URBAN RESILIENCE OF THE HISTORICAL BAZAAR AREA IN MEDINA OF TUNIS

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04/ 09 / 2020

Ibtissem LAGHA

ÖZET

Yüksek Lisans Tezi

TUNİS ŞEHRİ TARİHİ KENT MERKEZİ'NDEKİ ÇARŞI BÖLGESİNİN KENTSEL DAYANIMI

Ibtissem LAGHA

Bursa Uludağ Üniversitesi
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Danışman: Prof.Dr. Tulin Vural Arslan

Kentsel Dayanıklılık kavramı literatürde genellikle bir sistemin iç ve dış değişim karşısında işlevlerini ve yapısını sürdürme yeteneği ve mevcut kaynakları ve becerileri yeni durumlara ve çalışma koşullarına uyarlama yeteneği olarak tanımlanmaktadır. Kentlerin tarihleri boyunca karşılaştıkları tüm yıkıcı de değiştirici etkilere karşı nasıl direnç gösterdikleri birçok araştırmanın konusu olmuştur.

Tunis kentinin tarihi kent merkezinde (medina) yer alan tarihi çarşı bölgesi tarihi boyunca karşılaştığı sosyal, ekonomik ve kültürel değişim süreçlerine karşın günümüzde halen varlığını ve işlevini devam ettirmektedir. Tarihi kent merkezinin (medina) karşılaştığı savaşlar, krizler, pandemiler ve diğer tüm felaketler tarihi çarşı bölgesinin gelişiminde ve dönüşümünde belirleyici olmuştur. Ancak, bütün bu süreçlere ragmen, Çarşı bölgesi kurulduğu 7. Yüzyıldan bugüne kadar çağlar boyunca mekansal bütünlüğü ve morfolojik yapısını korumaya devam etmiştir.

Bu çalışmanın amacı Tunis tarihi kent merkezinde (medina) yer alan çarşı bölgesinin dayanımının ardındaki nedenleri tartışmaktır. Bu tartışmanın yapılabilmesi için çalışma kapsamında kentsel dayanım kavramı araştırılmıştır. Bu kavrama ilişkin literatürde kabul gören temel göstergeler ortaya konmuştur. Bu göstergelerden çeşitlilik, bağlantı, modülerlik, fazlalık ve uyarlanabilirlik Tunis kentindeki çarşı bölgesinin dayanımını araştırmak için seçilmiştir.

Anahtar Kelimeler: Kentsel dayanım, çeşitlilik, bağlantı, modülerlik, yedeklilik, uyarlanabilirlik Çarşı, Tunis.

2020, IX + 116 sayfa

ABSTRACT

M.Sc. Thesis

URBAN RESILIENCE OF THE HISTORICAL BAZAAR AREA
IN MEDINA OF TUNIS

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The concept of urban resilience is generally defined in the literature as the ability of a system to maintain its functions and structure in the face of internal and external changes, and the ability to adapt existing resources and skills to new situations and working conditions. How cities resisted against all the destructive and transformative effects that they encountered throughout their history has been the subject of many studies.

The historical bazaar area, located in the Medina of Tunis city, still continues its existence and function today despite the social, economic and cultural change processes that it has encountered throughout its history. Wars, crises, pandemics and all other man-made and natural disasters faced by the Medina have been decisive in the development and transformation of the historical bazaar area. However, despite all these processes, the Bazaar region has continued to preserve its spatial integrity and morphological structure throughout the ages since the 7th century when it was founded. Here the question arises about how this city managed to keep its urban spatial and how it achieved the resilience and its self-organization? What are the main features behind it?

The aim of this study is to discuss the reasons behind the resilience of the bazaar area in Tunis Medina. In order to make this discussion, the concept of urban resilience has been investigated within the scope of the study. Basic indicators accepted in the literature regarding this concept are presented. Among these indicators, diversity, connectivity, modularity, redundancy and adaptability were chosen to investigate the strength of the market area in Tunis city.

Keywords: Adaptability, Bazaars, connectivity, diversity, Medina of Tunis, modularity, redundancy, Resilience.

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Ibtissem LAGHA
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ABBREVIATIONS and GLOSSARY

Abbreviation	Definition
ASM	Association of Safeguarding of the Medina.

Glossary	Definition
Bab	Door/ gate.
Bey	Leader of the Ottoman regime; in Tunisia, the bey having conquered the power, the word means by extension, sovereign.
Chechia	Cotton cap tinted in red.
Fondouk	Caravanserai.
Jebba	A loose garment which constitutes the main part of the traditional male costume in Tunisia
J' maa	Mosque.
Hammam	Public steam bath.
Kasaba	Barracks.
Midha	Abolition.
Medina	City.
Medresa	Koranic school.
Oukala	House is made of individual cells to accommodate passing people or
single	craftsmen of a corporation.
Souk	Bazaar, commercial artery.
Zaouia	Funeral home of a holy personage, marabout.

