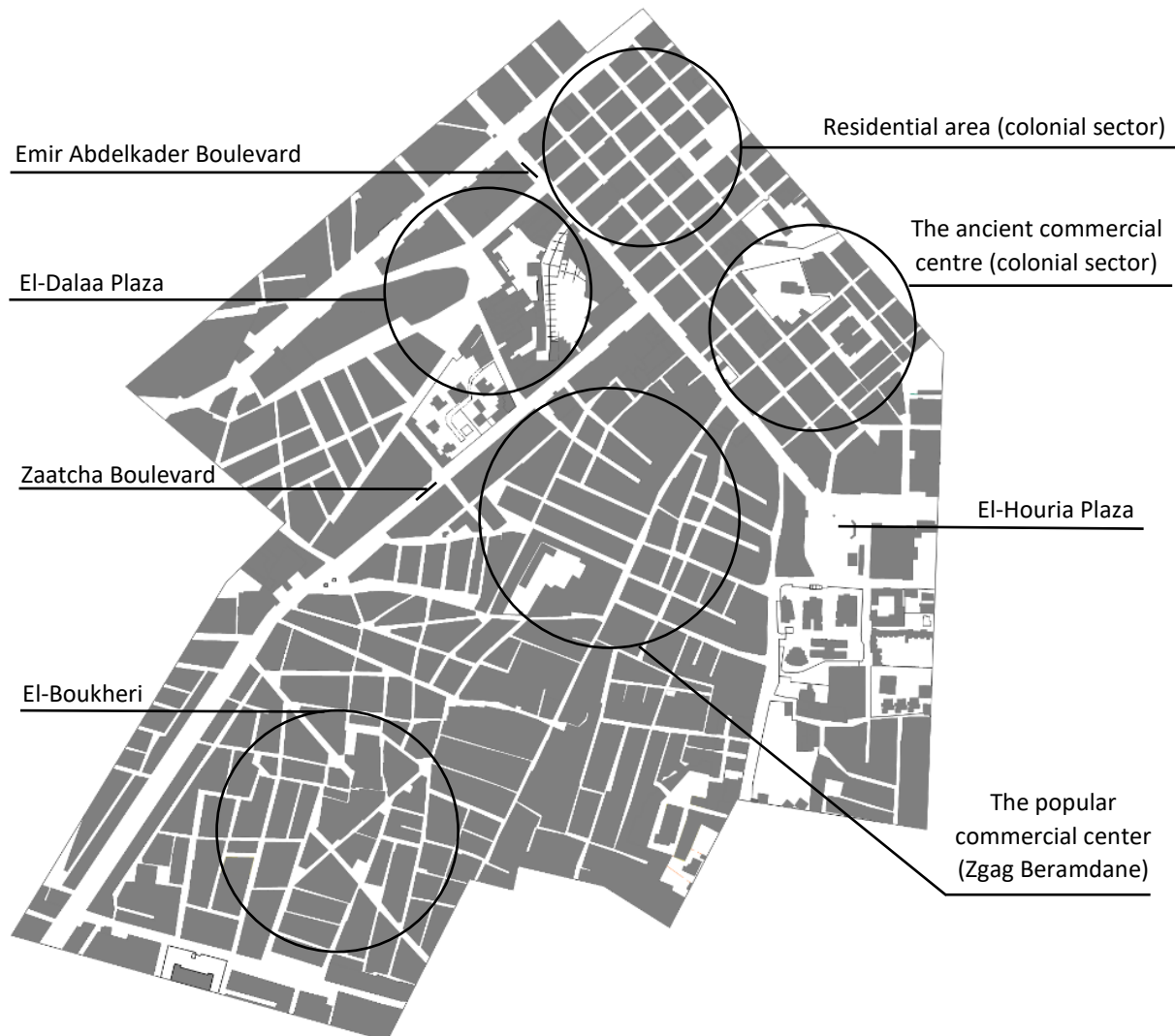
In order to analyse the chosen areas (urban grid) and their connexion with the surroundings, this investigation takes the city of Biskra as a case study to look into the issue of gender segregation at different scales with different variables included in every scale; first at the global scale (city level), at a district scale (macro), and then on a local scale (micro). The main districts of focus are the city centre and El-Alia districts (Figure V.8.) as they are considered to be the most dynamic areas in the city, the city centre is the main city magnet with several open spaces such as El-Houria Plaza, El-Dalaa Plaza, and other commercial centres as the ancient and the popular commercial centres, however, El-Alia district, is fostering as the centre of the east city extension, encompassing several retail activities and services as well. For the local scale study, six (6) subareas of 200- meter radius were considered in this study; Zgag Beramdane, El-Boukheri, Soug El-Aasr, El-Dalaa, the ancient commercial centre and finally the other part of the colonial sector (residential part). The selection of these areas was guided by the spatial configuration (change on values), the type of urban fabric, and the existence of commercial activities.



**Figure V.9.** Location of the studied areas within the context of Biskra city. **Source:** Author.

### V.2.1. City centre district

The first chosen district (global area) for this study is the city centre of Biskra (Figure V.10). One of the main reasons for analysing this area is the diversity of urban fabrics and structure which would be a relevant factor to the spatial configuration and the urban spatial use as well. By virtue of being traversed by Zaatcha and Hakim Saadane Boulevards (the main structuring axes of the city), and also because of the existence of several commercial activities (retails), the city centre is considered to be the most dynamic area in the whole city with a high potential of pedestrians' movement overall. It is also important to mention that the main focus of this study will be on the streets generated by city's morphology and the relation that exists between each other. Thus, five (5) subareas were chosen in the city centre district.



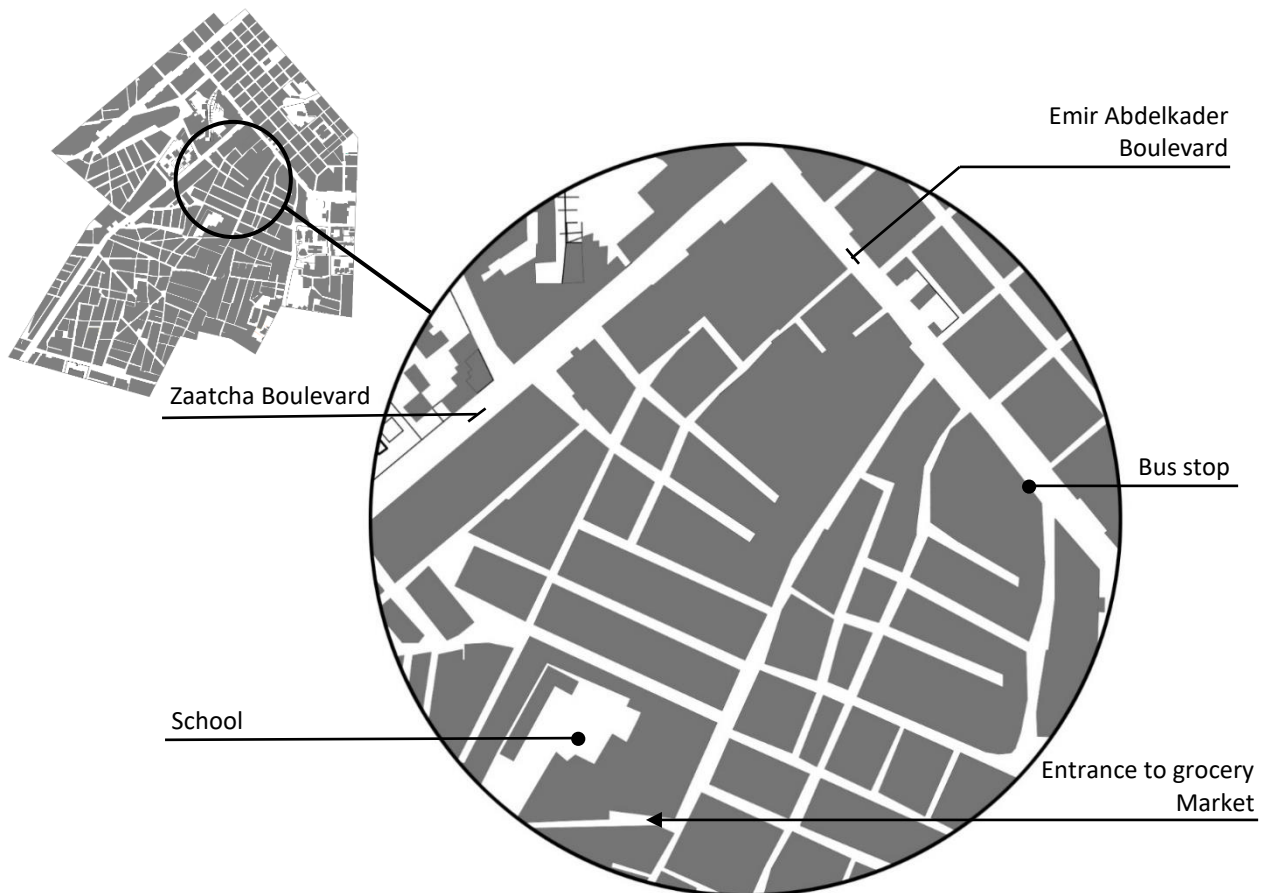
**Figure V.10.** The city centre, showing the chosen areas with the most important streets.

**Source:** Author.



### V.2.1.1. Zgag Beramdane

This area (Figure V.11) has been chosen for being one of the most important areas of commerce and retail activities in the city of Biskra. Zgag Beramdane has a high level of accessibility as being surrounded by the main streets of the city (Zaatcha and Emir Abdelkader Boulevards) with multiples entrances. This area is part of the post-independence fabric and consequently, it is easy to notice the compactness of streets and also the irregular pattern of layout with several dead ends inside the layout. These streets are mostly for pedestrian use, and often vehicles use it to traverse to the opposite side of the area. Although, Zgag Beramdane is mostly dedicated for clothing stores (in the internal routes), it is also a high residential area and most of the stores are owned by locals if not rented. All this makes this area worthy of investigation.



**Figure V.11.** The area of Zgag Beramdane and some of the existing attractions. **Source:** Author.



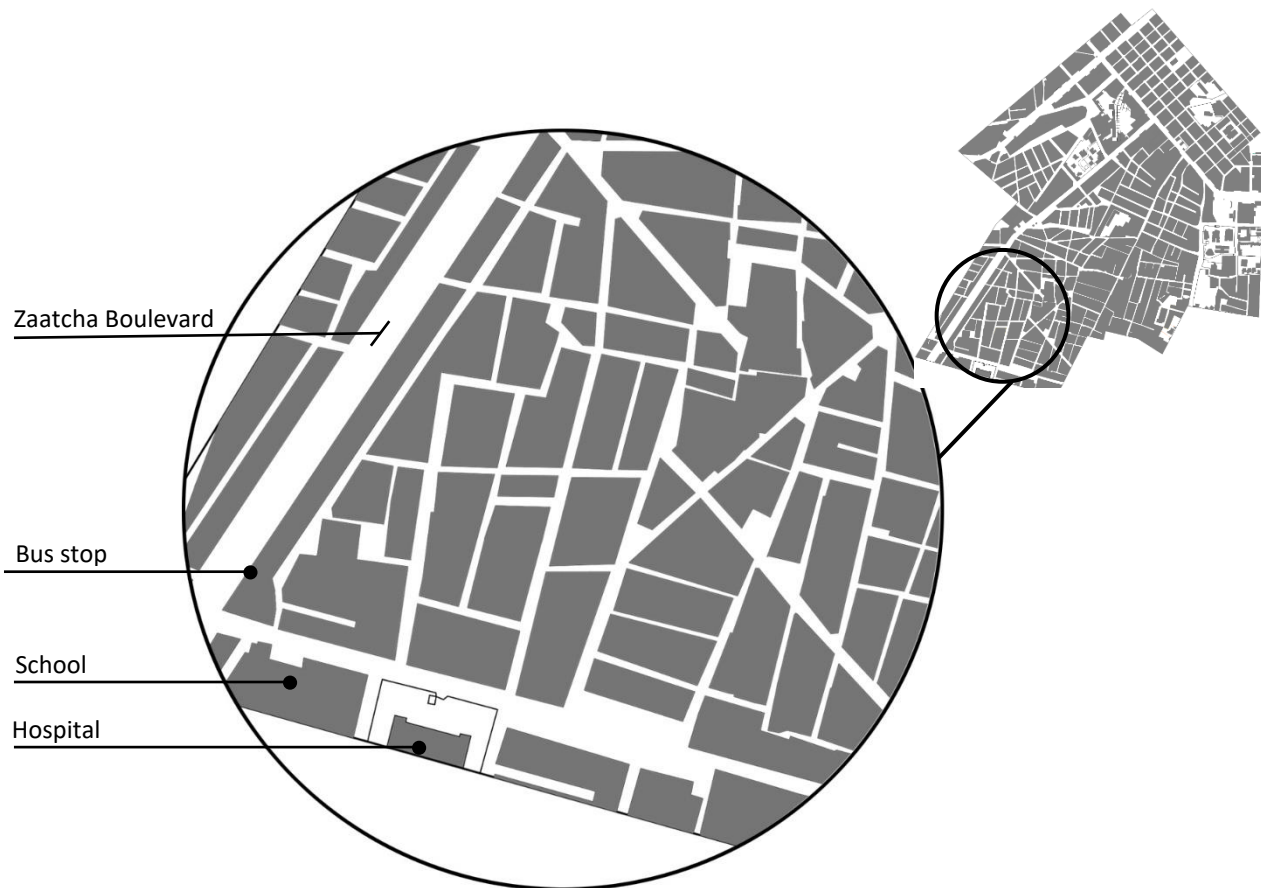
**Figure V.12.** Photos taken from the first studied area (Zgag Beramdane)

In the area of Zgag Beramdane, it was noticeable how the density of shops is extremely higher than other streets in the city centre, where users also follow this density with high number of shoppers. Moreover, it was easy to observe that this area is mostly frequented by women than men.

#### **V.2.1.2. *El-Boukheri***

This area is considered as a destination mostly to women for containing several retail stores that offer their needs (clothing stores, utensils...). Due to its connexion with Zgag beramdane, this area also of an irregular spatial pattern (post-independence fabric) with a compact urban layout whose streets favour privatisation from the public mixed spaces. In fact, this area was formed earlier than Zgag Beramdane.

The accessibility to this area is mainly from the main boulevard of Zaatcha or through the internal streets that are connected with Zgag Beramdane, these streets are usually used by local pedestrians with a really low density of vehicles. El-boukhari also provides the ‘Saturday market’ (Soug Sebt) in which the number of shoppers increases significantly. Few of the streets in this area are dedicated for commercial activities, with a high number of stores lined up next to each other, while the other streets appear to be for residential purposes only.



**Figure V.13.** The area of El-Boukheri and some of the existed attractions. **Source:** Author.

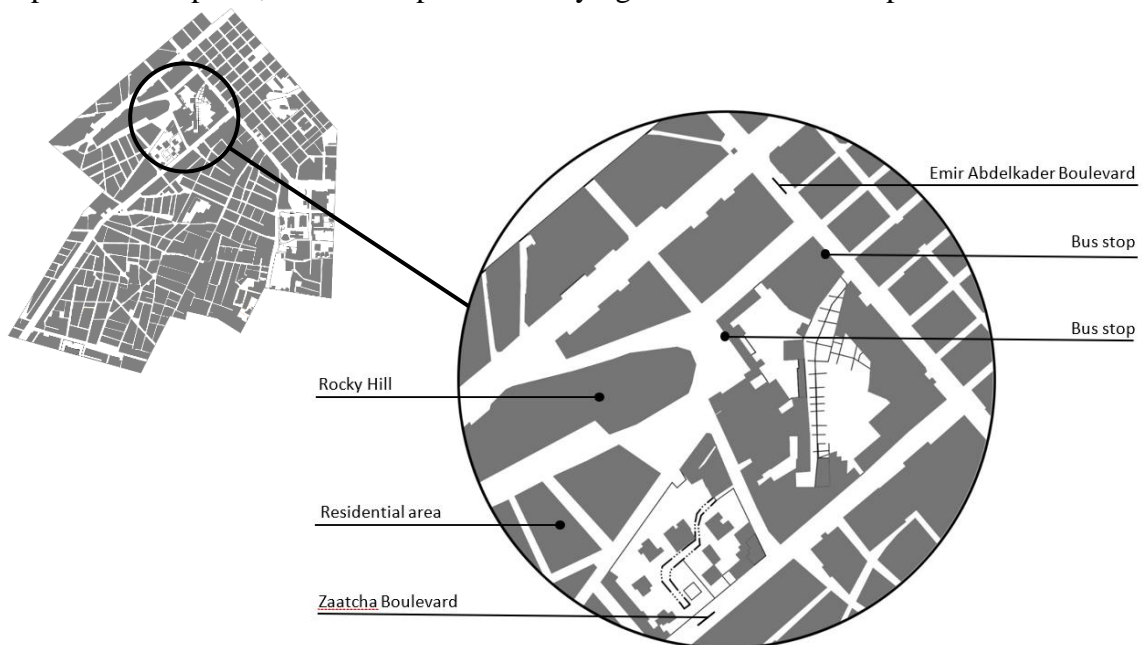


**Figure V.14.** Commercial centres of Biskra in 1952 (left), and 1972 (right). **Source:** DUC (1972)

Both commercials from the irregular fabric (Zgag Beramdane and El-Boukheri) weren't actually planned, however, they were a consequence of the overgrowth of population from the post-independence period, thus, it was mainly a reconversion of some housing streets into shopping ones and this process is still occurring until now. These commercial activities take place in the internal streets which indicates that it had followed the first built houses during development (Figure V.14).

### V.2.1.3. *El-Dalaa*

This area (Figure V.15, V.16 and V.17) has been chosen for containing an important plaza in the city, it's Dalaa Plaza. With its layout that provides several spaces for sitting, mixed-use stores and several commercial services such as restaurants, multimedia and cafes, this plaza is considered as an important part of the city for people and their communal life. Divided into three subspaces, Dalaa Plaza is characterized by its amorphous shape, a result from the existing of a rocky hill in the middle of the area. In general, this Plaza was not planned or intended to be designed, instead it was a 'left over' space resulted from the assemblage of different urban fabrics after the rapid urban growth that Biskra had in the post-independence period. The plaza and the whole area of El-Dalaa is well connected with the mains streets of the city (Zaatcha and Hakim Saadane Boulevards) which provides a good connexion with the rest of the city centre as well as an easy accessibility from different directions. Contrary to the rest of areas, El-Dalaa has a high flow of mechanical movement especially in the roads that separate the subspaces of the plaza, which hampers when trying to traverse from a space to another.