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1 INTRODUCTION

1.2 Literature Review

Resilience is a versatile concept that is currently used in different fields of research as an approach (Parivar et al. 2013a) that emerged from psychology migrated to ecology (Holling 1979) then to Urban planning. Nevertheless, while the definition of resilience is omnipresent, it still has not been widely embraced. Indeed, definitions can vary between disciplines or even within a particular discipline. As will be further explained in the following section, resilience is defined as "the capability of a system to maintain its functions and structure in the face of internal and external change*"* (Allenby 2005: 1034) and "the capacity to adapt existing resources and skills to new situations and operating conditions" (Comfort 1999: 21).

The resilience concept is more and more used in science and politics as an organizational theory to direct study in urban design and to promote a more informed decision-making process in the identification of vital urban resilience. An essential examination of Google Scholar and other analysis enginery (through search terms like 'urban resilience,' urban resilience,' 'resilient city,' etc.) reveal that less than two decades ago, the resilience term was incorporated through urban planning. A wide range of work on various aspects of urban resilience has since been published. (Sharifi 2019). This also paves the way for innovative planning approaches and more efficient assessment and sustainable thinking (Paviar 2013a).

There is a growing awareness of the critical impact of urban form and of its transformation on achieving sustainable and resilient cities (Gleeson 2012, Creutzig et al. 2016). Furthermore, the concept of resilience is applied in the urban form to evaluate how resilient are the cities in the extraction of the weak part of the system so as to achieve better resistance against disturbance and self-organization. In the assessment of urban resilience,

resilience indicators or resilience criterions were presented and classified by different scholars and researchers mentioned as follows; (Marcus and Colding 2014, Sharifi and Yamagata 2016, Meerow et al. 2016, Fellicioti 2017). Further explanation is provided in subsequent stages of this thesis.

Long before the Industrial Revolution, many old towns around the world illustrated a non-geometric plan and organization of their structure (Smith 2007). Such cities existed before the invention of contemporary, systematic urban planning (begun in the industrial period, when urban cities were developed through the improvement of working-class quality of life) (Filion *et al.* 2015). These cities thrived for hundreds of years (Smith 2007), most notably the ancient Islamic cities that are unique in their urban morphology and spatial distribution, distinct from the western models of 'organized' cities.

This view was a "contemporary debate," as Gharipour (2012) mentioned in his book *The Bazaar in the Islamic City.* Some Westerns scholars dismissed this construction as a city "because it did not follow western models of organized' cities" in which the municipality or local government governed. Considering the Islamic city as a structure included elements separating it from medieval European towns, such as mosques and bazaars. Later, the intervention of revisionist researchers and scholars offered an insider perspective, stressing method over form and meaning over substance. These scholars attempted to understand the reasons behind what orientalists identified in Islamic cities as chaos or disorder, through emphasizing the socio-political causes behind urban development. They made clear that the disorderly or disorganized nature of the Islamic cities was not the result of a lack of government. The shape of these cities was a reflection on the macro and micro levels of the functionality of the concept of the umma and the Muslim community (Gharipour 2012).

1.3 Objectives Of The Thesis

This study is more to wonder how the Islamic cities together with their traditional spaces as its identity, its 'chaos' and unique urban morphology with its bazaars, although the

disturbance; environmental disasters, war, economic crisis, pandemics, and quick globalized changes, are still resistant and flourishing.

These Islamic cities such as Istanbul, Damascus, Cairo, Marrakech, and Tunis were all preserved for long years and centuries. These ancient Islamic cities still preserve their splendor and distinctive historical urban fabric. The most prominent of them is the ancient city of Tunis (Medina of Tunis), which is 1979; together with the old towns of Damascus and Cairo, the Medina of Tunis was one of the first Arab old towns to be designated by UNESCO as a World Heritage Site, Which is famous by its Souks, Mosques and different building typologies. The Medina of Tunis is one of the few Arab cities that is preserved until today. Moreover, It is a very fertile field of analysis; many famous researchers concerned in the Islamic cities choose Medina of Tunis as a case of their studies, as we can mention; André Raymond, Roberto Berardi, Paul lowy and, Jellal Abdelkafi.

The Medina of Tunis was and still maintaining its distinctive character and its importance in the progress of civilization, economic, social, and cultural. However, since Antiquity, the formal structure in the Medina of Tunis has undergone quite a few shifts, but it represents an excellent typo-morphological consistency over many centuries. The Medina has had different variations from the 7th century up to our days, especially in its core: the set of souks.

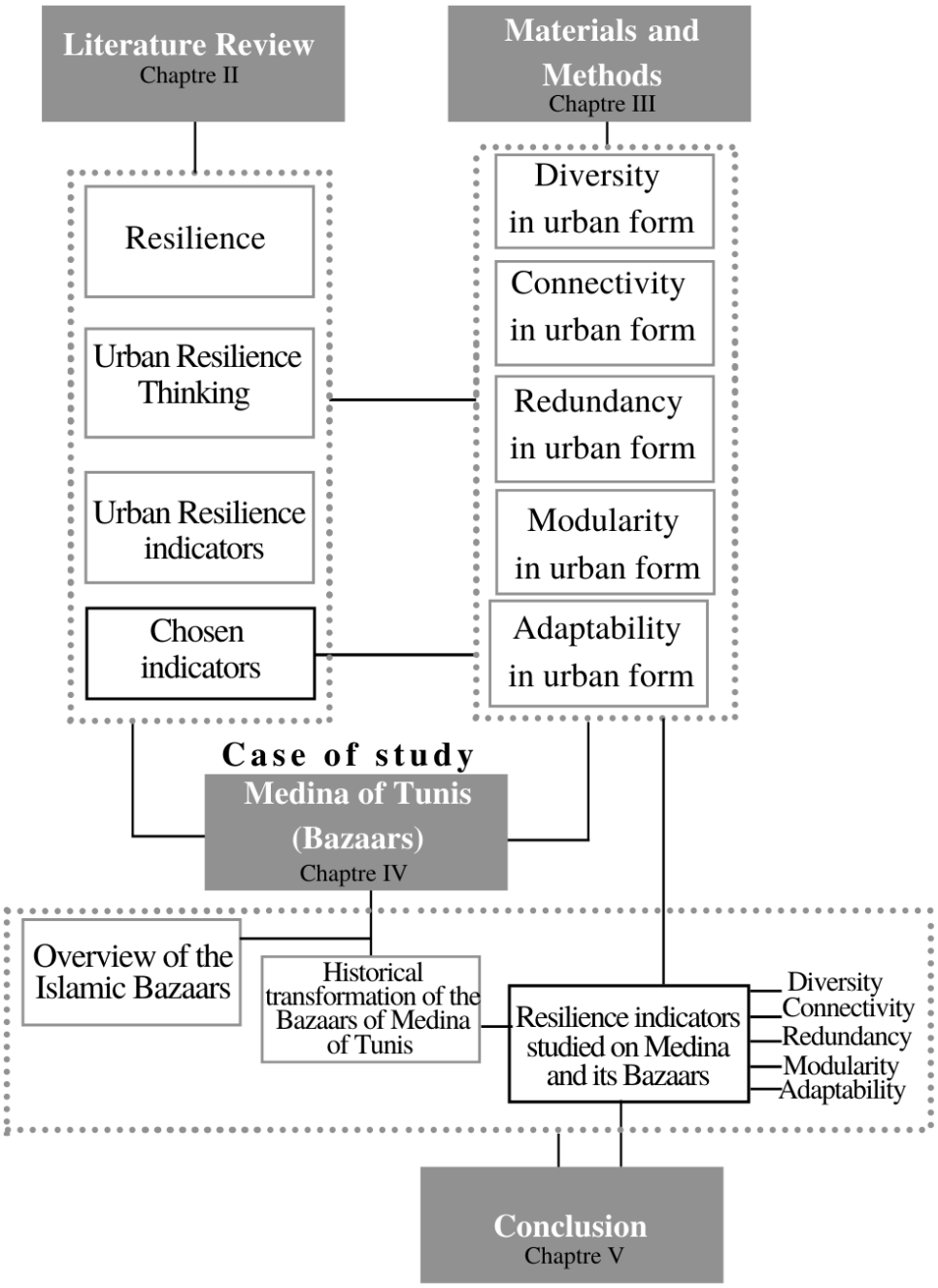
Here the question arises about how this city managed to keep its urban spatial and to achieve the resilience and its self-organization? What are the main features behind it? If these features are sufficient to achieve better resilience in the future?

This study aims to define and extract the indicators (features) of a resilient urban form. to investigate the discrete processes that are behind the resilience of the Medina by analyzing the morphological urban spatial of the Medina of Tunis and focusing on the dominant land use pattern area, which is its “Souks” by relying on the following resilience indicators; diversity, connectivity, modularity, redundancy, and adaptability.