**Figure V.15.** The area of El-Dalaa and some of the existed attractions. **Source:** Author.



**Figure V.16.** A satellite view showing the area of El-Dalaa with the subdivided spaces.

**Source:** Author.

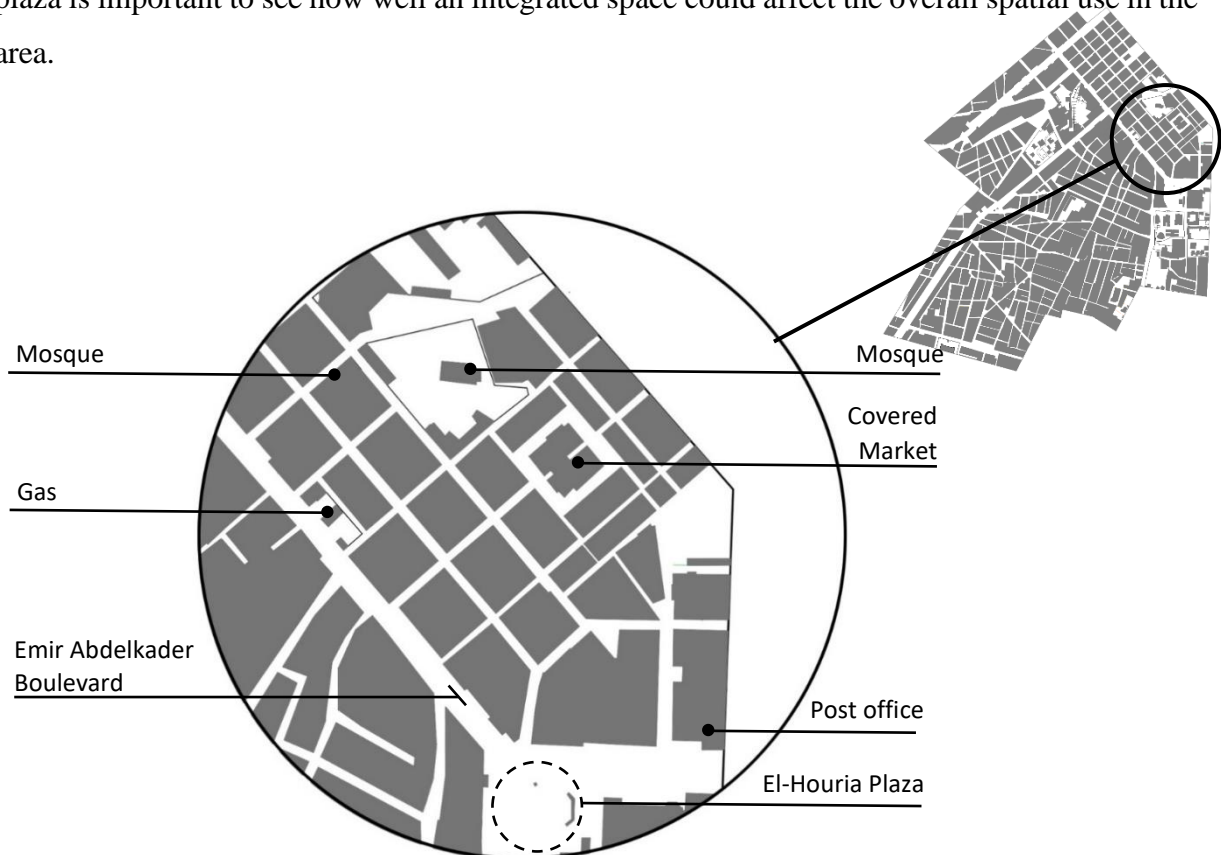


**Figure V.17.** Photos taken from El-Dalaa showing the environment of the studied area (left) with some of the commercial activities (right).

#### V.2.1.4. *The ancient commercial centre*

This area has been chosen for being a known centre for commercial activities in the city of Biskra. Due to being a part of the colonial sector, its layout was designed on the basis of a checkerboard fabric with a ‘colonial’ architecture style which produced several equal plots with different functions. The land use here exhibits a variety of commercial activities, in the middle of this area there is the ‘Covered market’ surrounded with grocery stores as an extension from the market. The vicinity streets in the other hand are mostly clothing stores for men, restaurants and food wholesalers, these streets are also well-known with temporary retail sellers (without stores) that sell used phones and other daily objects.

With its connexion to Emir Abdelkader Boulevard, this area is provided with many entrances toward the centre as well as the other side, however, vehicles inside this area are almost non-existent as it is mostly used by pedestrians, strictly men. Another important element here which is El-Houria plaza, this plaza is frequently used by public with a layout of two levels that provides many sitting places and a vast open space on the top level. Putting a spotlight on this plaza is important to see how well an integrated space could affect the overall spatial use in the area.



**Figure V.18.** The area of the ancient commercial centre and some public facilities

**Source:** Author.

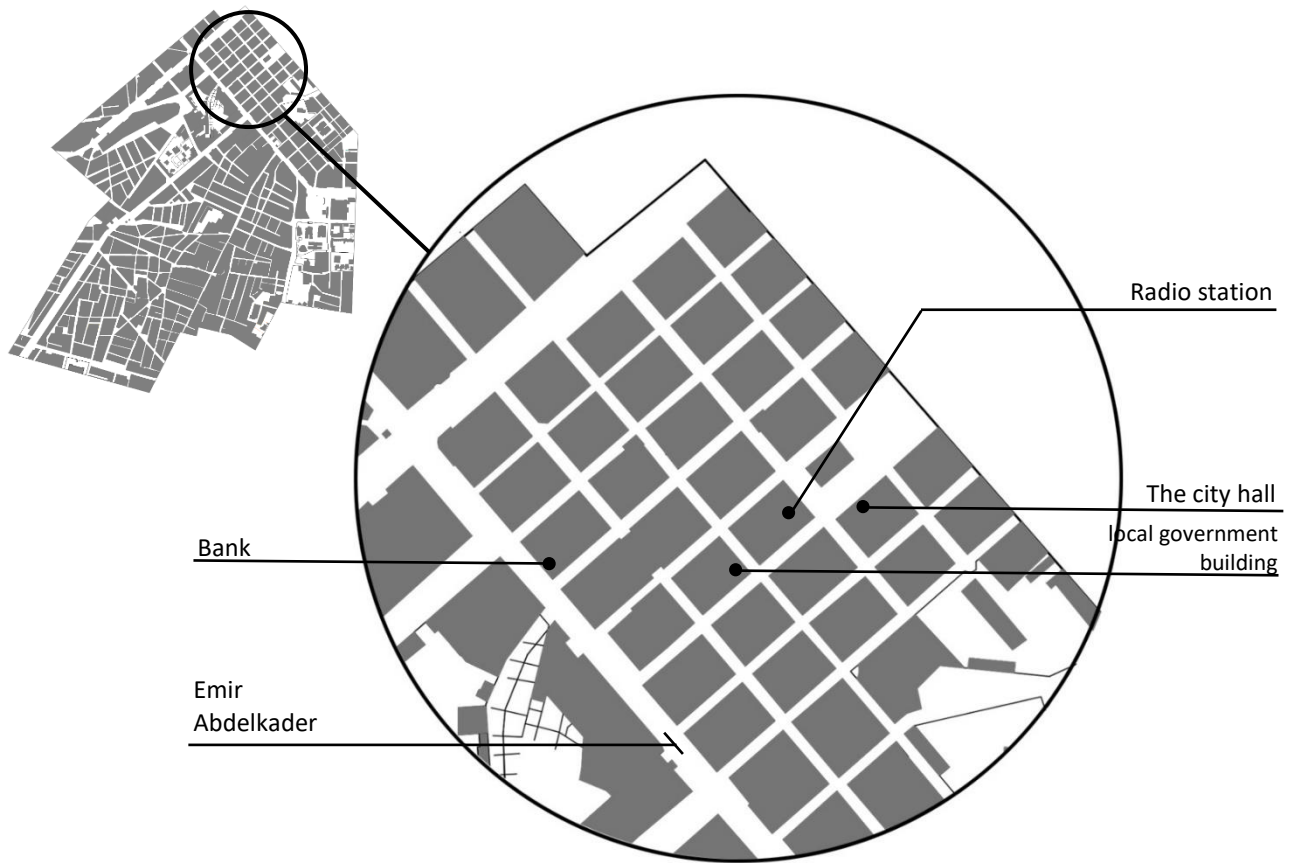


**Figure V.19.** Photos taken from the ancient commercial centre showing the covered market (left) and some clothing stores from the vicinity streets (right).

#### **V.2.1.5. *The residential area (colonial sector)***

This area was chosen for being a part of the gridiron fabric but also for being a residential area in the first place. Compared to the previous area (the ancient commercial centre), this part of the colonial fabric is mostly dedicated for residential purposes with only few existed stores, in fact, this area contains several facilities such as the city hall ‘Baladia headquarter’ and the local government building ‘Daira’ as Biskra still uses these buildings for the same function since the colonial period.

Contrary to the other part of the colonial district, this area has a higher density of vehicles, and with the same level of connexion with the main street of Emir Abdelkader, it offers a higher level of accessibility as well. The plots generated here are mostly built, however, we can see some gardens and open spaces near the centre (Figure V.19.).



**Figure V.20.** The residential area from colonial sector some of the public facilities.

**Source:** Author.



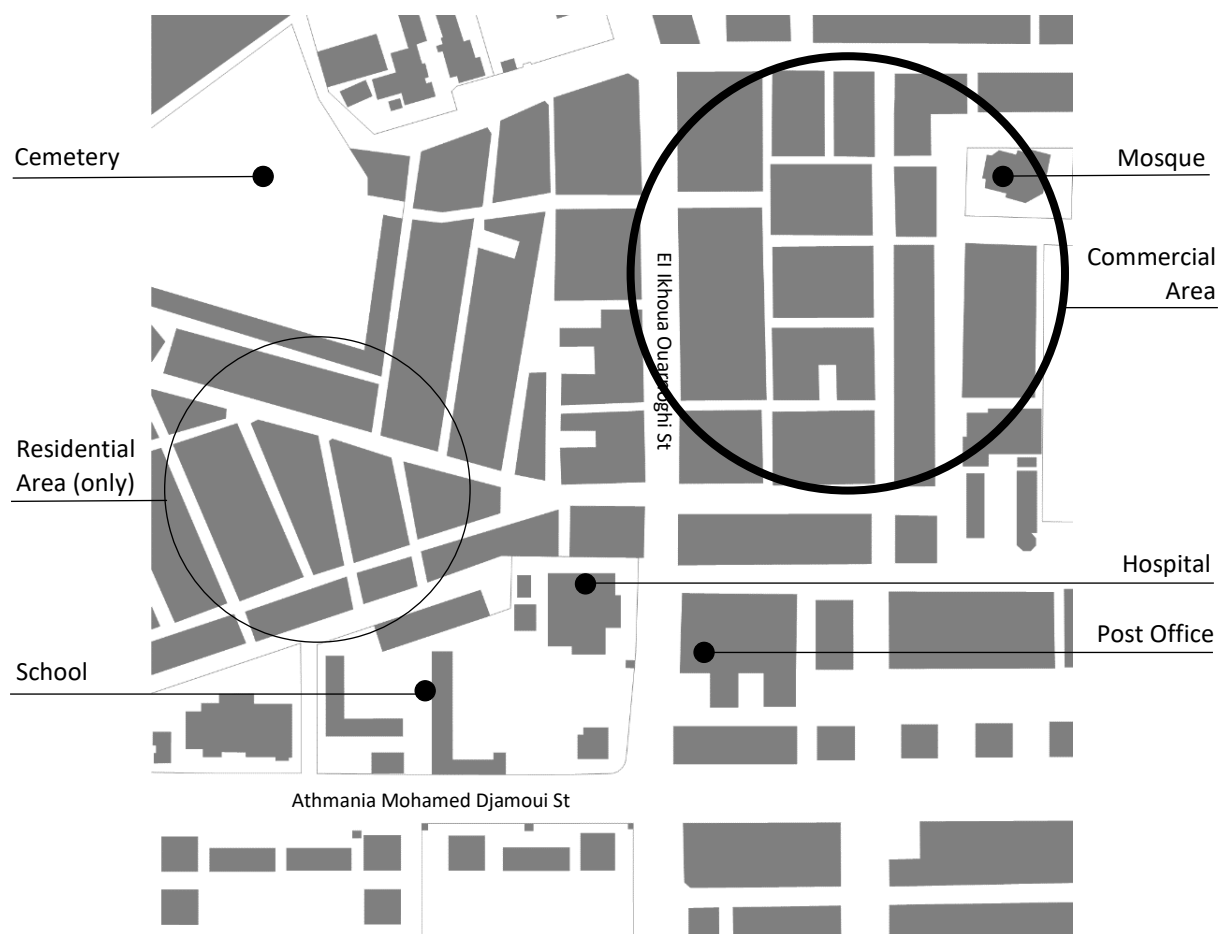
**Figure V.21.** A satellite view showing the nature of the grid composition. **Source:** google earth (2020).



### V.2.2. El-Alia district

The other chosen district (global area) is a part of the late expansion of Biskra city, its El-Alia. This area is situated in the north-east of Biskra and it has witnessed a remarkable expansion within the framework of real estate development. Long ago, el-Alia was equipped with the necessary facilities in terms of education and health, and has allocated green spaces within the urban fabric as well. Therefore, it is necessary to study all the important areas in the city of Biskra as a whole, for an overall assessment.

This district has been chosen also for having a variety of functions such as the commercial neighbourhoods that are growing to be an important centre despite the fact that it was not planned to be that, this part of El-Alia is mainly connected directly with the third bridge that is coming from the other part of the city. We can say that this area is the most dynamic places in El-Alia.



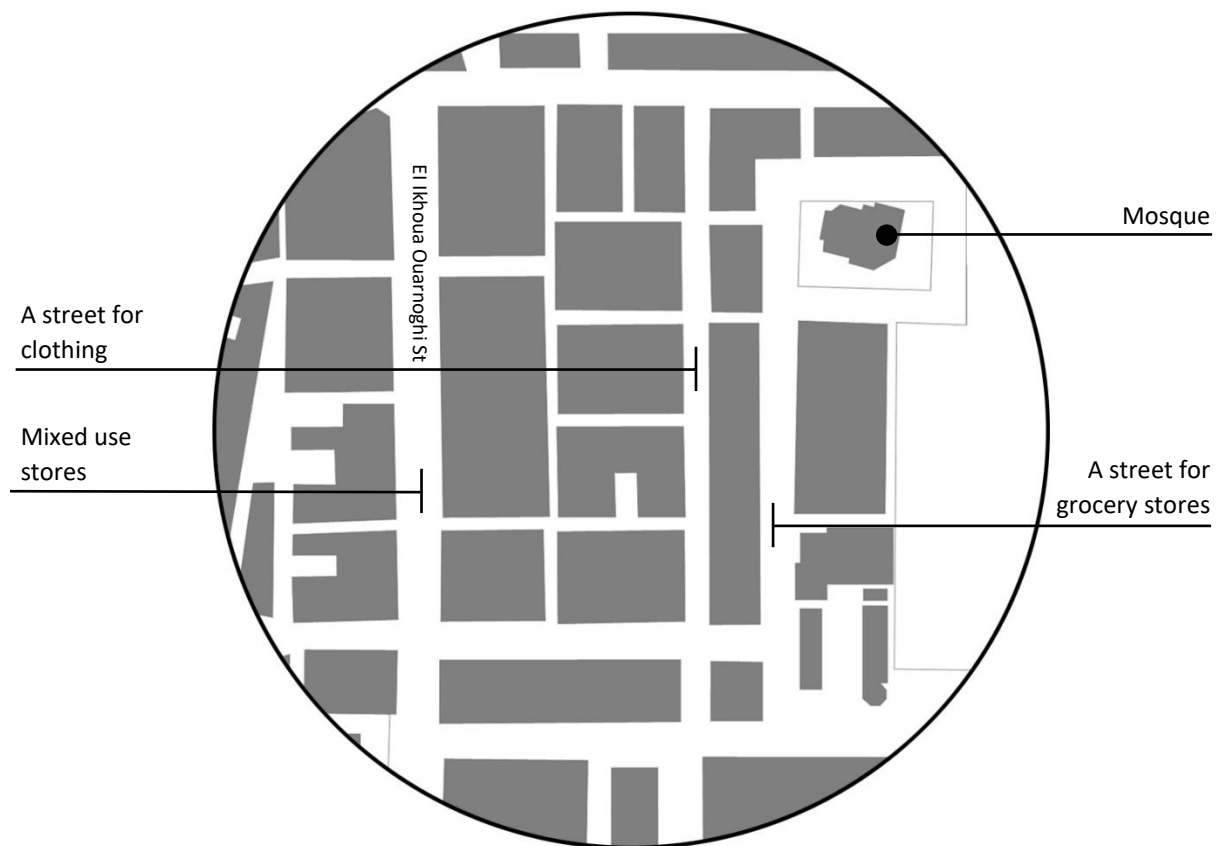
**Figure V.22.** El-Alia district with the most important streets and public facilities.

**Source:** Author.

### V.2.2.1. Soug El-Aasr

With the selection of this area, we aim for a comparative examination with the colonial district, since this area has some similarities in terms of the gridiron fabric as well as the presence of retails, thus, analysing the land use from this perspective could give some relevant explanations with the spatial configuration in relation. The thing worth mentioning here is that streets in this area are divided by function, as one internal street offer needs for women while other external streets are mixed-use stores, and some others remain for residential purposes only.

The accessibility to this area presents multiple choices for pedestrians as well as vehicles through the street of Athmania Mohamed Djamoui that is connected with the bridge.



**Figure V.23.** The commercial area (Soug El-Aasr) some of the public facilities.

### **V.3. RESEARCH METHODOLOGY**

#### **V.3.1. Objectives**

This study seeks to identify the logic that underlie the genders' spatial use segregation in the city of Biskra. It will investigate what guides the two groups' locational patterns (which spaces men and women use and which spaces are mixed) by focussing on three features: type and location of commercial activities (shops types), spatial configuration and people's movement behaviour, mainly by using space syntax method, to study streets' patterns of use and their correlation with the urban configuration in Biskra city. This research also aims to work as an analytical framework to serve as a guideline for future urban designs, whether it has a negative or a positive effect, to avoid or maintain this separation.