1.4 Methods and Hypothesis

The analyzing method will be provided in this research of the different features of the Medina of Tunis and its bazaars in parallel with the chosen indicators to present an overall view on the city used method to self-organize, to absorb disturbance, to adapt and recover, furthermore to investigate if these processes are sufficient to achieve better resilience in the future. Several aspects of the selected area shall be measured for this purpose as regards their contribution to resistance to disturbance.

However, in the first place, a literature review will be provided concerning the notion of the Resilience concept and its evolution, then the concept of urban resilience thinking and its indicators. In the second place, detailed presentations and definitions of each indicator, based on the existing literature in urban design and urban morphology in order to understand how can be used for the analysis that takes place in the following chapter which starts with a brief review about the Islamic cities, then a historical background of the Medina of Tunis.



1.4 Contribution To Knowledge

This research presents an overview of the existing literature concerning Bazaars in Islamic cities, which have been of crucial importance to cities throughout the Islamic world in

economic, cultural, and even political transformation. Most specially bazaars of Medina of Tunis, It also addresses the importance of decision-making and planning of a better designed urban system, ready to absorb and stand against any disruption, For this purpose, this research will further provide knowledge about the concept of resilience its emergence to Resilience urban thinking as well as the methods and the features of/ for a resilient urban system.

2 THEORETICAL BASICS and LITERATURE REVIEW

The purpose of this chapter is to define the concept of Resilience in the first step and then the concept of urban resilience thinking and its indicators. It is starting in the first section with general definitions and literature reviews of some existing resilience definitions used across different disciplines and frameworks, including a brief historical review about the notion and the evolution of the term. The second section firstly includes the concept of resilience thinking in general. Secondly, literature reviews of Resilience in urban forms, starting with definitions of urban form and resilient urban form. Lastly, the notion of urban Resilience thinking and illustrates how to apply Resilience in urban forms. The last part categorizes the indicators of a resilient urban system.

2.1 Resilience: From The Identity of The Term To Its Emergence

Regarding the fundamental definition of Resilience across professional disciplines, there are significant differences of opinion. Often these differences arise from intrinsic complexities in the resilience concepts, how and to which disciplines they become applicable. For instance, resilience concerns steady-state deviations (‘engineering resilience’) or changes between entirely different states (‘ecological resilience’), given a clear objective of convergence towards a flexible, single, and simple definition for use in our study. In this chapter, the existing definitions of resilience are first reviewed, and a functional description for these types of analyses is then developed.

2.1.1 The Notion of The Term “Resilience”

Resilience is a polysemic concept covering different facets depending on the discipline that mobilizes it, the context in which it assembled, and the objective it serves. According to Djament-Tran et al. (2011: 23), “resilience is a vibrant concept, which has the undeniable advantage of being mobilizing.”

The word *resilience* comes from the present participle of the Latin verb *resilire*, which means to leap back / rebound, to rebound. In material physics, it refers to the notion of a return to the initial state since it is similar to the capacity of the material to resist shock or pressure. This notion is used in several disciplines, such as the study of ecosystems and psychology, and now refers to a capacity for adaptation and organization of a system which best deal with disturbances (Simmie and Martin 2010, Villar 2014).

The historical explanation for the spread of the concept is variable:

- For several French authors, the beginnings of the discourse on Resilience go back to the aftermath of the Second World War and reconstruction (Leblanc 2010). Economic crises have also played a role in the spread of the concept, as shown by the work on unoccupied territories (Daviet and Valin 2010).
- For German authors, the period of the 2000s, called the age of uncertainty, is the ideal breeding ground for the dissemination of the concept, even if it echoes older reflections also dating back to the post-war period (Bürkner 2010, Sieverts 2012).
- On the American side, it seems that September 11, 2001, and the Katrina catastrophe constituted breaking points that contributed to the media coverage of the concept (Well 2011, Hernandez 2008, Pouzoulet 2003).

In fact, since the 1950s, the idea of Resilience has been developed in different disciplines, from physics to psychology, ecology to governance. However, the idea in the various fields has not been discussed. The term comes from the Physics: in this field, the strength of the materials defined in the face of external disturbances, the ability to deform under load elastically (Gordon 1978). In Ecology during the 1970s , Resilience found ample space, though possibly it had been incorporated into this field since the 1950s (Kelman 2008). According to several types of research, such as Galderisi (2013), Holling (1973) was probably the first to use the concept to characterize the behavior of natural systems in the face of external disruptions, distinguishing resilience -which described as measuring the capacity of a system to withstand changes in state variables, driving variables and parameters, and yet persisting -from stability, which meant the capacity of a system to

return to balance after temporary perturbation. Besides, in the mid 1990s, also Holling was the one to distinguish the difference between “ecological” and “engineering” resilience.