#### **V.3.2. Space syntax theories, movement and land use**

Before we get to the process of investigation, it is necessary to talk about the principal method in this study and its relation with movement and the feeling of safety afterwards, because movement is considered as an important element in urban planning and design, and since it affects the dynamicity and the liveliness of urban spaces, the appropriate distributing and accommodating of movement is really an important factor (Peponis et al, 1997).

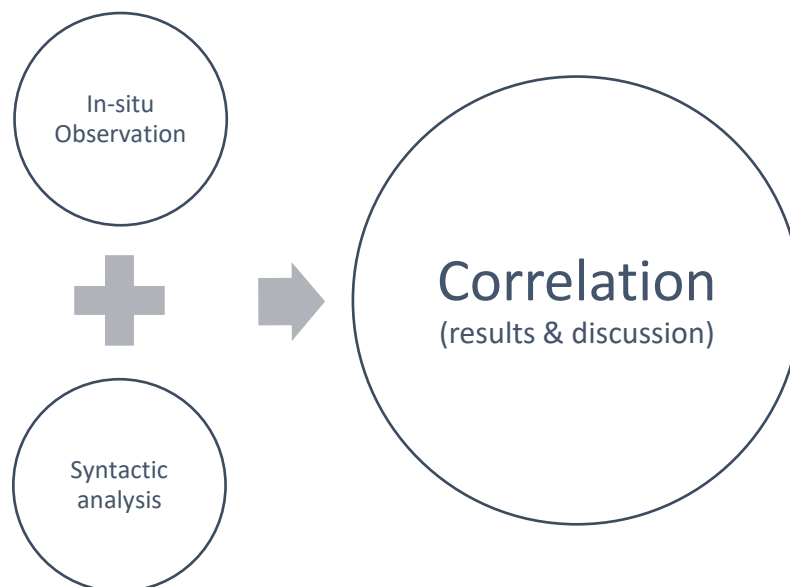
Space syntax method provides insights on people's behaviour and their environment; activity and movement patterns according to the topological-visual features. In space syntax theory, the generated movement flows in the urban space through spatial configuration alone is referred to as 'natural movement', it is also called the network effects, and although it is not always the case in urban spaces, however natural movement remains the most consistent and predictable type of movement (Hillier et al., 1993). Furthermore, space syntax suggests that cities are primarily shaped by the socio-economic forces, it argues that land uses and commercial activities are also a street network effect that are mostly exist to take profit of the movement generated by the spatial configuration, that has been referred to as the phenomenon of 'movement economy'. In some cases, space syntax parameters showed that it is not fully an efficient way to predict the pedestrian movement in a studied area, as there are many other factors that could play a role in the choices of where do people prefer to wander (Hillier et al., 1993; Hillier and Iida, 2005).

In several studies, the urban spatial use has been correlated with security aspects, because sometimes insecurity could be an enough reason to avoid using certain spaces which could be

a reason coming from feeling of fear, street harassment, aggression, violence and so on, Oscar Newman talked about the importance of natural surveillance from the interior spaces to improve the security against crime incidents in general, that is what he called the ‘defensible space’ (Newman, 1972). In fact, in space syntax as well, it has been declared that spatial configuration could provide a source of safety through the moving strangers (affected by natural movement) and the local dwellers, as they create a complementary relationship in keeping surveillance in an urban space, by locals from their dwelling’s windows and entrances and by strangers inside the space itself which is better to reveal on a micro scale (natural surveillance) (Hillier et al., 2009).

#### V.4. PROCESS OF INVESTIGATION

In order to answer the queries mentioned earlier in the problem statement, this investigation will be conducted by using qualitative and quantitative methods simultaneously by going through three levels; In-situ observation, syntactic analysis and finally the correlation part which will be graphically as well as statistically.



**Figure V.24.** Primary idea for the process of investigation. **Source:** Author.

#### **V.4.1. In-situ observation**

##### **V.4.1.1. *Survey of shops distribution***

The first part of the qualitative approach consists on recording and locating the retails regarding their gender classification, the distribution of commercial activities in both studied districts has been done by visiting the areas several times and by identifying the types of retails in the ground level floor. The criteria for the classification of the gender type of these stores are the activity provided in the store itself, where we always have to ask the question whether this store provides women needs, men needs, or both-genders needs, for example the category of retails for women are: clothing stores for women, coiffures for women, and other small activities only for women, and the same criteria go for men and both-genders stores.

##### **V.4.1.2. *Movement observation***

In order to reflect more on the behaviour of both men and women and the choice of which streets and locations they prefer to use the most, the gate count method has been exploited. The pedestrian count was conducted by selecting 27 gate locations within the city centre district. Observation and counting have been carried out in a weekend day (Saturday, the 30th of March, 2019) as well as in a weekday (Tuesday, the 2<sup>nd</sup> of April, 2019). Movement of both men and women walking and crossing a perpendicular imaginary line were counted for five –minutes within each two-hour period, throughout six different times of the day (08:00-20:00), and multiplied up to get to an hour rate, the choice of this specific timing helps figuring out whether the people's flow is affected by the stores opening hours and working hours or by different factors instead. The selection criteria for gate counts locations were in relation with the changes on syntactic values (from integrated to segregated) and with the ranging from busiest to poorly used routes, it is also important to mention that the outcome numbers are the ones registered in the observation gates only, so the results coming in later in the study could be different with other observation points or even with the slightest changes on the circumstances of this survey. Due to lack of observers, the movement observation has only been done in the city centre district, as this method requires all the counting to be done at the same time, moreover, we think that the city centre is sufficient enough for being the most dynamic area in the whole city.

#### **V.4.2. Syntactic analysis**

Concerning the quantitative approach used, a spatial configuration study will be conducted mainly through ‘line’ analyses (axial and segments graphs). Starting from the assumption that the urban spatial configuration i.e. street network impacts people movement, the goal is to simulate and predict how pedestrians (shoppers) navigate through the studied area and which paths they prefer to take to travel from a space to another. These analyses will be carried out by using Depthmap software to generate axial maps as well as segment maps. The considered parameters in this study are ‘integration’ (known as to-movement outside of space syntax) and ‘choice’ (referred to as through-movement outside of space syntax). These parameters will be applied in every allocated scale based on the assumption that a multiscale focus syntactic analysis reveals more detailed results on the spatial configuration properties, in fact, movement appear differently in the local and the global scale and analysing the interchangeable movement between the two scales is important in order to understand the pattern of way-finding and orientation in the urban environment (Mohamed, 2016). Moreover, parameters themselves will be interpreted in multiple radii, according to Hillier (1996), the best way to predict the pedestrian movement on a local scale is by using the parameters with smaller radii. Thus, the studied areas will be analysed at different radii (R<sub>n</sub>, R<sub>3</sub>...) to see how pedestrians’ movement is affected in every scale.

#### **V.4.3. Correlation and interpretation**

The correlation part itself consists of four steps where each type of correlation would be conducted at a different scale. However, in the global scale (city level), the interpretation will be only through the syntactic analyses (axial maps) to see how both districts are connected with the rest of the city.

Based on the assumption that spatial configuration could affect the land use’s distribution (the theory of movement economies), the first part will be about examining whether there is any correlation between the distribution of commercial activities by gender specification and the urban configuration, this will be carried out at two scales, at the district scale (the city centre and El-Alia) and at the local scale (six areas). The objective here is to see if the urban structure plays a role on the distribution of retails.

The second part aims to look into the movement’s behaviour between women and men within the city centre of Biskra, it focusses on how street pattern configuration shapes their mobility

(the theory of natural movement), and also to see if it affects differently women and men mobility. Space syntax method will be used to look into this phenomenon of gender segregation by analysing the spatial configuration of the urban grid and then by statistically correlating it with the observed movement of both men and women along the observed locations with both syntactic measures (integration and choice).

In the third part we will try to understand whether the distribution of commercial activities affects the locational pattern of movement for men and women, this part of correlation will rely principally on applying the gate count method coupled with the distribution of commercial activities in the city centre of Biskra.

One type of the correlations in this study will be a statistical comparison between the data obtained from the movement counting, this data will be used to study the probability of encounter between male and female pedestrians (people-people relation). The data will be loaded into an electronic data base by using Excel software to be analysed in each gate and observation periods from both days.

Finally, there will be an overall discussion to see to what extent the spatial configuration could affect the movement of both men and women together and separately. these results will help us getting answers for the queries mentioned earlier and also to develop a set of conclusions and recommendations for future studies.

## **V.5. INVESTIGATION TOOLS**

### **V.5.1. In situ observation**

#### **V.5.1.1. *Gate count***

For the movement observation, a meeting has been organized with observers to explain the work in details and to divide the observation locations between each other. Due to the simple process of counting, the observers were a combination of college students as well as high schoolers (friends and family), where each observer had between 4-5 points to count within. A mobile application called 'Qtally' has been used by observers to help with the counting of moving users in every gate as it facilitates the counting of the passing men and women by simply clicking two buttons.

### **V.5.1.2. *Shops survey***

The shop survey has been carried out by using base maps for each area to help wandering without forgetting any street, moreover, this work has been done by the author solely, it has taken multiple trips to every area which took a total of 12 days of work (starting from 12<sup>th</sup> August 2018), pictures have been taken for the stores to be revised and to finally assign to what categories of gender every store belongs.

## **V.5.2. Space syntax parameters**

### **V.5.2.1. *Axial map***

In axial maps, space (street) is represented by a direct line of sight passing through each space in the system and linking them all together, in this study the maps are composed of the fewest and the longest axial lines which take up the most possible routes and paths in the urban space. This type of map will be generated by using Depthmap software, the map will be used only on a global scale (city level) as it is not very efficient in a more detailed scale. In the graphs the warm colours (from red) indicate the most integrated spaces, while the cold colours (blue) indicate the segregated ones, generally speaking, the integrated lines are likely to be active and more used by people.

### **V.5.2.2. *Segment map***

The advantage of the segment analysis is that it gives a finer and much detailed result than the axial map does at a local scale, as it interprets values between each junction in every line giving a more effective model to predict movement (Hiller and Linda, 2005). Thus, segment maps will be used at the micro scales.

### **V.5.2.3. *Radius***

In segment analysis there are three kinds of methods: angular analysis, topological analysis and metric analysis. Like the analysis type, the shortest path between nodes can be governed by a radius type as well, it can be angular, metric or topological, the reason of using metric radius in the local scale is that it's the best way to capture movement, while the topo-geometric radii are more efficient for a global scale (Turner, 2007). In this study we will be using radii ranging from global to local to find relevant results in relation with the distribution of commercial activities and the pattern of movement for both men and women.



**V.5.2.4. Macro scale**

Space syntax theory has proven the importance of the macro scale when studying spaces' properties as well as its relation with the micro scale as they constitute a complementary relationship between each other. The objective of using the macro scale was to address the queries on how main streets are connected to each other and to the other streets in their vicinities, all in relation with the urban land use. The spatial measurements that will be considered in this analysis are: global integration, local integration, global choice, local choice.

**V.5.2.5. Micro scale**

In order to reveal the factors that underlie the phenomenon of segregation between the movement of men and women in each street, six local areas in the city of Biskra were studied in more in-depth. The micro scale focuses more on studying the spatial relationships that exists between dwellings and adjacent street segments. However, micro scale analyses cannot be conducted through software processing alone, instead it is necessary for the micro scale characteristics to be paired and studied (observed) with a qualitative approach, which would be the relationship between stores entrances and streets segments in front of them.

**V.5.2.6. Integration measure**

In space syntax, integration measure (to-movement) is defined as the average depth that exists between an axis (line) and the whole other axes in a single system, when studying movement, integration defines a terminal point to be reached from an origin, it would measure the attractiveness and the accessibility of a space compared to its environment, this measure will be used in the studied areas to see how movement is generated through the urban grid and its relation with other variables. Global integration will be applied to see how areas are connected (accessibility and attractiveness) to the rest of their environment, while local integration (with less radius) will be used to investigate the behaviour of genders' segregation with more in-depth between one street and another within local areas (neighbourhoods).

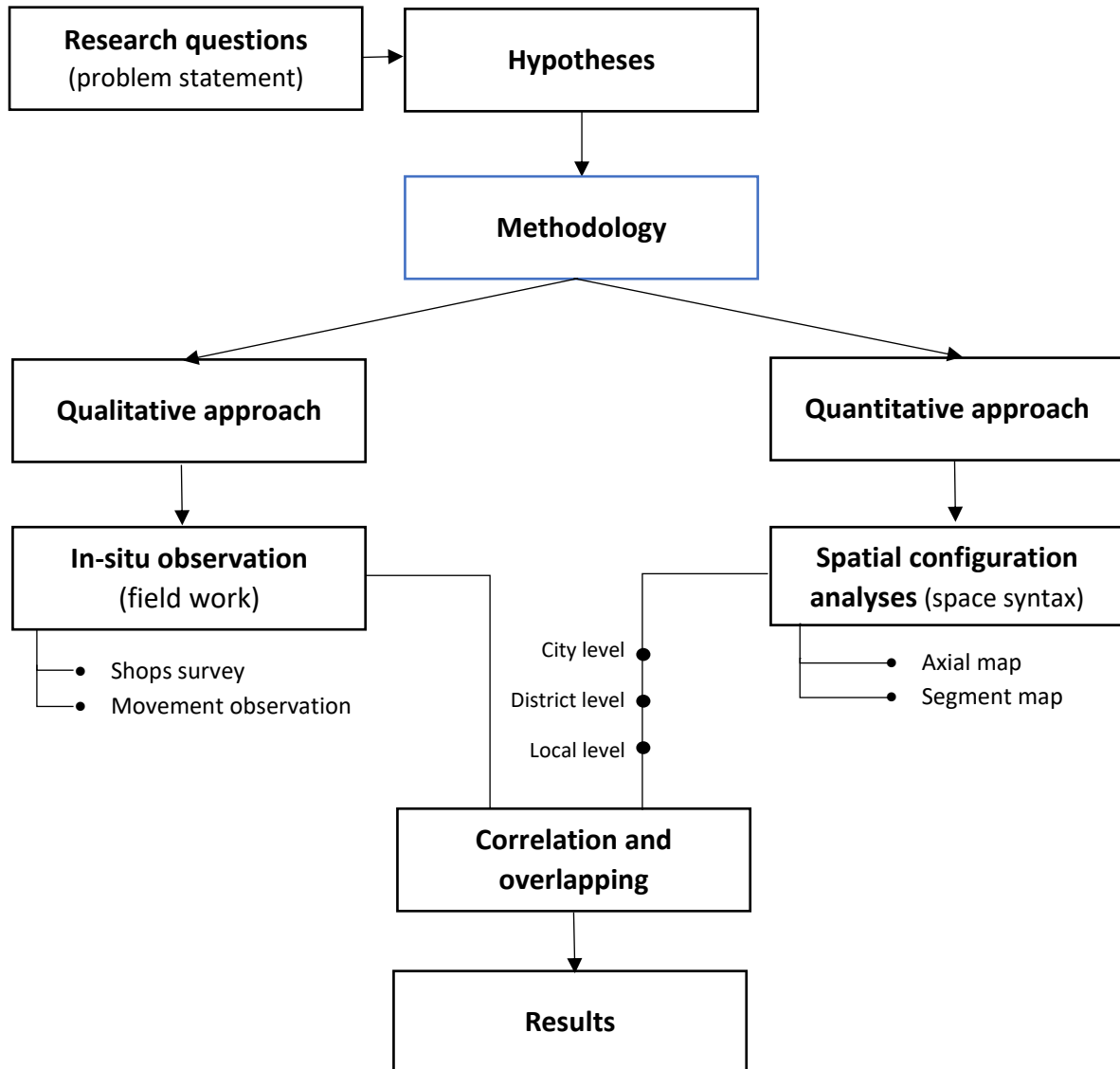
**V.5.2.7. Choice measure**

Choice measure in the other hand, represents the axe/segment that would likely to be taken as a route to reach other spaces compared to other routes (Hillier & Iida, 2005), so by using this measure we aim to see which streets does men and women use the most to traverse in the

studied areas. Same as integration, study area will be analysed with both global and local choice measure.

#### **V.5.2.8. *Normalizing measures***

The Normalisation of variables was first introduced by Tao Yang in Hillier et al. (2012), this method has been made specifically for comparing different urban systems (cities, neighbourhoods...) with each other even when they have different sizes, with this we can compare small neighbourhood to cities depending on the objectives of the study.



**Figure V.25.** A diagram that summarizes the process of the whole investigation and the methodological framework of our study. **Source:** Author.

## CONCLUSION

This chapter has firstly presented a comprehensive report for the city of Biskra, starting with basic information such as a general description and then by going into more details like the cultural aspects giving that Biskra was influenced by different civilisations that helped the growth of the city overtime. Moreover, we have noticed how the large increase in population at the post-independence period affected the development of the overall structure of the city,

which made Biskra a compilation of three different urban fabrics. Furthermore, we have introduced the case studies which were located within the city of Biskra at three different scales; the city level, the district level (two districts), and a local (neighbourhood) level (six areas), each one of these areas has shown unique characteristics in terms of attractions, accessibility and urban grid type which made it an important selection for and overall assessment.

The second part of this chapter was about the methodology that will be adopted in the study, many investigation tools will be used as every single one of them provide different variables which could be the relevant factor that affect the phenomenon of segregation between genders in the use of urban space. This study relies essentially on applying quantitative paired with qualitative approaches based on the certainty that space syntax theory alone is not fully efficient to interpret some phenomena. These tools have been defined as well as explained on how and when will be used to finally able to correlate the results and arrive to a conclusion. The next chapter will exhibit the application of our research methodology mentioned in this chapter.

# CHAPTER VI

## APPLICATION OF RESEARCH METHODOLOGY

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“Research simply seeks the answer of certain questions which have not been answered so far and the answer depend upon human efforts”

- Yogesh Kumar Singh, 2006

## **INTRODUCTION**

Space syntax method has been chosen for this study due to its diversity and effectiveness on treating many social phenomena and problems, this theory has linked the physical components of a space directly with people's behaviour. However, space syntax alone is not fully sufficient to explain certain results, therefore, pairing it with other qualitative methods is an important part in order for the results to be interpreted.

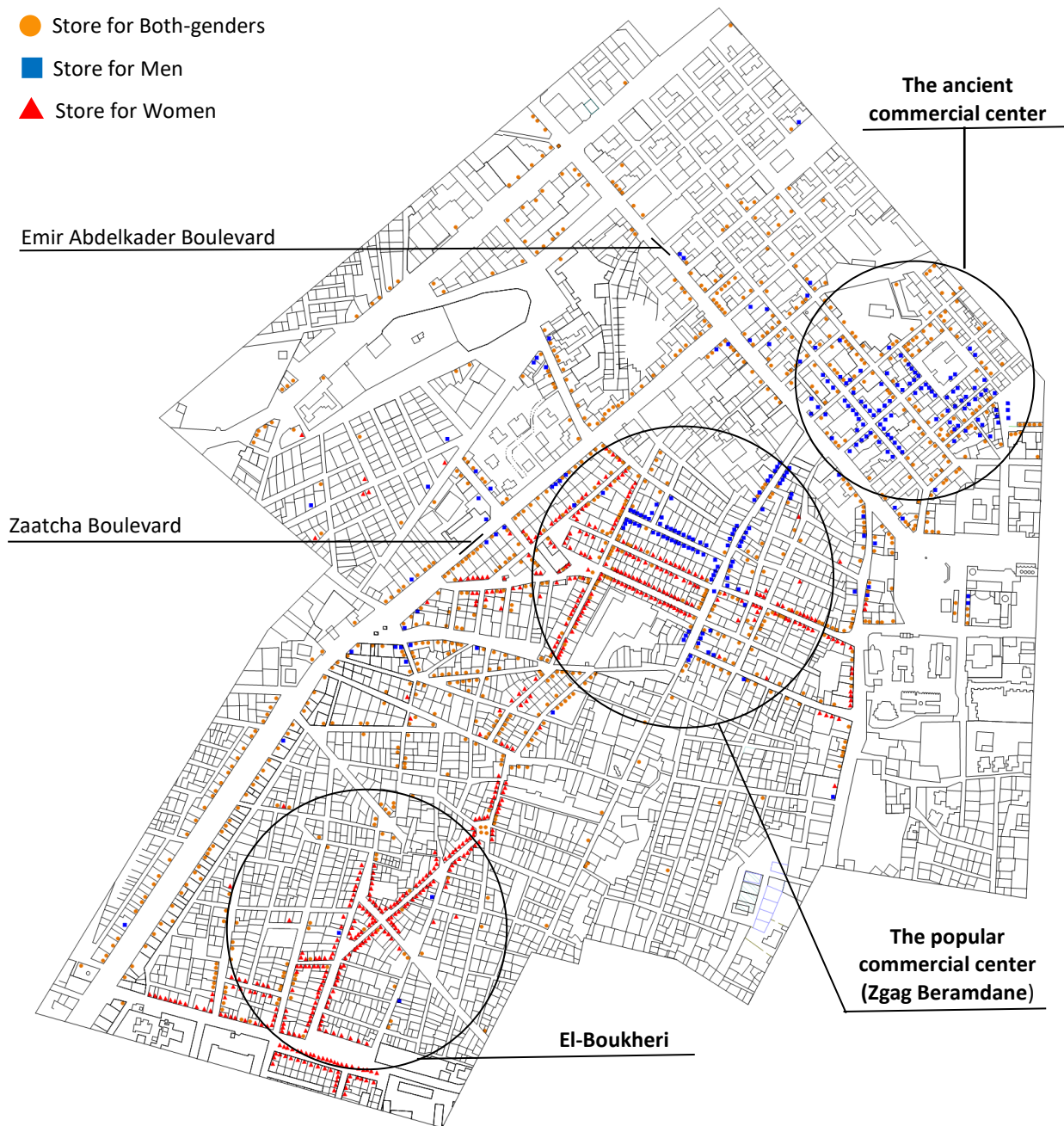
After setting up our research methodology in the previous chapter, we arrive to the part where we apply it on the case studies. Herein, we discuss whether the spatial configuration could affect both genders' movement behaviour together and separately in Biskra city, as the phenomenon of segregation is extremely noticeable, especially in the city centre where one part is majorly used by men (colonial quarter) and in another it is mostly used by women (Zgag Beramdane and El-Boukheri). This segregation is not only in the use of space that might be a result of the retail distribution and services offered to each gender, but it is also conspicuous in both genders' mobility from place to another within the city centre, where women choose certain itineraries, avoiding some spaces and streets.

After exhibiting the results from the qualitative and quantitative approaches separately, the next main focus of this investigation will be the correlation part, where several facets of correlations will be conducted between the collected data to understand the common effects that they have with each other; Spatial Configuration-Land use, Movement-Spatial configuration, Land Use-Movement, and finally between the movement patterns of Men-women. The final section of this chapter will be a full discussion about the results obtained from each type of correlation to verify the hypotheses mentioned in the outset of this study.

### **VI.1. IN-SITU OBSERVATION**

#### **VI.1.1. Survey of shops distribution**

In the qualitative part of the study we will begin by the survey of shops distribution, this part will be conducted on both chosen districts (the city centre and El-Alia) to see the pattern of shops distribution by gender; men's stores, women's stores and both genders' stores.



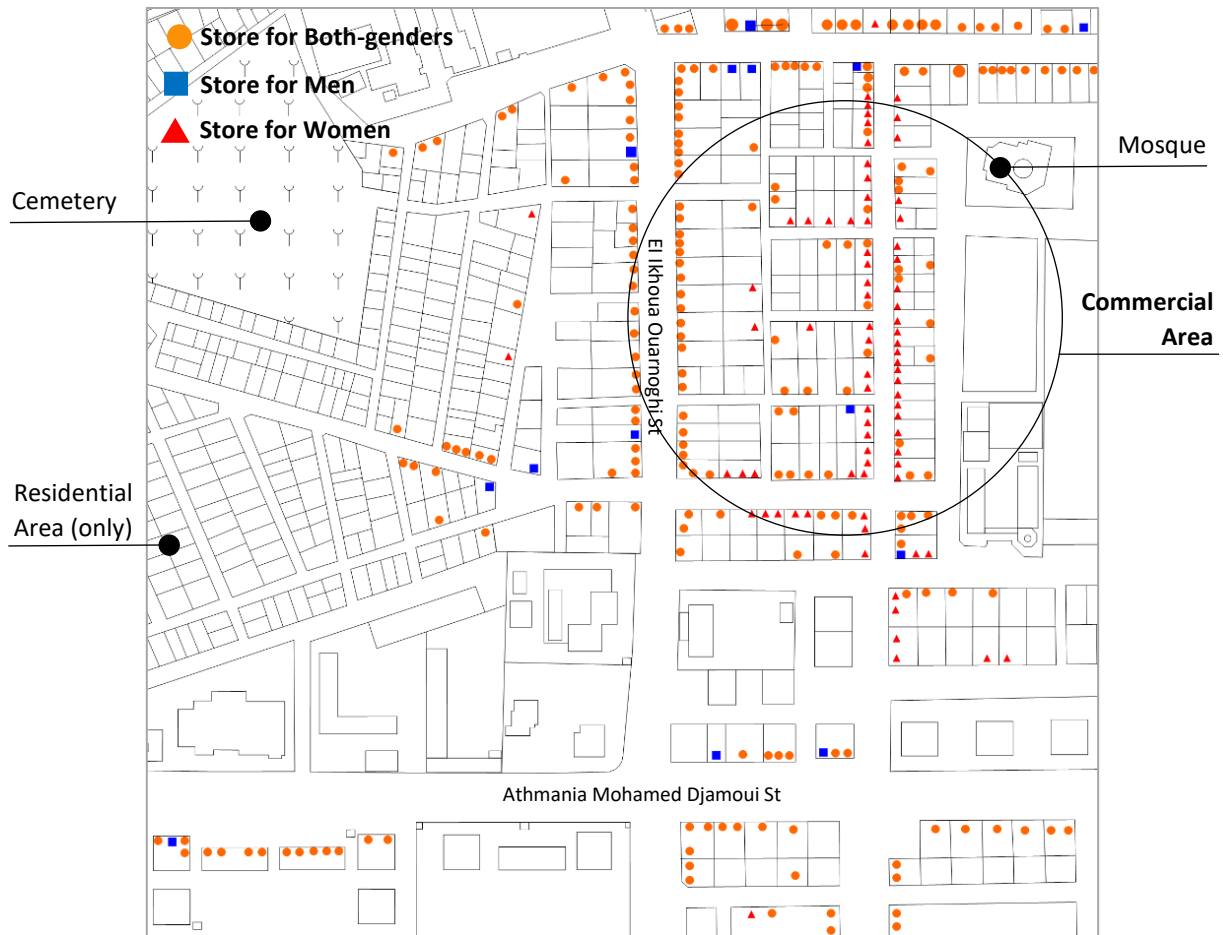
**Figure VI.1.** The distribution of commercial activities by gender in the city centre of Biskra.

**Source:** Author.

As it notable in (Figure VI.1.), the men's stores are clustering in both commercial centres; the ancient and the popular one, whereas women's stores are distributed in the irregular fabric only, for the both-genders stores they are distributed everywhere and more precisely in the main streets of Emir Abdelkader and Zaatcha. Moreover, it is easy to spot the segregation between commercial activities in the internal routes where each street offers stores for a single gender only.

**Table VI.1.** Number of commercial activities in the city centre of Biskra by gender classification. **Source:** Author.

| Retails and stores | For men | For women | For both genders | total |
|--------------------|---------|-----------|------------------|-------|
| Number             | 247     | 530       | <b>863</b>       | 1640  |
| Percentage         | 15%     | 32%       | <b>53%</b>       | 100%  |



**Figure VI.2.** The distribution of commercial activities by gender in the part of El-Alia.

**Source:** Author.

**Table VI.2.** Number of commercial activities in the part of El-Alia by gender classification.

**Source:** Author.

| Retails and stores | For men | For women | For both genders | total |
|--------------------|---------|-----------|------------------|-------|
| Number             | 14      | 77        | <b>213</b>       | 304   |
| Percentage         | 5%      | 25%       | <b>70%</b>       | 100%  |



Looking into the distribution of commercial activities in the part of El-Alia (Figure VI.2) which is considered as a look-like gridiron fabric, we can easily say that women's stores remain confined along two internal streets while men's and both-genders' stores are scattered everywhere. The most important thing here to notice is that women's stores in El-Alia don't have an issue being in the planned part of the studied area while in the city centre of Biskra the women's stores are limited to the irregular fabric only.

When we look into the numbers of the stores in both districts (table VI.1 and VI.2), men's stores have the lowest percentage among the 3 categories coming after women and then both-genders stores.

### **VI.1.2. Movement observation**

The second part of the qualitative approach has introduced the gate count method which will be used in order to understand the movements behaviour of both men and women. It is important to remind that the movement observation has been performed only in the city centre district (see investigation methodology in the previous chapter). Location of the chosen observation points are shown in figure VI.3.

Looking into the total registered number of men and women (Figure VI.4) during the weekend, the presence of men is slightly higher than women throughout the day, however, the number of women appears to be higher in the morning between 08:00-10:00 (with a rate of 51.01% ) and in the afternoon periods as well, but after that it starts dropping drastically going toward the last period of the day (66.70% men to 33.30% for women). For the week day, the number of men is slightly higher than that of women, mainly in the morning period (57.66% to 42.34%) until afternoon, however, the number of women becomes slightly higher than men within the afternoon period from 12:00 to 18:00. The thing that is worth mentioning here is that women's numbers are always low at the end of both days (18:00-20:00) which is accompanied by the closing hours of retails and commercial activities. Moreover, despite the number of women's stores being bigger than the men's (Table VI.3), men still show a higher density than women in the studied area.

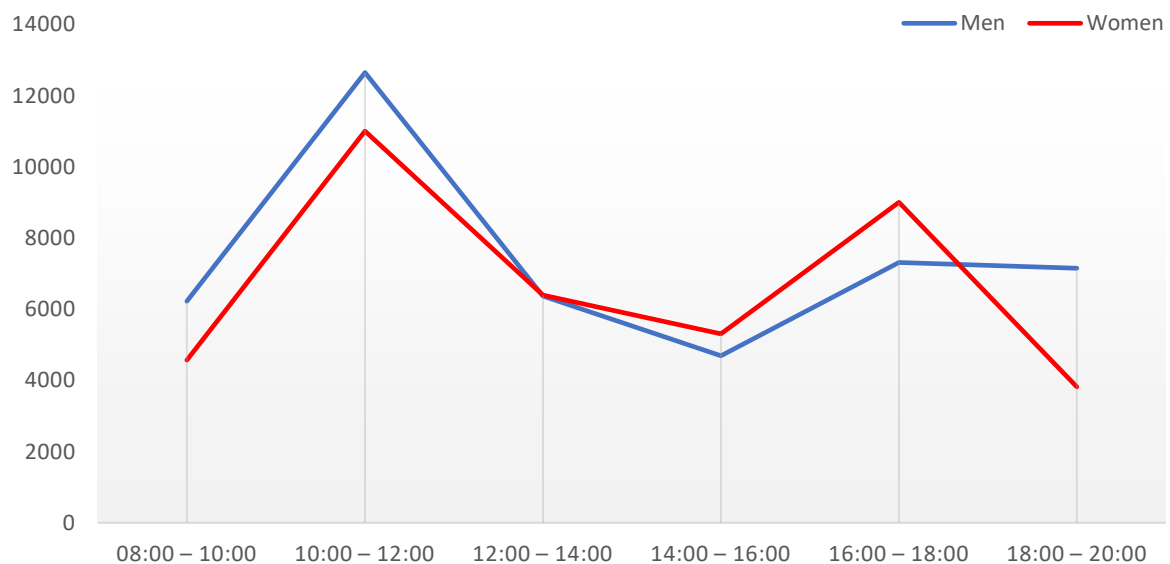
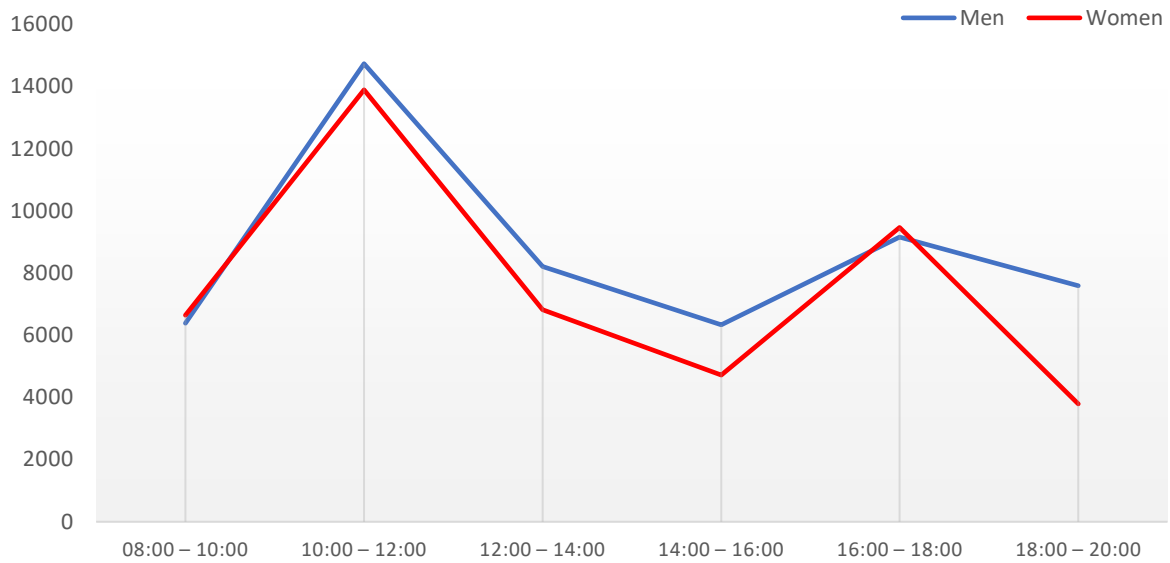


**Figure VI.3.** Location of the chosen observation points in the city centre of Biskra. **Source:** Author.

**Table VI.3.** Statistical data from the pedestrian counts of men and women in both days.

**Source:** Author.

| Gender in %               | 08:00–10:00 | 10:00–12:00 | 12:00–14:00 | 14:00–16:00 | 16:00–18:00 | 18:00–20:00 | Aggregate number |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------|
| <b>Saturday (weekend)</b> |             |             |             |             |             |             | 97753            |
| <b>Men</b>                | 48.99       | 51.46       | 54.63       | 57.32       | 49.15       | 66.70       | 52417            |
| <b>Women</b>              | 51.01       | 48.54       | 45.37       | 42.68       | 50.85       | 33.30       | 45336            |
| <b>Tuesday (weekday)</b>  |             |             |             |             |             |             | 84504            |
| <b>Men</b>                | 57.66       | 53.47       | 49.90       | 46.93       | 44.84       | 65.19       | 44409            |
| <b>Women</b>              | 42.34       | 46.53       | 50.10       | 53.07       | 55.16       | 34.81       | 40095            |



**Figure VI.4.** Total number of men and women registered in the observation gates throughout six periods of a weekend day (Saturday) (top) and a weekday (Tuesday) (bottom). **Source:** Author.

The next step is for analysing the movement differentiation between men and women at each observed gate separately, for this purpose six maps have been prepared (Figure VI.5, VI.6) to see how the movement pattern is generated in the studied area respectively throughout the six periods for the weekday and the weekend day.