In several vision and mission statements, the word resilience is now common and used in all types of fields, but the word has four primary roots: ecological, psychosocial, disaster relief and military, and engineering (Walker and Salt 2012). Indeed, if it is asked the people who are using these concepts what they think they mean, it will be received different responses, often about how someone is facing a surprise or an uprising, which is not merely that. The concept of Resilience is more profound and complex. In earlier years, Rose (2007) pointed out that the principles of Resilience were in danger of becoming a banal “buzzword,” mainly due to the variety of methods and the various disciplinary point of view, overuse, and uncertainty.” For that reason, referring to experts in the main fields, citing different definitions of Resilience seems necessary to understand it correctly.

2.1.2 Existing definitions of “resilience”

The ecologist C. S. Holling is considered by many for being the first to provide a systems-level definition of Resilience as “a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables” (Holling 1973). Since that time, others have put forward general and domain-specific definitions; e.g., Resilience is “the capacity to adapt existing resources and skills to new situations and operating conditions.” (Comfort 1999:21). According to Tierney and Bruneau (2007:14), Resilience is “both the inherent strength and ability to be flexible and adaptable after environmental shocks and disruptive events.”. Referring to Allenby (2005:1034) defines Resiliency as “the capability of a system to maintain its functions and structure in the face of internal and external change and to degrade gracefully when it must.”. For the Regional economic domain, Resilience is “the inherent ability and adaptive response that enables firms and regions to avoid maximum potential losses.” (Rose and Liao 2005:75). Indeed, Social resilience” as the ability of groups or communities to cope with external stresses and disturbances as a result of social,

political, and environmental change," according to Adger (2000:347). In addition, for Fiksel (2003:5332), resilience is "the essence of sustainability […] the ability to resist disorder". Furthermore, following Ahern (2010:148), "Resilience is largely about expecting the unexpected and planning for recovery after a failure".

All these definitions include certain facets of gradual change, whether it can be through a reduction in the impact of the change, adaptation, or recovery from the change. Many of them declare that one aspect is to adapt to the change by maintaining the system's functions. For Regional economic systems, planning for recovery and inherent the ability to adapt to avoid losses. Many of the above meanings emphasize that the capacity of a system to adjust with fewer resources (time and money) quickly is essential after a disturbance (Djament-tran et al. 2011).

The term "resilience" is used in many disciplines: physics of materials, ecology, psychology, economics, companies, etc. It is often assimilated or confused with other concepts without explaining the differences: redundancy, resistance, robustness, adaptability, return to normal, return to a state of equilibrium, etc. (Villar 2014).

Following these definitions, the resilience debate is about the ability of systems to manage transition (change) while retaining essential functional characteristics in the presence of perturbation. The question here is how the concept of Resilience emerges from one domain to another, as it is mention before from psychology, physics, social-ecological and urban systems.

2.1.3 Evolution of the concept "resilience"

Researches about the concept Resilience is carried out through two primary sources, which have evolved independently of each other. The first comes from psychology, where the term resilience is used relating to child and adolescent development as well as mental wellbeing focusing on psycho-emotional responses and approaches aimed at handling

stressful situations and traumatic incidents. The second comes from physics but acquired its present significance in ecological science owing to American-Canadian theoretical ecologist Crawford Stanley Holling (Feliciotti 2018).

Succeeding this second stream of study, the resilience debate concerns capacity of structures to cope with change while retaining essential functional features in the face of disruption. Focusing initially on the effect of human activities on natural habitats, the idea of Resilience later broadened its scope to consider a change in all dynamic adaptive structures, including human-dominated environments such as social-ecological (Adger 2000), socio-technical system (Baxter and Sommerville 2011), economic (Simmie and Martin 2010), and urban systems (Vale and Campanell 2011). As the idea progressed, several aspects of Resilience began to emerge and formalized three prevailing approaches: engineering resilience, ecological resilience and evolutionary resilience.

The first approach, called “engineering” resilience, refers to the ability of a system to maintain an ideal stable state in the face of stress or to bounce back rapidly to its former state after it has been disrupted (Davoudi et al. 2012). The second approach, or “ecological” Resilience, focuses on the system’s ability to retain core functions and survive in the face of shocks, as well as the amount of change that the system may withstand until it hits a breaking point and shifts irreversibly to a new alignment. Remarkably, this is never continuous but can fluctuate significantly within the limit of system resilience (Davoudi et al. 2012).