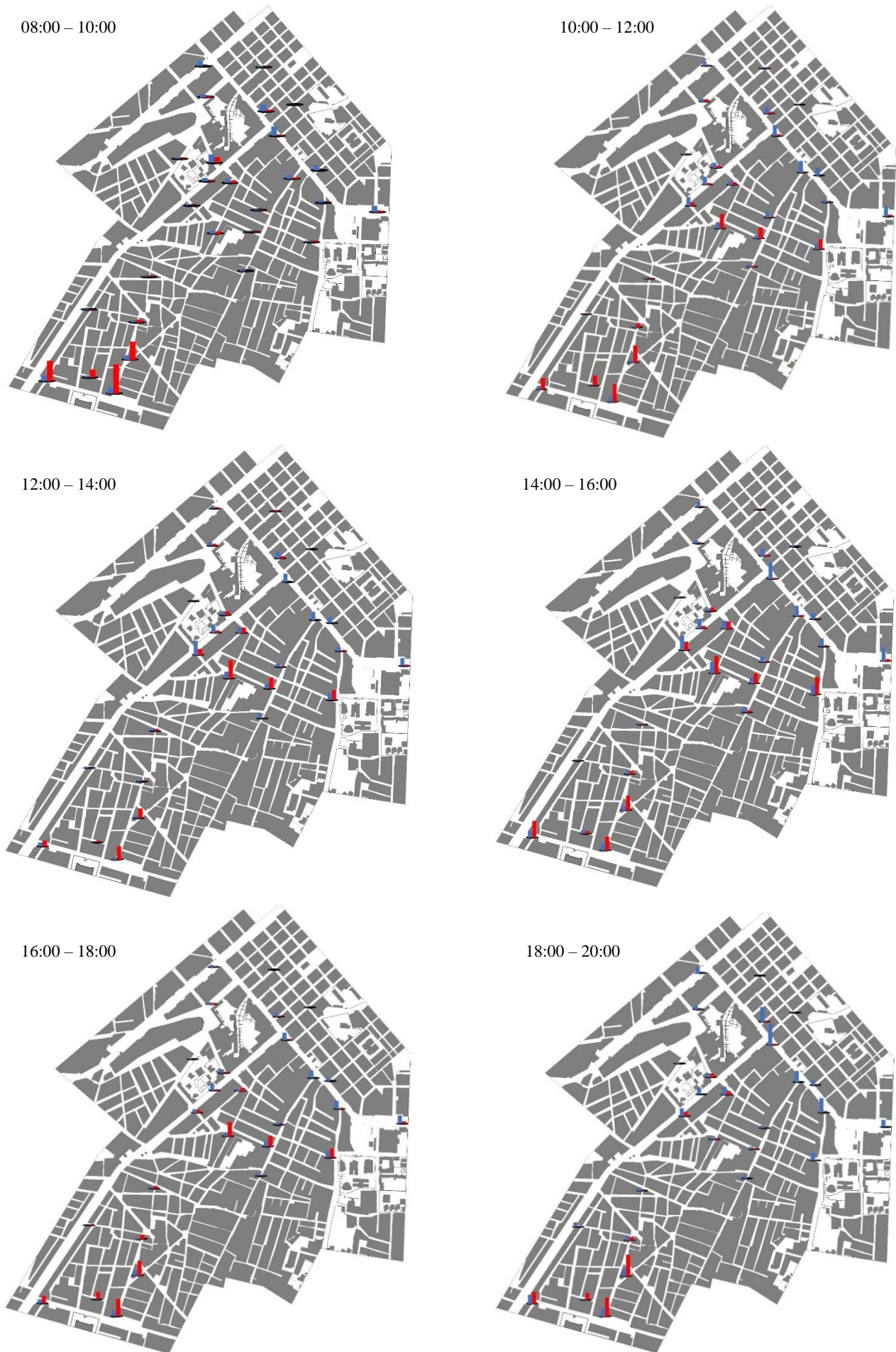


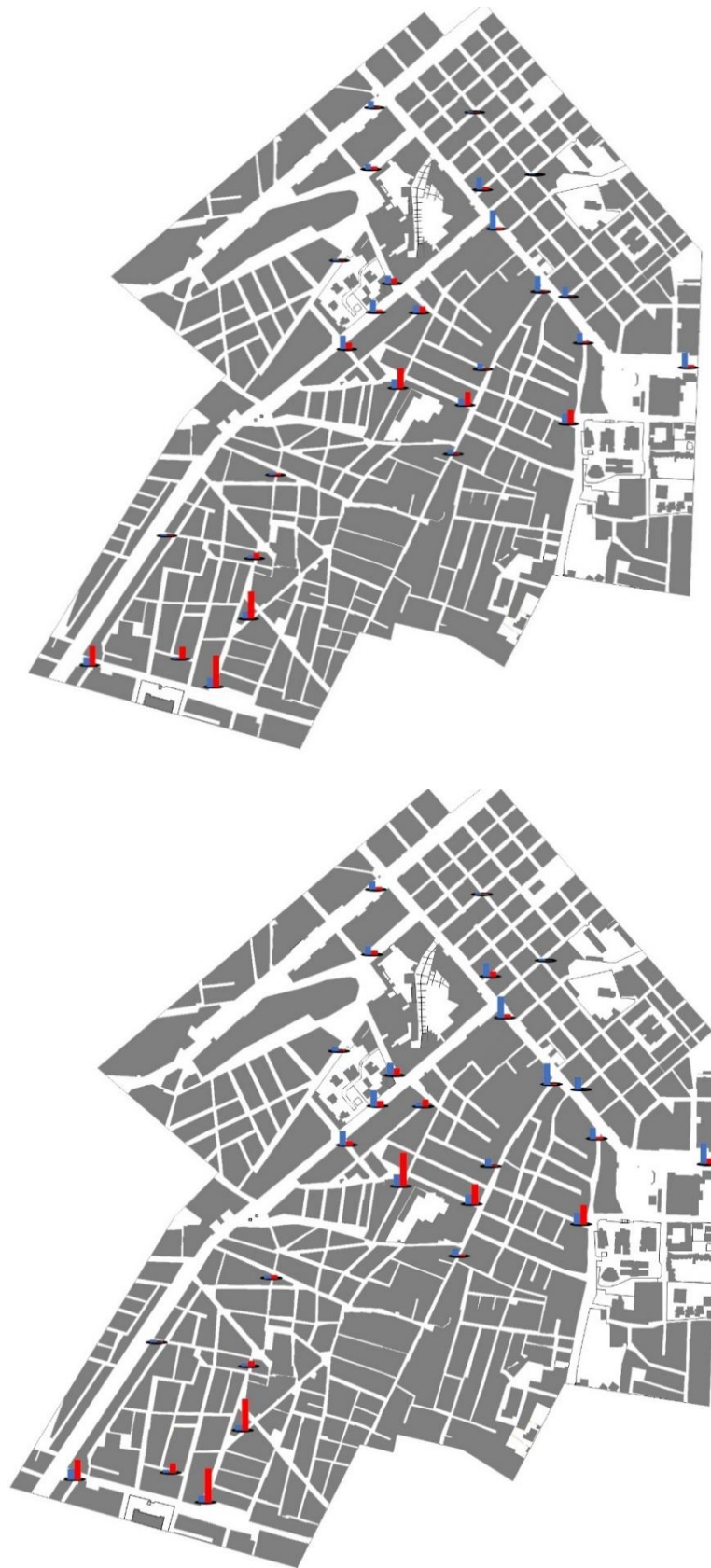



Figure VI.5. Number of men and women counted at each observation gate at different periods of a weekend day (men  women).



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**Figure VI.6.** Number of men and women counted at each observation gate at different periods of a weekday (men  women).



**Figure VI.7.** The aggregate number of men and women counted at each observation gate in the weekend day (top) and weekday (bottom) (men  women). **Source:** Author.

The things we can notice from the registered numbers in the observation gates are first, men are dispersed in the whole studied area, inside or outside of commercial centres, in the other hand women tend to wander mostly closer to the popular commercial centre at the irregular fabric. In the weekend as well as the weekday, the most consistent density for men appeared to be on the main streets of the studied area (Emir Abdelkader and Zaatcha). Although women have less density than the men in the city centre in general, they still show a drastic density along the internal routes of the local commercial centres that provide their needs only as (Zgag Beramdane and El-Boukheri). At the last periods of the day and even when all the densities go low in the whole area, we can still see a reasonable amount of women's density along the streets with commercial activities, while the streets of Emir Abdelkader and Zaatcha become dominated by men as they're showing even a higher density as in the afternoon period. The only difference between the exanimated days is that the weekend day had a slow start in the period of (08:00-10:00) compared with the weekday.

## **VI.2. SYNTACTIC ANALYSIS**

### **VI.2.1. Analysis at the city level**

The syntactic analysis consists of generating the axial map on the city scale, by using Depthmap software, the interpretation is based on two measures: integration and choice.

When we look into the graph of global integration ( $R_n$ ) (Figure VI.8), we can notice that the city centre district is one of the most highlighted areas and therefore it is considered to be integrated at the global scale with an average value of (1.201), even more warmer colours (red) in the axes that represents the main structuring streets of the city (Zaatcha, Hakim Saadane and Emir Abdelkader Boulevards) with values up to (1.490) giving more accessibility to local areas inside the district, furthermore, the colonial quarter showed higher values in the district itself with an average of (1.289), while the irregular fabric showed an average value of (1.069) which could indicate that different settlements structures are affected differently (spontaneous versus planned fabrics). In the other hand, the studied district from El-Alia showed an average level of integration that is considered to be lower than the city centre values (1.007) with more segregated areas going towards the margins of the city.



**Figure VI.8.** The axial map of Biskra city with global Rn (top) and local R3 (bottom) integration. **Source:** Author.



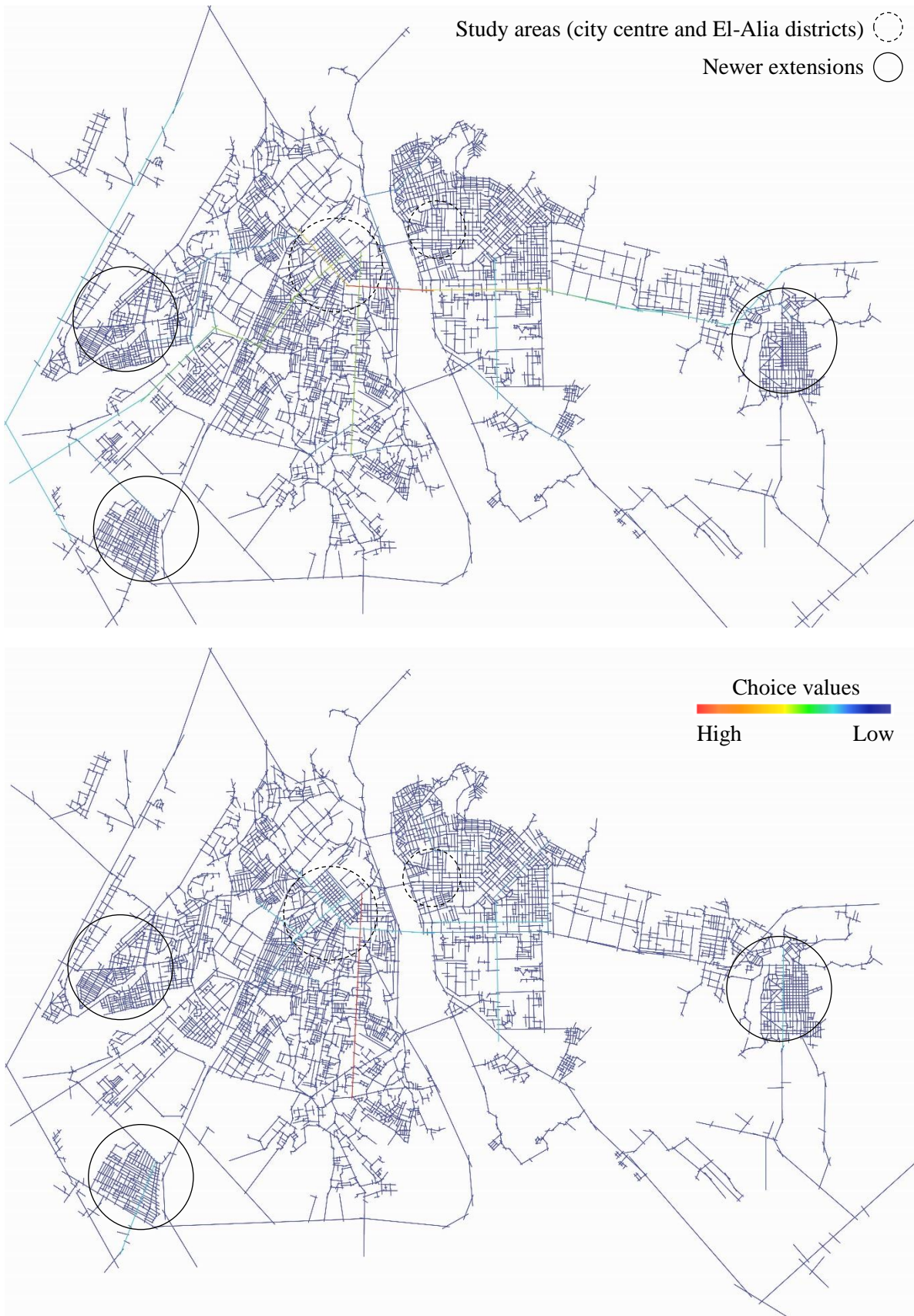
In the local scale (R3) we can say that there is an overall resemblance with the global radius, however local centres seem to have less connexion with the main integrated streets. Another thing worth mentioning here is that new local areas have showed a higher integration values (2.351, 2.445) as they looked segregated from the rest of the city on the global scale's graph (0.823, 0.587), these planned areas (with orthogonal streets composition) are Chetma and Sidi Ghazel districts (newer extensions from the city of Biskra).

**Table VI.4.** Integration and choice values from the axial graphs of Biskra. **Source:** Author.

| <b>Biskra city</b>    | <b>Minimum</b> | <b>Average</b> | <b>Maximum</b> |
|-----------------------|----------------|----------------|----------------|
| <b>Integration Rn</b> | 0.405          | 0.861          | 1.490          |
| <b>Integration R3</b> | 0.333          | 1.882          | 4.424          |
| <b>Choice Rn</b>      | 0              | 43024.6        | 6.65716e+006   |
| <b>Choice R3</b>      | 0              | 785545         | 15938          |

The analysis conducted on the same axial map was to obtain choice graphs on the same scales as well (Rn, R3). Looking into the global choice graph (Figure VI.9), the main streets of (Zaatcha, Hakim Saadane and Emir Abdelkader Boulevards) seems to be highlighted, evidence of cars usage in these roads by non-locals to traverse through the city as it considered to be the shortest path. Moreover, we can see the commercial centres next to the main highlighted streets look segregated compared to them.

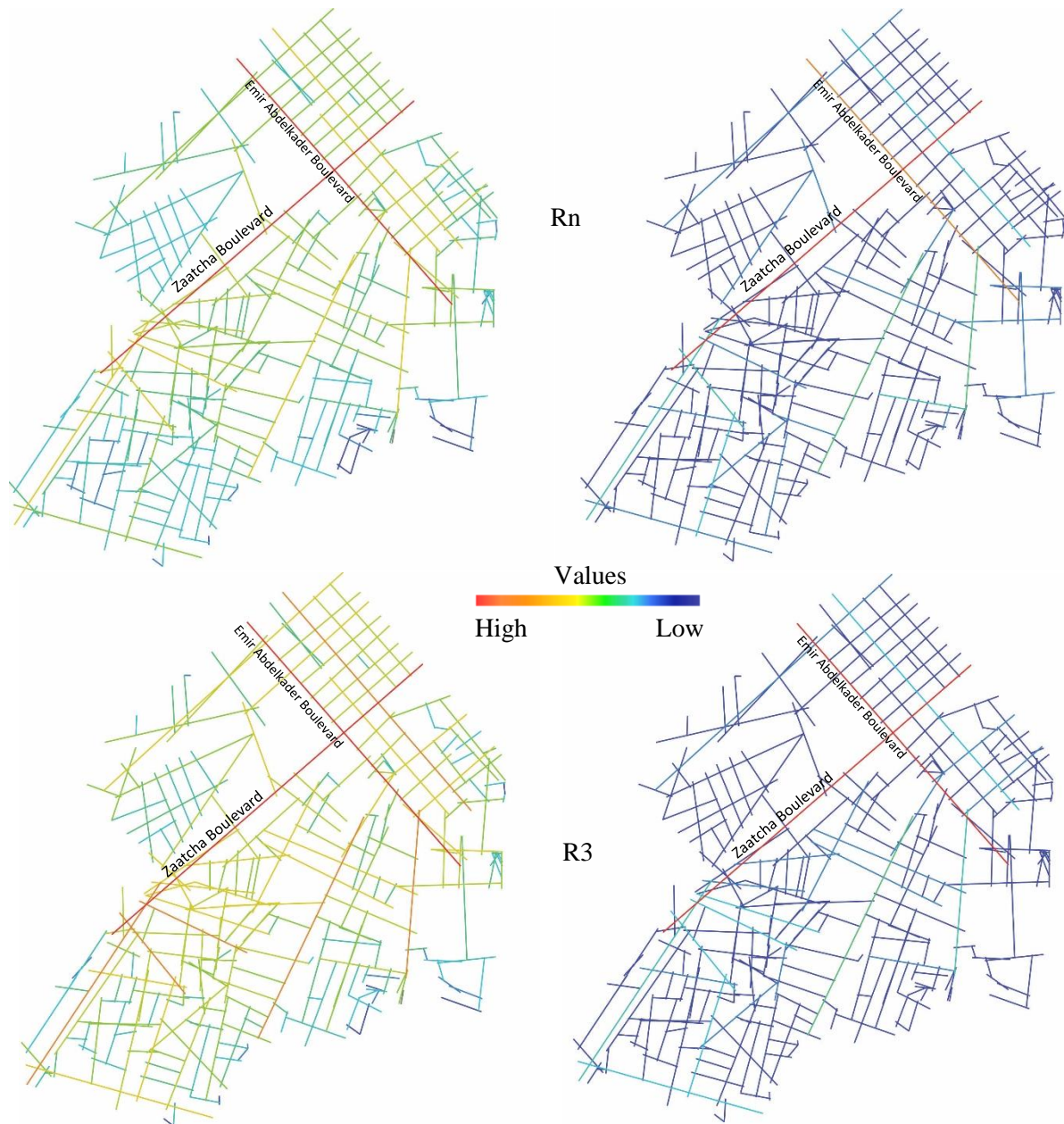
In the local scale (R3), Hakim Saadane Boulevards looked as the more traversed street in the area, besides that there is not much difference from the global scale as there is no local centres highlighted inside the city centre or anywhere else.



**Figure VI.9.** The axial map of Biskra city with global  $R_n$  (top) and local  $R_3$  (bottom) choice.  
**Source:** Author.

**VI.2.2. Analysis at a district level**

**VI.2.2.1. City centre**



**Figure VI.10.** The axial maps of the city centre with both local and global radii of integration (left) and choice (right). **Source:** Author.

**Table VI.5.** Syntactic values from the axial maps of the city centre. **Source:** Author.

| City centre    | Minimum | Average | Maximum |
|----------------|---------|---------|---------|
| Integration Rn | 0.764   | 1.530   | 2.722   |
| Integration R3 | 0.689   | 2.139   | 3.624   |
| Choice Rn      | 0       | 903.064 | 21412   |
| Choice R3      | 0       | 92.544  | 2154    |

As it appears from the integration axial maps, at the district level, both commercial centres (Zgag Beramdane and the part from the colonial sector) are connected with the most integrated streets (in red) which as mentioned earlier are the main streets in the city centre (Emir Abdelkader Boulevard and Zaatcha Boulevard) with values ranging from (2.337-3.337). Relatively, both main streets are considered as good locations for commercial activities since they are the most accessible/attractive axes in the system (movement economies), these main streets offer an optimal location for sellers to take profit from locals as well as through travellers. Simultaneously, the inner routes in El-Boukheri are considered to be segregated reaching a value of 0.689 (Table VI.5), despite that, they show a better connection with the main streets at the local scale ( $R=3$ ). In the other hand both commercial centres appear to have higher values of integration and fairly a good connection with main streets, as they seem to be adjacent to them. In the choice axial maps, we can see in both scales that main streets are the only axes highlighted in the city centre while the internal streets looked segregated. Interestingly enough, when we tried analysing the city centre by using the metrical segment analyses at a global choice radius, we noticed a highlighted path that traverses the irregular fabric area (Figure VI.11), in fact, this route is highly used by locals to travel from Zgag Beramdane to El-Boukheri.

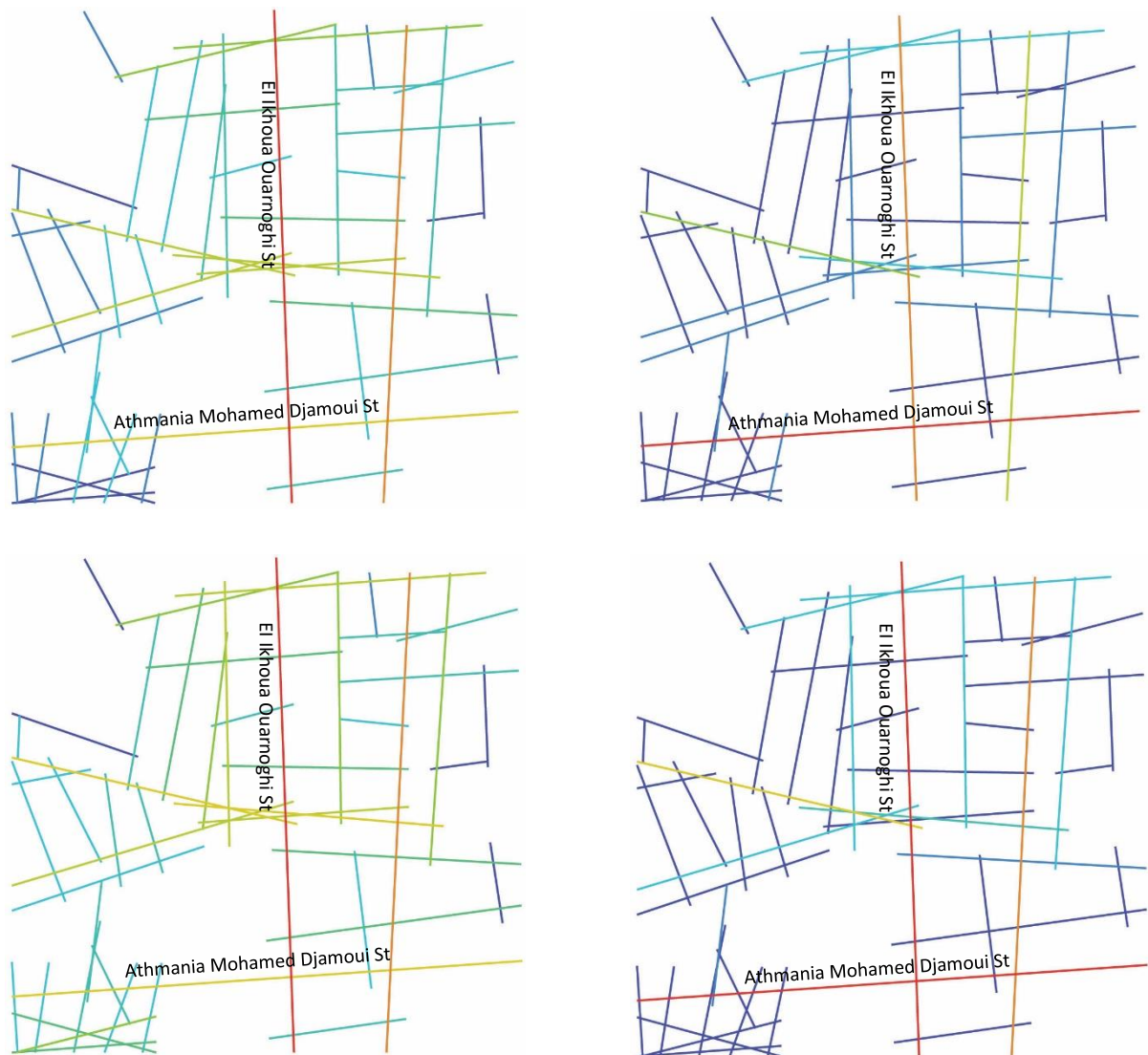


**Figure VI.11.** The metrical segment map of the city centre with the global radius  $R_n$ .

**Source:** Author.

### VI.2.2.2. *El-Alia district*

The analyses on El-Alia district has been conducted with the same parameters as the city centre's graphs. The first thing we can notice from the integration graphs is the highlighted axis in the centre of the area with a value up to (2.228), this is a street that gathers several public facilities such us (post office, hospital...) as well as a lot of commercial activities for mixed-gender use, in-between streets however looked segregated as they usually represent the residential areas. Furthermore, the choice axial graphs showed to somewhat a resemblance with the same integrated streets with more segregated ones overall, also, the street of Athmania Mohamed Djamoui (that comes from the other part of the city) showed even higher values, which lead us to the assumption that this street is traversed more than any other on in the area.



**Figure VI.12.** The axial maps of El-Alia district with both local and global radii of integration (left) and choice (right). **Source:** Author.

**Table VI.6.** Syntactic values from the axial maps of El-Alia district. **Source:** Author.

| El-Alia               | Minimum | Average | Maximum |
|-----------------------|---------|---------|---------|
| <b>Integration Rn</b> | 1.119   | 1.779   | 3.240   |
| <b>Integration R3</b> | 1.218   | 2.074   | 3.359   |
| <b>Choice Rn</b>      | 0       | 91.061  | 740     |
| <b>Choice R3</b>      | 0       | 44      | 311     |

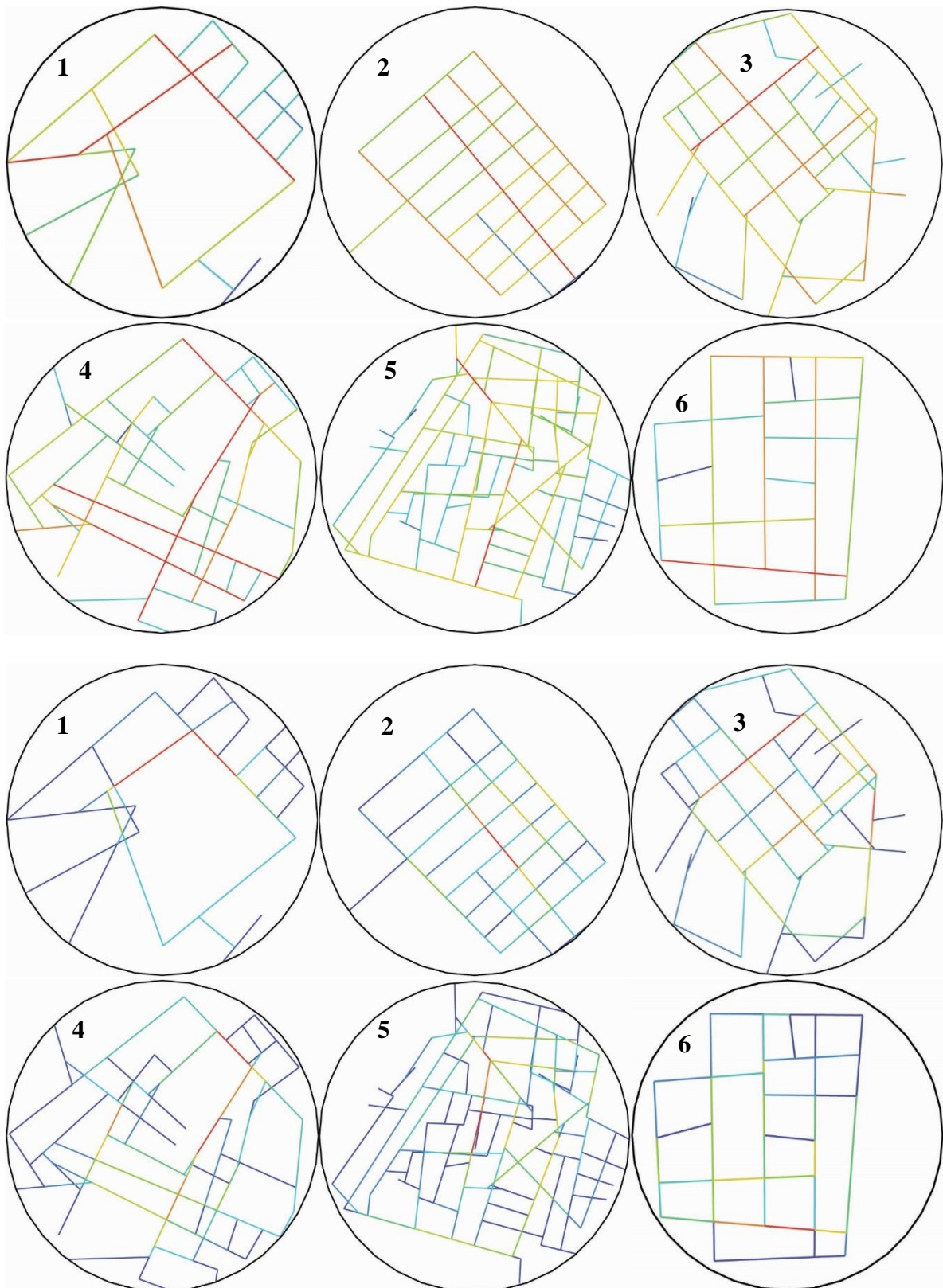
### VI.2.3. Analysis at the local (neighbourhood) level

In this part, the chosen local areas will be analysed through angular segment graphs and by using a global metric radius with both integration and choice parameters, again it is important to remind that these areas are zoned within around a 200 meters radius.

Looking into the first area (El-Dalaa), the integrated segments are representing the streets that lead to El-Dalaa plaza while the segregated ones represents the streets that are dedicated for residential purposes only. Relatively, the choice graph gives some resemblance when it comes to the segregated streets, however, only two segments seemed integrated, one from the main street of Emir Abdelkader and the other one that leads to the plaza, indicating that these spaces are probably the most used by pedestrians.

In the residential part from the colonial sector (area n° 2) we can notice that the most integrated street is in the middle of the area (55.029) rather than being Emir Abdelkader boulevard, which found to be the most integrated street at the district level, other segments looked less integrated but only one segment that really seemed to be segregated in this area. In the choice graph, we see more highlighted segments near the centre of the area and more segregated ones when going towards the edges of the area.

The other part of from the colonial sector (which contains the important ancient commercial centre, area n° 3) looked similar on integration values with the rest of the colonial sector, however, this time the centre of the area (Covered market) looked less integrated in comparison with the rest of segments in the area. Moreover, in both integration and choice graphs, El-Houria plaza showed a lower level of connexion than expected with the rest of area as it is considered to be a popular public space.



**Figure VI.13.** Graphs of the global angular integration (top) and choice (bottom) for the chosen local areas with a metric radius, area n° 1 (El-Dalaa), area n° 2 (the residential part from colonial sector), area n° 3 (the ancient commercial centre from the colonial sector), area n° 4 (Zgag Beramdane), area n° 5 (El-Boukheri), area n° 6 (Soug El-Aasr). **Source:** Author.

In Zgag Beramdane (area n° 4), we see more integrated streets going towards the centre of the area while the more turns we take inside it, the more streets become more segregated, however, only a couple of segments from the main streets show a higher level of integration and they are connected with the internal integrated streets as well.

El-boukheri (area n° 5) exhibits to somewhat random values dispersed in the whole area, the only thing we can mostly notice is that segment with average values are sometimes in the main street of Zaatcha and other times are in the internal streets, however, as in the previous area (Zgag Beramdane), when we go more deeper inside the area we see more segregated streets that are used mostly for residence.

Analysing the area n° 6 (souq El-Aasr) shows a difference in comparison with the colonial quarter, where the most integrated street is not in the middle of the area but instead in the margin, two other segments looked to have high integration values which happened to be connected to the most integrated segment (Athmania Mohamed Djamoui St). the choice graph however shows different colour representation than the integration graph, where when we go to the north of the area the segments become more segregated.

**Table VI.7.** Angular Integration RN for the local areas. **Source:** Author.

| <b>Angular<br/>Integration RN</b> | <b>Minimum</b> | <b>Average</b> | <b>Maximum</b> |
|-----------------------------------|----------------|----------------|----------------|
| Area N°1                          | 13.134         | 24.898         | 32.383         |
| Area N°2                          | 33.268         | 48.503         | 55.23          |
| Area N°3                          | 30.114         | 63.347         | 79.872         |
| Area N°4                          | 39.187         | 64.633         | 79.974         |
| Area N°5                          | 63.813         | 124.313        | 174.166        |
| Area N°6                          | 20.739         | 30.478         | 36.602         |

**Table VI.8.** Angular Choice RN for the local areas. **Source:** Author.

| <b>Angular Choice<br/>RN</b> | <b>Minimum</b> | <b>Average</b> | <b>Maximum</b> |
|------------------------------|----------------|----------------|----------------|
| Area N°1                     | 0              | 93.229         | 453            |
| Area N°2                     | 0              | 106.794        | 321            |
| Area N°3                     | 0              | 417.306        | 1172           |
| Area N°4                     | 0              | 497.85         | 2021           |
| Area N°5                     | 0              | 1924.49        | 7829           |
| Area N°6                     | 3              | 56.957         | 174            |



### VI.3. CORRELATION AND INTERPRETATION

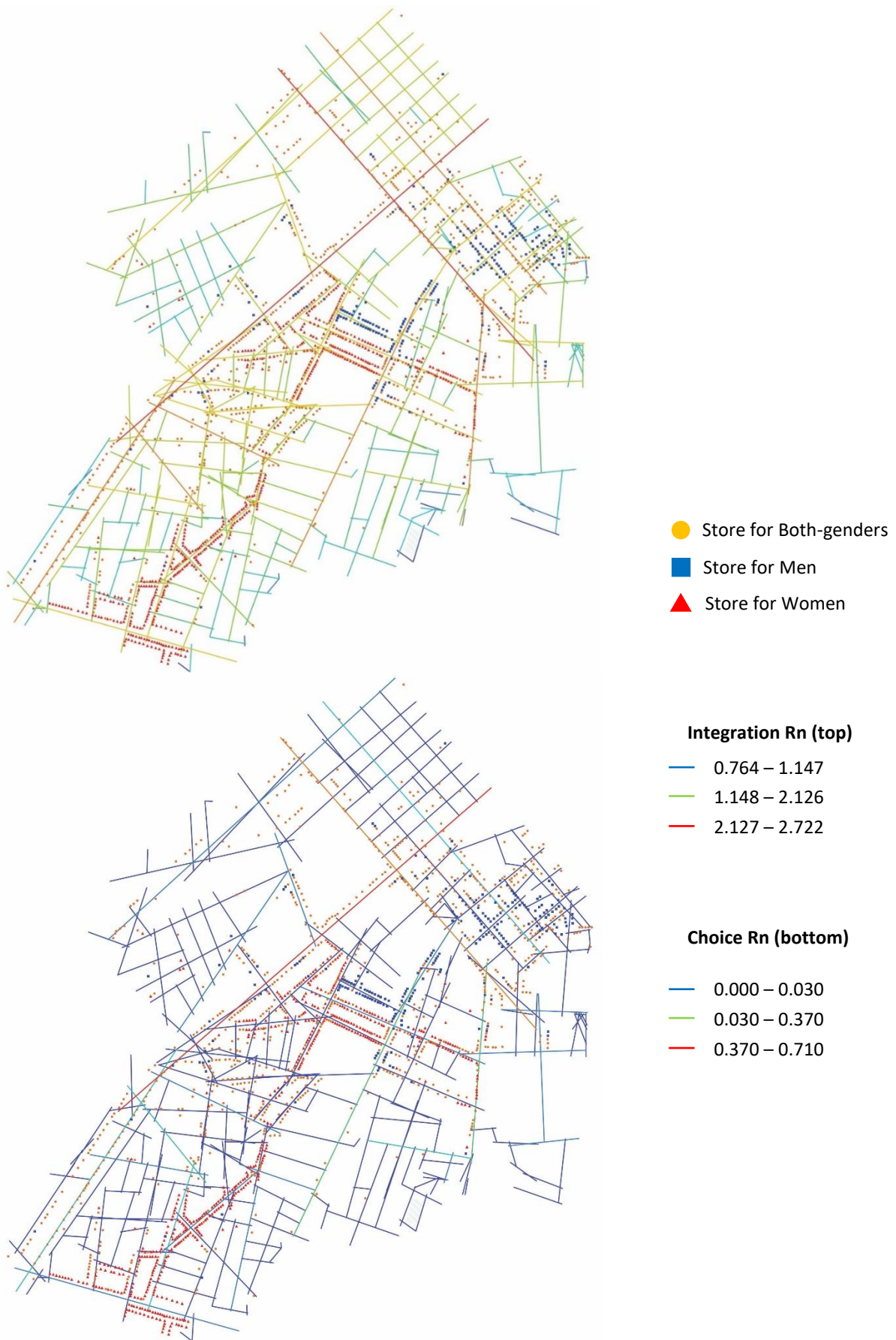
#### VI.3.1. Spatial configuration - Land use

In order to study the relation between the spatial configuration and the land use of the studied areas, syntactic parameters were correlated with the distribution of commercial activities.