Known as “evolutionary resilience” the third approach defines a system’s capacity to extemporaneously and adaptively reconfigure its internal structures to mitigate the disrupting influence of shocks (Davoudi et al. 2012), while incessantly evolving by removing out-of-date structures and creating a possibility for new growth trajectories. Having the benefit of understanding, the last definition explains that transformations can follow any number of internal or external shocks: undergoing these transformations, the system incessantly re-adjusts to new states, slightly or even meaningfully different from the

original, so that it cannot return to any preceding state and does not have any ideal functioning. Increasingly assumed in describing all those complex systems that do not endure unforeseen and catastrophic changes instigated by external shocks and events, evolutionary Resilience also experiences little, incremental adaptation during their lifetime, that is chiefly related to internal self-organization procedures.

Cities being considered a typical example of this kind of complex adaptive transformations (Batty 2013a), the most important is the evolutionary understanding of Resilience in the background. Urban Resilience as the capacity of interrelating social, cultural, environmental, and physical subsystems to endure and even thrive in the face of external challenges and internal changes without hitting a breakpoint from which recovery will be too troublesome and without being lastingly stuck in destructive pathways (Feliciotti 2018).

2.2 Urban Resilience

Resilience is a theoretical concept that has been widely discussed and modified since the first definition from material physics. This notion is often defined as an “umbrella concept” (Klein et al. 2004) or even a “boundary object” (Brand and Jax 2007) in order to highlight its transdisciplinary and the holistic approaches to which it is subject. when it comes to implementing it, research on the urban environment brings together diverse skills from the field of town planning, architecture, engineering, economics, geography, sociology, and others. The concept of urban Resilience gives place multiple translations in terms of problematic and methodological development, allowing dialogue (confrontation) between these disciplines often segmented.

2.3 Categorizing Urban Resilience Indicators

While work on resilience indicators has generally begun a long time ago, urban scholars have recently found a collection of local spatial indicators of urban Resilience. Several indicators are provided in different references to assess the overall Resilience, which is

general and systemic, often connected to resilience engineering or Resilience of socio-ecological systems and rarely linked to urban structures and "urban resilience." According to the latest analysis, the local-spatial measures of "urban resilience" are clarified in this report, taking into account the urban environment as a whole, and it is argued that these measures must be implemented to help planners comprehend how to improve the capability to strategize and prepare for the disruptions absorption, adaptation to destructive events and recovery. Studies on the production of urban resilience metrics have increased according to the literature review, acknowledging it as a significant issue in the science and political realms concerning future urban growth (Sharifi and Yamagata 2016). Figure 1. shows the conceptual analysis model diagram (Gharai al. 2018).

2.3.1 The indicators of urban *local-spatial* resilience: a literature review

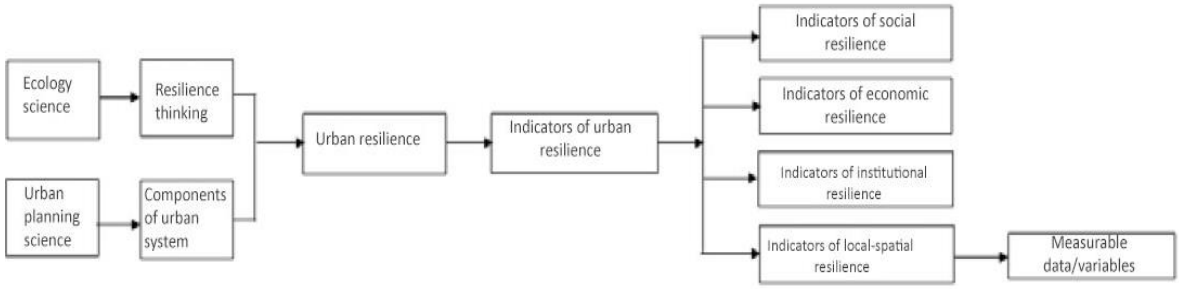


Figure 2.1. A diagram of the conceptual research model (Adapted from Gharai et al. 2018)

Urban local-spatial resilience indicators are in a straight line linked to the urban system's physical and environmental measurements, which are aligned with the critical components of the city's spatial organization. The city's spatial structure is a representation of the local-spatial urban aspect, which relies on various interrelationships of all forces and factors within the city. These aspects can include market forces, events, urban infrastructure, and diverse amenities, which often have intricate interrelations with each other (Ziari et al. 2013).

Spatial organization is a network whose constituents are urban centers (mixed-use industrial, business, cultural, etc. focused on the entire scale of the city, its districts and regions, major transport routes, main roads, and subway lines; principal functional axes and significant land uses, on the city's scale and its districts and regions) (Gharai et al. 2018). Hence, the city's spatial organization involves core elements of the city's development, which are: main roads, main buildings that provide significant city-scale facilities, and public green open spaces (Godschalk 2003). The spatial structure of the city is based on the city's definitions and explanation.

Walker and Salt, who were pioneers in the recommendation and creation of resilience indicators (Walker and Salt 2006), derived another grouping of indicators. Indicators were examined for urban applications, including by widespread consensus the use of redundancy, diversity, performance, autonomy, connectivity, adaptability, robustness, and versatility in towns (Sharifi and Yamagata 2016; Feliciotti, Romice and Porta 2016, Gharai et al. 2018).

According to Gharai et al. (2018) four indicators for local-spatial urban disturbance planning were identified, including; diversity, connectivity, robustness and redundancy. The reason they were chosen is that 3-5 primary indicators were suggested for studying local and temporal Resilience of urban structures of which those four indicators were the most frequently cited in urban resilience studies such as; Chelleri and Olazabal 2012, Eraydin and Tasan-Kok 2012, Barthel et al. 2013, Hassler and Kohler 2014, Marcus and Colding 2014, Feliciotti et al. 2016, Sharifi and Yamagata 2016, Meerow et al. 2016. They had the maximum compatibility with urban spatial organizational fundamentals, in a way that they could be used for urban applications by urban design researchers (Gharai et al. 2018).

2.3.2 Conclusion

Urban Resilience is considered as the capacity of the city to absorb a disturbance and then to recover its functions following (Lhomme et al. 2010). In this sense, the city is well regarded as a system in the sense that components (habitats, activities, infrastructure, populations, governance) interact to constitute the urban fact. This definition is based on the observation that the services (or functions) to be provided by the urban form face many disturbances and must, therefore, adapt to respond to these dysfunctions.

Islamic bazaars considered as the main function of many Islamic cities that get affected along centuries by several disturbances, therefore, these bazaars still functioning, resisting and adapted in a manner to maintain its activities, its identity and its structures.
This is what will be called Urban Resilience of Islamic bazaars. In this study, the historical bazaar in Medina of Tunis is selected as one of the Islamic bazaars that are resistive.

3 MATERIALS and METHODS

This chapter proposes detailed presentations and definitions of the chosen indicators in order to understand the aspects and the methods that will be used in the following analysis of the selected case of study Medina of Tunis and its bazaar.

3.1 Urban Resilience Indicators

It was possible to define three key conceptual categories, from the descriptions given by the different authors to the different resilience properties/principles (Feliciotti 2018). A first classification involves resilience *performances*, i.e., principles that describe what optimal processes will take place in a system to identify this as resilient, that is, what a resilient system would or should do. This category includes principles such as persistence, flexibility/adaptability, and transformability. A second classification includes *attributes* of Resilience or principles reflecting systemic and general qualities of Resilience in urban environments (i.e., what would be a resilient system). The concepts such as diversity, continuity, connectivity belong to this category. The last classification involves resilience *assets* that are linked to exclusive physical, structural, commercial, economic, or ecological resources that a specific construction should possess to enhance its Resilience, owing to their specificity, either to the system considered or to the disruption. (Feliciotti 2018).

Considering the diction *performance,* it is meant that a program is capable of executing the spectrum of responses when faced through change pressures. *Attributes* define the overall structural qualities that impact the likelihood of a specific indicator response, consequently influencing the system's predisposition to follow specific performances over others. Attributes *"*act as a bridge between the general and the particular*"* between results and properties (Allan et al. 2013). Lastly, assets are the concrete representation of general characteristics in a system or domain which reflect the domain-specific material that is, for example, infrastructure, or immaterial (knowledge), resources which systems hold or may implement to activate attributes.