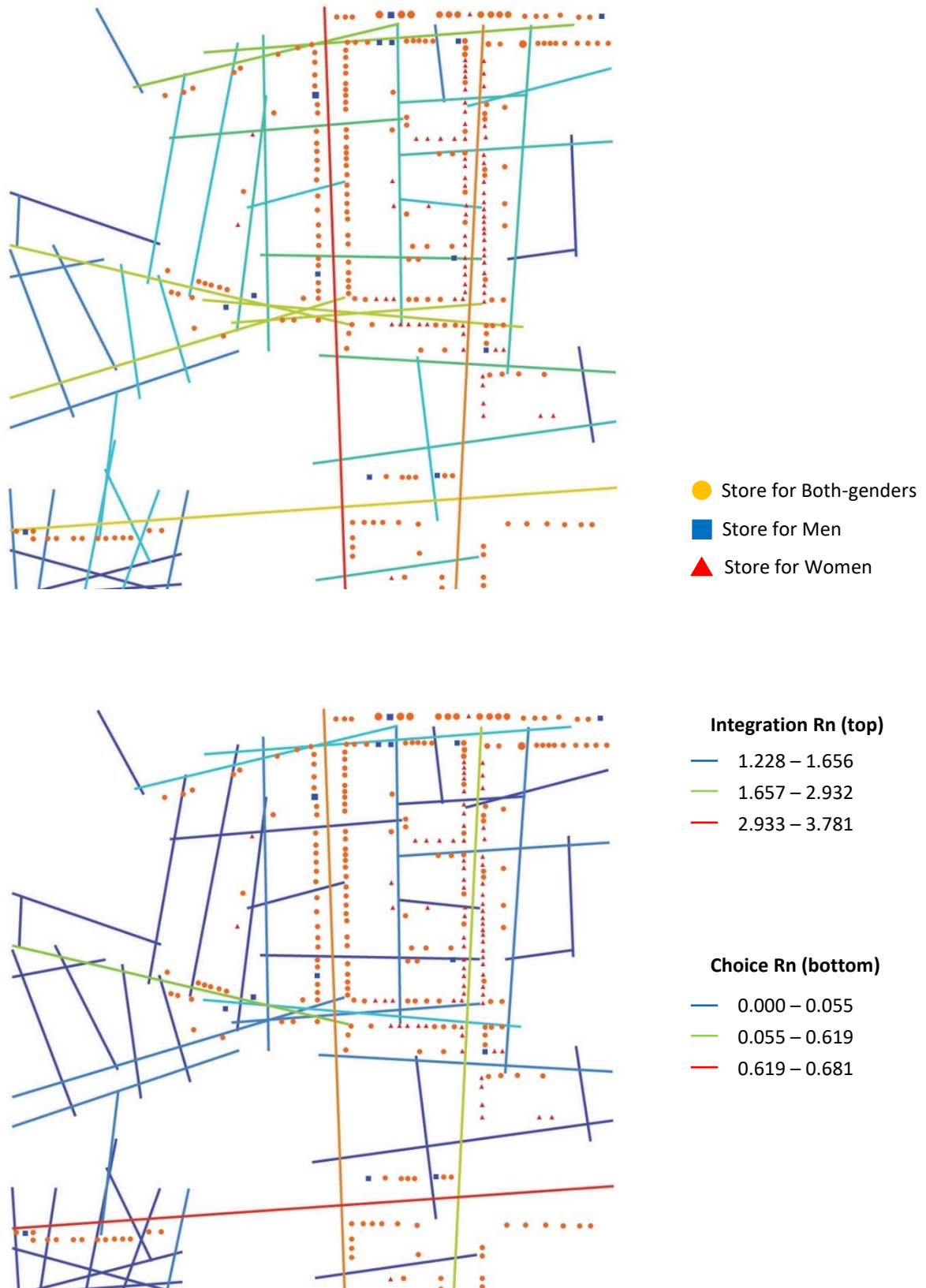
In the integration graph of the city centre (Figure VI.14), it is noteworthy that the clustering of commercial activities for a specific gender does not spread along the streets with high integration nor streets with low integration values, instead, they spread on the streets with medium values, leaving the integrated streets and the closer plots for retails that offer needs for both genders (mixed-land use streets), while the segregated streets remain significantly for residential purposes, with the existence of some retails for men in the high integrated streets. Correlating this distribution with the choice graph (Figure VI.14), shows how the most used streets by moving strangers (which are the integrated streets) are mostly stores for both genders only while the segregated axes gather different type of stores.

Looking at the axial maps of Al-Alia (Figure VI.15) we can see most of the commercial activities for all categories clustering around the high integrated streets, moreover, women's stores are gathered in a single street (with average values) while men's stores tend to scatter in the whole area, segregated streets in the other hand are almost without any type of stores. When we compare the orthogonal urban layout in both of the colonial fabric as well as the new planned area in El-Alia, one might notice the incompatibility between values (integration, choice) and the presence of retails activities, where in one part there are men's stores in the high-integrated streets, and in another one, there is a lower number of mixed stores in the streets with same values.

All in all, most of the stores were supposed to be clustered heavily around higher-accessibly streets, however, that was not the case in the studied areas, as we saw more volume in streets with less integrated values (mostly in commercial centres), moreover, the gender segregation between stores was confided inside the commercial centres as well (average syntactic values) with no logic in their separation, however, the goal of this part was to understand the logic behind the segregation between men and women, and as it is notable from the correlation between stores and syntactic graphs alone, there is no correlation between values and the streets of both genders.



**Figure VI.14.** Axial map of the city centre overlapped with the distribution of commercial activities.



**Figure VI.15.** Axial map of El-Alia overlapped with the distribution of commercial activities. **Source:** Author.

To understand whether the location of separated shops in different urban fabrics are relevant to the spatial configuration, the next part of this section will consist on a comparative correlation between the most important commercial centres in planned and informal urban environments at a local scale where there is a high clustering of stores; El-Boukheri, Zgag Beramdane (as ancient centres), and Soug El-Aasr (as a newly developed centre), for this purpose, normalised angular graphs overlapped with the distribution of commercial areas will be used (Figure VI.16). Same as before, warm colours indicate streets with high values while the cold colours indicate the segregated ones.

**Table VI.9.** Values of the Normalised angular integration and choice of the local chosen areas.  
**Source:** Author.

| Syntactic parameters | Minimum               | Average | Maximum |
|----------------------|-----------------------|---------|---------|
|                      | <b>Zgag Beramdane</b> |         |         |
| NAIN                 | 0.809                 | 1.330   | 1.642   |
| NACH                 | 0                     | 0.957   | 1.428   |
| <b>El-Boukheri</b>   |                       |         |         |
| NAIN                 | 0.702                 | 1.365   | 1.911   |
| NACH                 | 0                     | 1.03    | 1.460   |
| <b>Soug El-Aasr</b>  |                       |         |         |
| NAIN                 | 0.935                 | 1.362   | 1.628   |
| NACH                 | 0.327                 | 0.860   | 1.243   |

The first thing to notice from (Table VI.9) is that these three areas have very close values despite their urban structure, however, in informal areas we can see that the clustering of stores are around the streets with higher syntactic values whereas the very segregated streets seem to be deserted from commercial activities (strictly residential), it shows that they are distributed positively in correlation with the to-movement segments more than that of through movement ones, NACH in both informal areas shows how good they are both connected with main streets indicating the degree of potentials contact between local dwellers and though travellers. Unlike unplanned areas, in Soug El-Aasr, we see stores scattered in the whole area, as it is sometimes located in the integrated segments and other times on segregated ones. however, we can notice how women stores are clustered in a single street same as in the unplanned areas, this clustering appears to be in a stacked way, as it follows routes with a minimum angular deviation.



**Figure VI.16.** Normalised angular global integration (left) and choice (right) for the local chosen areas overlapped with the distribution of commercial activities. **Source:** Author.

### VI.3.2. Movement - Spatial configuration

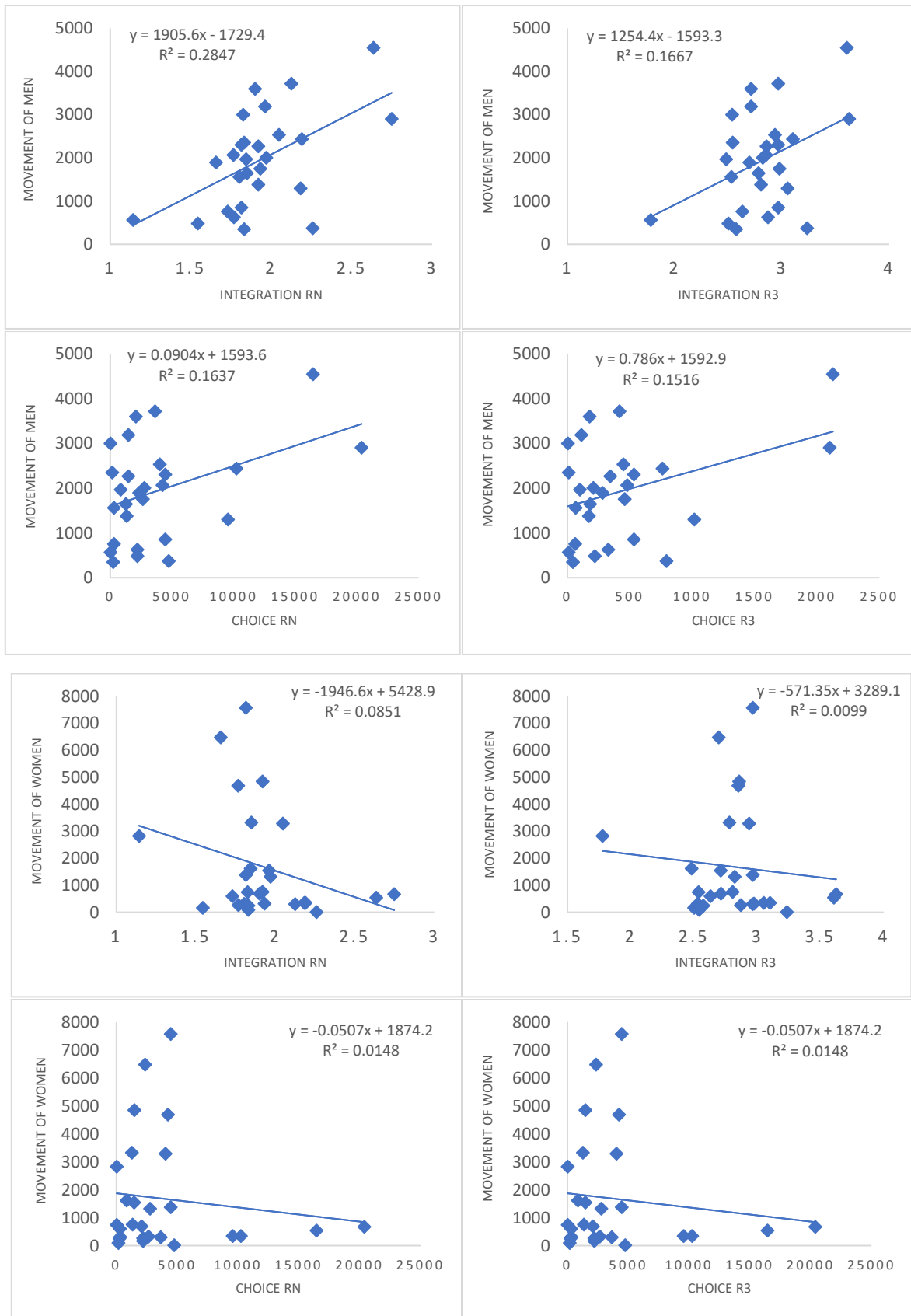
Assuming that spatial configuration can affect the movement pattern, the theory of ‘natural movement’ will be tested by correlating the movement behaviour of pedestrians (both genders) with the axial map of the city centre by using integration as well as choice attributes.

The results from the gate counting investigation show the presence of men throughout the spaces (streets) of the city centre district along the day, this presence is noticeable in either integrated or segregated streets, nevertheless, women tend to gather majorly in great numbers (reach to 40428 women) within and around the two principal commercial centres (Zgag Beraramdane and El Boukhari) which both have respectively lower integration values (RN=1.652) and (R3=2.496) from the rest of the district. Streets with high integration values (2.680-3.608) such as (Emir Abdelkader and Zaatcha Boulevards) are mostly used by men where their numbers (52417 in the weekend day and 44409 in the weekday) appear to be higher in the weekend day. Even though the movement volume of women is lower than those of men in the city centre in general, the presence of women numbers is recorded with high density along the ‘interior’ routes of the two commercial centres (Zgag Beramdane and El Boukheri). At the local scale (R3), streets along Zgag Beramdane and El Boukheri become more integrated than in the global scale (RN), which could demonstrate that these streets are more known and used by local dwellers rather than outsiders as a familiar space. Another thing worth mentioning is that women are rarely accompanied by their husbands or male relatives only for some reasons that are related to the sensation of safety in segregated streets.

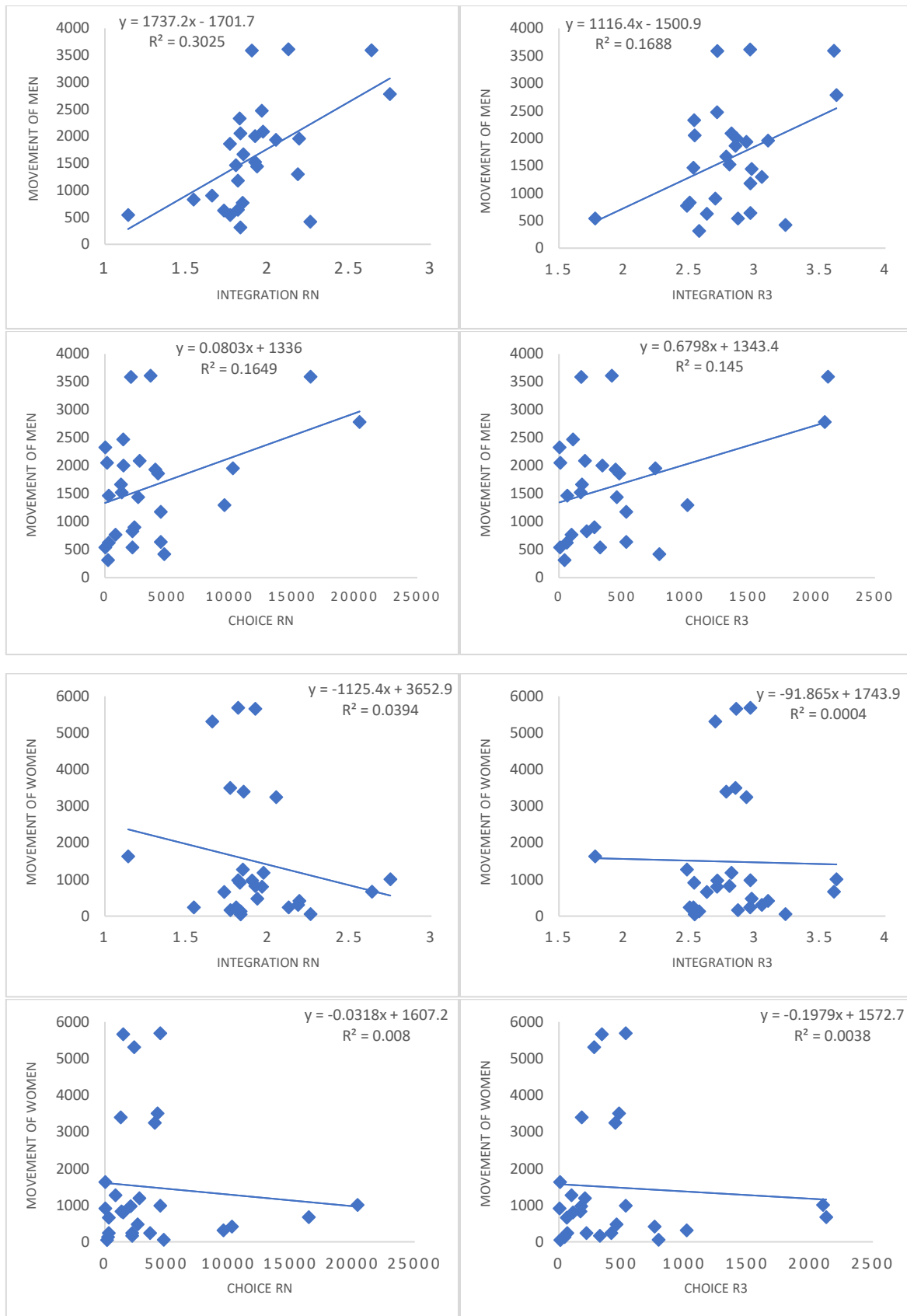
In order to interpret the collected data in a more precise way, the movement pattern (the sum numbers of the six time periods from a week day as well as a weekend day) of both men and women were linked with local and global syntactic parameters (integration and choice) through a scatter plot to analyse the correlation coefficient by using Excel software (Figure VI.17 and VI.18).

**Table VI.10.** Correlation coefficient of the movement pattern for both genders and the used syntactic parameters in the city centre of Biskra. **Source:** Author.

| Movement pattern/Syntactic parameters | Pearson's R |        |         |        |
|---------------------------------------|-------------|--------|---------|--------|
|                                       | Weekend Day |        | Weekday |        |
|                                       | Men         | Women  | Men     | Women  |
| <b>Integration RN</b>                 | 0.533       | -0.291 | 0.550   | -0.198 |
| <b>Integration R3</b>                 | 0.408       | -0.099 | 0.411   | -0.019 |
| <b>Choice RN</b>                      | 0.404       | -0.121 | 0.406   | -0.089 |
| <b>Choice R3</b>                      | 0.389       | -0.102 | 0.381   | -0.062 |



**Figure VI.17.** The relationship between the registered movement of men and women (27 observation gates) and both global and local syntactic attributes in the city centre of Biskra during the weekend day. **Source:** Author.



**Figure VI.18.** The relationship between the registered movement of men and women (27 observation gates) and both global and local syntactic attributes in the city centre of Biskra during the weekday. **Source:** Author.



Plotting the movement volume of men and women against the syntactic attributes shows how the coefficient of determination was relatively weak (almost no correlation with women) in both studied days, however, we can clearly see that men had a slight better correlation than women especially with the global integration graph with a value of ( $R^2=0.30$ ) on a weekday, this indicates two things, first, men's movement is more globalised, and secondly, spatial configuration even with a weak rate of correlation, has more effect on men than that of women as they showed R square values closer to 0 which indicates no correlations whatsoever.

### **VI.3.3. Land use – Movement**

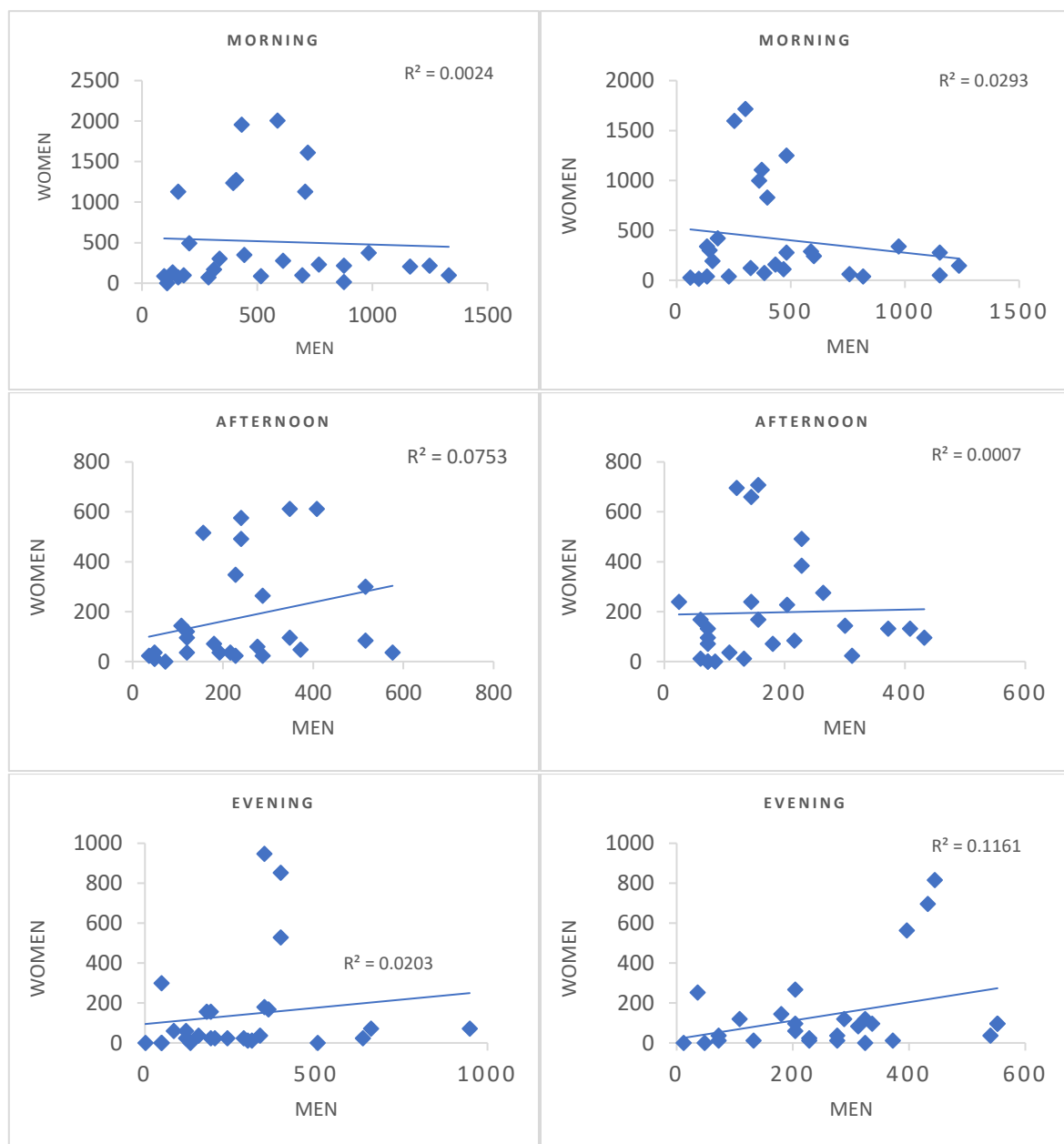
In the previous part of correlations between the gathered data, we saw how the movement pattern of both men and women generally wasn't affected by syntactic attributes, which lead us to the assumption that these volumes of pedestrians are affected further by other factors, therefore, in this part, we will try to link the registered movement with the distribution of commercial activities in the city centre of Biskra.

Explaining graphs of the total number registered in both days (Figures VI.4) is actually logic when we correlate these numbers with the opening hours of the commercial activities at (08:00 - 10:00) and the break period at (12:00 - 14:00), however, when we look into the registered numbers in each gate (Figure VI.5 and VI.6), most specifically at (18:00 - 20:00) which is usually the period when stores start closing, streets became as paths instead of a destination which explain the low remaining density of women along the interior streets of Zgag Beramdane and El Boukheri toward the end of the day, men in the other hand don't have a problem strolling in the whole area and in the streets without commercial activities that concern them even at late hours of the day, which tells us that they don't need a proper excuse to do that unlike women who are guided by the existence of commerce. Moreover, we can notice that streets with no attractions tend to have less people using it, i.e. low movement rate even though having the same integration values as to other highly used and crowded streets.

All in all, commerce services appear to be an important factor and an influencing feature in the distribution of pedestrian movements in the studied area for the most volume of women as they tend to wander closer or only in the streets that provide their activities, and even for a slight number of men.

### VI.3.4. Men - women

The next piece of correlation is the relationship that exists between men and women's movement pattern in each observation point from the city centre, the goal in this section is to understand how likely both genders would encounter or avoid each other in a same space. Likewise, in this part the movement pattern of both genders was plotted against each other (Figure VI.19) to study the coefficient of determination in three periods of the weekday as well as the weekend day; morning (10:00-12:00), afternoon (14:00-16:00), and evening (18:00-20:00).



**Figure VI.19.** The relationship of the registered movement between men and women (27 observation gates) during the weekend day (left) and the week day (right). **Source:** Author.

Looking at figure VI.19 shows no correlation between the number of men and women throughout both days, as the coefficients of determination are relatively the same low value in the three periods of the day, however, it is clear how the streets of this urban space are dominated by men especially in the main streets as we saw in previous parts, and this dominance becomes even higher in the evenings. The plots that are closer to the trendline represents the same streets where volumes of women were accompanied by minor numbers of men, these plots are the observation points taken from the commercial centre in the organic fabric. Generally speaking, streets that lack mixture and natural interfaces between men and women tend to be less dynamic and so it provides less sensation of safety for women.

## **CONCLUSION: DISCUSSION OF RESULTS**

This study has presented an investigation on the segregation that exists between men and women in Biskra city, the main purpose was to understand the phenomenon of segregation in gender spatial use through space syntax theory, and to understand if the syntactic properties of the urban spatial configuration impact or foretell its use, assuming that spatial configuration shapes users movement and the land use's pattern afterwards. The findings show that the city of Biskra is not totally in compliance with space syntax theories related to urban spatial use, where the women/men spatial segregation may be linked to social and cultural aspects instead. In line with the hypotheses, we have introduced several variables to help with the process of interpretation, and several results were found to discuss in each step of the conducted investigation.

Firstly, the theory of movement economy has been tested by studying the relationship between the spatial configuration and the land use's pattern of distribution. It was noticeable that the results seem to not respond to the effects of movement economies theory, where the distribution of commercial activities as a whole was not clustered around the integrated streets. Moreover, when we perceived them from gender categorising point of view, each type of the stores looked random or might followed another method in their organization rather than the hypotheses mentioned earlier in this study. One important thing to mention is that this segregation in the distributions of stores appears when we try to go one step deeper from the integrated axes which indicates that there is some kind of privatisation for those who are headed towards that location, as these stores considered to be mostly clothing stores. Here, we can say that the higher the street is integrated, the more mixed-land use it tends to be, while the separation between

genders activities remains always in the streets with lower syntactic values. By focusing on the local scale results (within the perimeter of each area), the objective was to see whether streets' pattern plays a role on changing the variables of the syntactic values and the distribution of stores. This showed more compliance with the concept of movement economy, where the distribution of commercial activities as a whole was clustered around the integrated streets. This indicates how local areas are more affected and organized by the movement economy theory, more precisely in the spontaneous areas more than that of the planned area. In space syntax theory, it has been pointed out that the clustering of shops and commerce activities that are related to the movement economy theory are not easy to reveal in non-organic areas (with a grid morphology), because the explanation of organic cities morphologies is their 'natural' growth process over time, and how attractions took location based on the need of society, either to facilitate or to deny accessibility to certain areas (Hillier, 2001; Strano et al., 2007; Ortiz-Chao, 2008).

Although there wasn't a similar study that gathered a correlation between syntactic values and land use's distribution (with gender categorising), there are some studies as (Özbil & Peponis, 2007; Fatah Gen Schieck et al, 2008; Lerman & Omer, 2013; Choi & Koch, 2015; Kubat et al, 2014; Monokrousou & Giannopoulou, 2016) that proved how land uses' distribution could be affected by other factors than being a network effect. This finding also relates to the study of Conroy-Dalton (2003) and how people prefer to take straight routes as possible and 'follow their noses' while avoiding turns as they tend to use their prior knowledge of the environment rather than information provided by the urban structure

In the next section, we have integrated the counting of moving pedestrians to verify whether it is affected directly by the physical structure in the studied urban system (natural movement theory), turns out, that there wasn't neither a positive nor a negative correlation between the two variables, however, even with a slight correlation rate, men seemed to be more guided by the spatial configuration than women. Likewise, in a previous study in the city centre of Sharjah, UAE (Güney and Kubat, 2015), when no correlation between the observed movement of men/women and the syntactic values was found, it suggested that the pattern of movement is related to land uses factors (shopping centers, banks...).

Due to the inefficiency of space syntax alone to predict the movement pattern of both genders in particular streets (local level), we have tried to correlate the registered movement with the distribution of stores. Remarkably, women are more guided by the shops provided in the urban

space oppositely to men, this proves how a particular pattern of land use and attraction could attract pedestrians and their choices when wandering in the urban space, even to a very local area neglecting the influence of the syntactic properties, means that they use their prior knowledge of the space they are going rather than the information provided by the structure of space.

Later on, we have conducted a statistical analysis between men and women to study their natural interfaces in a same space which led us to see results even in a clearer way, first, it showed how the city centre of Biskra priorities the movement of men in general, also, some women tend to avoid to use streets that are used mostly by men and to be accompanied than being alone in a segregated space, we can even assume that men are in these areas because of women and if they changed location then there would be even a higher correlation with the syntactic attributes. In another study that had been conducted in Cairo (Mohamed, 2016), it also showed that there was a gender segregation in term of movement, the author later explained how this could lead to a less sensation of safety as the natural interference was considered to be weak between men and women. In a previous space syntax study, it has been seen that when different categories of users are co-aware of their presence in a same urban space, a 'virtual community' is generated with two types of structures depending on the shape of the scatter gram. One structure is called 'multiple interface', its defined when there is a mixture between other users, therefore a better encounter and interaction with each other. The other one is 'L-shaped' scatter plot, it means that only one group of users dominate the space where it can cause many problems in terms of security and the quality of the urban environment (Hillier et al, 1983; Space Syntax Ltd, 2004; Can, 2012).

All in all, men's use of space and movement to somewhat are guided by the spatial configuration while for women, they are much more directed by the location pattern of land uses, such as retail shops. This shows that women unlike men, are limited in their freedom and restricted to the places they daily use. This finding relates to what Beauvoir has declared in her seminal work (1993), where women can't experience the city as men do, and even though they gained more freedom in the modern societies by being able to participate in more activities, they still cannot escape their traditional role as mothers/housewives, as they will stay always as a 'second sex' within their society (Pardo and Echavarren, 2002; Deutsh, 2000).

Space syntax theories come from the belief that cities are mainly shaped by economic forces, i.e. built around attractions and needs of the public, this means that there is a complementary

relationship between the people use of space and the pattern of land use's distribution (natural movement, movement economies). Therefore, the more integrated the street is, the more liveliness it become, the higher gender mixture tend to be (Rueb and Van Nes, 2009), however, looking at the achieved results and how the integrated streets are dominated by men, questions whether cities are shaped in a way that influence genders differently, similarly to the study of (Güney, 2014).

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# GENERAL CONCLUSION

## CONCLUSION

This thesis has presented an extended study in order to respond to the questions raised in the beginning of this work, which was outlined by exploring the factors behind the phenomenon of segregation between genders in their spatial use as well as the shops distribution in the city centre of Biskra. The main purpose was to understand the phenomenon of segregation in gender spatial use through space syntax theory. In pursuance of the established objectives, this thesis has gathered a theoretical background from different fields, however, the focus was more linked to aspects that highlight the hypotheses stated earlier, i.e. revolving around spatial segregation, movement, pattern of land use and space syntax theory, while taking into account other aspects that may enrich and contribute more towards the results of the study or that may serve as guidelines in future designs.

Urban spaces (mainly streets) were regarded as important elements in the city. Despite being the connector between public spaces, they themselves are considered as public spaces for the people, they are a place for movement, gathering, social interaction, and other daily activities like shopping. By exploring the development of their structure and pattern of distribution it showed how they may influence individuals' spatial use in many levels, most importantly through the attractions presented within them. Often commercial uses have contributed positively by being a destination for individuals, not only for shopping but also to enjoy other leisure activities. The other side to this however is that commercial uses (such as malls) also contribute in negative way within the city, they drag people away from city centres, making them more segregated and abandoned from users which could lead to more other issues such as insecurity, fear and vandalism.

This thesis has also explored the factors behind segregation in cities and the uneven density of uses, as some of them were mainly based on cultural differences, hierarchical status or functional and economic role. Part of the phenomenon of gender segregation also goes back the roots of most societies of the world where women were long restricted to their domestic role (in the private space), while men had the full freedom in the city (public space). This was related to the structure of cities and how they were shaped to cater for the needs of men while abandoning women. The topic of urban spatial use, however, is much broader than just the influence of the socio-cultural factors solely, as many other attributes (environmental) play their own role affecting their preference, feeling of safety and attachment to the particular spaces.



When prior knowledge is not accounted in the peoples' spatial use, it then comes to the lived experience and how they perceive their environment in order to use and navigate through it. As an essence of this thesis, movement is deemed to be one of the essential means to perceive the environment. While moving, individuals could cognize, interpret and evaluate their environment to gain and store a mental image, which would help them later on to gain knowledge about the environment and make decision according to that registered information. Given that the visual properties are a strong way to perceive the space, the theory of space syntax also has addressed this topic making it a suitable approach to follow for this study.

Adopting space syntax as an investigation method to this study was logical given the percentage of efficiency it had with several phenomena such as social segregation. Moreover, space syntax by nature associates between movement, visibility and spatial configuration of the urban structure by a variety of analytical tools and parameters that were interpreted through Depthmap software. By integrating this theory alongside the qualitative approaches (surveys and gate counts), the process of investigation was structured into three parts; a syntactic analysis, an In-situ observation and a correlation part.

Although the analyses on the city of Biskra and the results achieved were deeply interpreted in the last chapter of this thesis. However, to sum up, the present study showed two contrasting results (for men and women) that are related to the first and third hypotheses of this study. The first hypothesis, which was intended to prove that the spatial use by men and women would follow the logic of 'natural movement and movement economy' theories showed that men are slightly affected by the natural movement process while for women they were mostly guided by the commercial uses. Therefore, the first hypothesis this study is validated. The second hypothesis was negated as individuals doesn't use segregated streets that don't provide any type of attractions, they are rather streets for residential purposes only. The third hypothesis was also validated due to the fact that moving individuals goes for the places that they already have an idea on it despite being less integrated than the most accessible streets in the city centre to accomplish their daily activities (commercial centres).

All in all, these results have led us to reach our initial determined objectives. Firstly, this study showed that the segregation of spatial use between men and women is subjected to the type and location of commercial activities as well as spatial configuration by comparing their movement pattern. On the other hand, these results also enable us to prepare a set of

recommendations on the people's spatial use that is dependent on the spatial configuration and attractions in the urban space to serve as guideline for future urban planning and design.

## **RECOMMENDATIONS**

The gender segregation in the city is considered as a big problem in the modern period, where urban planning might play a role in ignoring women in public spaces, as they overlook their needs and experience in the city (McDowell, 1983; Pardo and Echavarren, 2002; Garcia-Ramon et al, 2004). Woolf (2008) sees that in the present time there is a possibility for women to escape from the 'second sex' status, where he suggests that the key to the woman spatial freedom is related to her mental freedom, by being able to choose between several things, i.e. choosing where she wants to go or what she wants to do, and take responsibility for it, which is currently happening more and more clearly. Therefore, the role of the urban designers is to look into the women needs as an active member on the society by providing them multiple activities to choose among them.

Throughout different studies it was shown how areas without activities and attractions tend to be unsafe for users, therefore the best advice here is to avoid mono-functional buildings and to provide streets with a variety of activities increasing the liveability of the area, which will tend to permit more mixture and thus more security.

Planning the pattern of streets into more of an integrated system could lead to more accessibility as well as attractivity and mixture however, it would most likely diminish the experience of people in the city with the same repeated type of composition.

The sense of safety and the security of commercial activities keep showing their importance in the spatial use within cities, not only in this topic, but across many domains as well. This therefore, indicates that it is necessary to provide security in space mainly through natural surveillance.

Perhaps women preferring to carry out shopping in less accessible streets might be the most optimal choice for them in terms of privacy or product prices for instance, however, it is hard to affirm this assumption without a more in-depth investigation in these topics.

## **LIMITATIONS OF THE STUDY**

The methodological choices of this study were mainly constrained by the difficulty on collecting data. We have conducted many surveys in the study area to observe the movement of men and women as well as type and location of economic activities. However, we faced many difficulties in carrying out questionnaires and interviews with people mainly due to the non-cooperation of users of that space as well as the cultural aspect of the city where most of women are accompanied by their husbands. This lead us to think about doing these types of survey with store owners instead of moving pedestrians.

The movement observation of individuals was categorized into male and female groups only, more variety in age might play another factor in this study as kids, adults and elderlies don't have similar interests in public spaces, which could lead to more results consisting of the effects of spatial configuration on the movement of individuals.

Classification of stores depending on the precise activity and the products provided for shoppers rather than only products for different genders might also help figuring out what type of products drives people from one place to another. However, it requires more details and longer work periods of time while several stores tend to provide mixed type of products and services rather specialising in one domain.

Many other limitations were also linked to the fact that I have been working on the practical part but I had to stop the field work due the pandemic (Covid-19) that occurred and changed the conditions and circumstances of the work, this could change the data obtained such as the movement pattern of individuals to avoid certain spaces for example.

## **RESEARCH INSIGHTS**

Part of the results obtained in this research work of the case of Biskra certainly are driven by several factors such as the socio-cultural context in separating men and women realms in Arab-Islamic society, as in spatial segregation in houses' layout. Therefore, the results of this work may provide some insight, that may be completed by other works, to urban designers and urban planners on how to handle this kind of segregation on urban scale for a context similar to the one of Biskra, in planning land-use pattern of commercial distribution, and designing street pattern and configuration responsive to gender differences in spatial use and socio-cultural

needs. Before generalizing this finding however, this should be verified by studying other topics. Further research may address:

- Environment perception from the point of view of men as well as women.
- The impact of building heights and shadowing on the movement of both genders.
- An investigation on public transportation and the mobility of genders in the city.
- Movement of genders in relation with crime and feeling of security.
- The correlation between the distribution of commercial uses and real estate values.

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