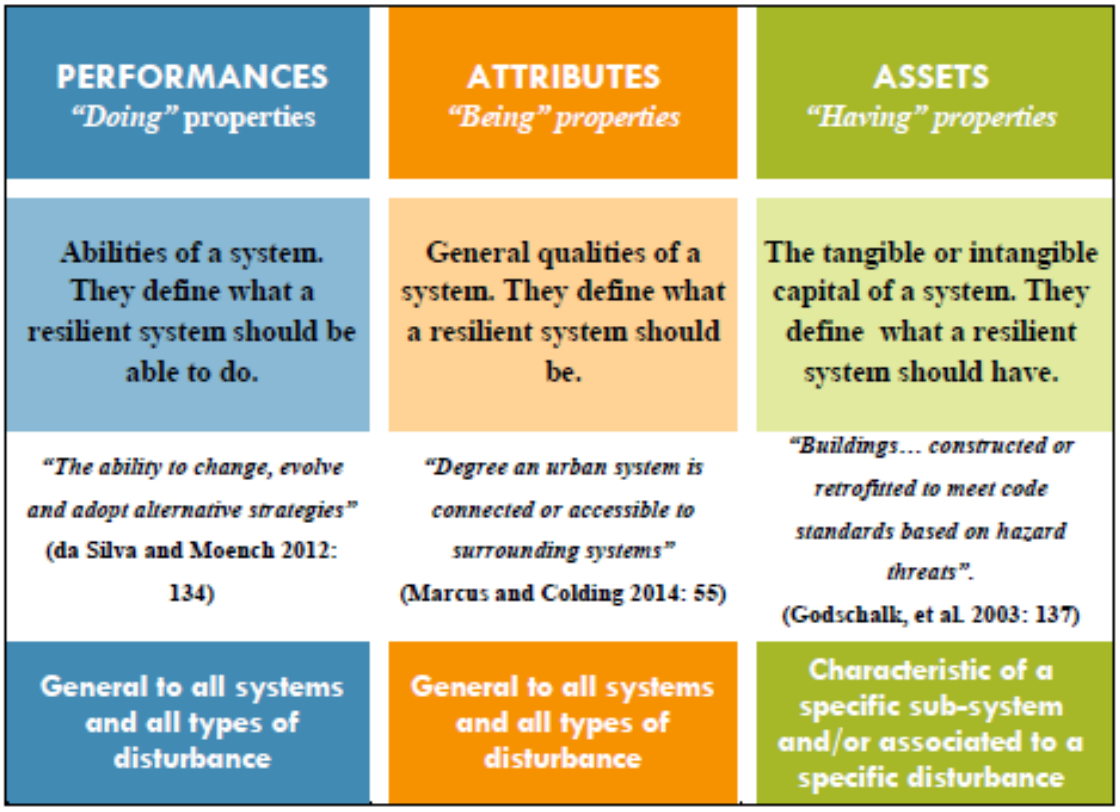


Figure 3.1. Difference between performance, attributes, and assets (Feliciotti 2018)

Performances, attributes and assets described will be addressed in the next sections focusing on the system of urban form relating to the different morphological scales.

3.1.1 Resilience through system performances

The term performance is a manifestation of system capabilities; that is what a given system can or cannot do when confronted with an assortment of situations. As emphasized in the literature reviewed, four such overall system capabilities plus one, unlike the other four, is exclusive to human systems, have been established. These are as follows: a) robustness or absorptive capacity, b) responsiveness or restorative capacity, c) adaptability or adaptive

capacity, d) creativity or transformative capacity; and e) preparedness or foresight capacity (Feliciotti 2018).

Robustness or absorptive capacity talks about the capacity of constructions, subsystems, and/or constituents to endure without breaking down the influences and insinuations of change (Bruneau et al. 2003, Godschalk 2003, Sharifi and Yamagata 2016). A robust system can meet expectations and achieving goals during acute shocks (dangerous events) or chronic stress, without experiencing performance deterioration or failure. However, when a system's absorptive ability is surpassed, systems must adopt alternate methods in order to either return to the previous state or a new one (Feliciotti 2018).

Responsiveness or Restorative capacity is a system's ability to rebound rapidly from a destructive incident or failure (da Silva et al. 2012, Collier et al. 2013). A delicate system can muster and organize its resources to reinstate functional systems and rebuild them to pre-disruption points. The function of recovery potential is particularly critical when it comes to acute incidents, but is less useful when it comes to slow-onset and chronic stresses where it is not possible to define an exact state to which to return.

The capacity of a system to evolve slowly and continuously in response to changing external drivers and internal processes is *adaptability or adaptive capacity*. Learning from past experiences, and adaptable system may incorporate gradual changes to its configuration and adopt alternative strategies to retain work as contextual circumstances mutate (Folke et al. 2010). In that sense, rather than reacting passively to transition, adaptability is about consciously accepting it. Adaptive responses are especially critical in coping with slow-burn stresses ensuring that the system continues to develop along a trajectory (Folke et al. 2010, Feliciotti 2018).

Lastly, *transformative or innovation capacity* talks about "the capacity to create a fundamentally new system when ecological, economic or social structures make the existing system untenable" (Walker et al. 2004). Innovative systems intentionally transfer

properties, alter processes, reorganize factors, implement new outcomes that cause transformative changes at a larger scale (Folke et al. 2010). Transformability, in this perspective, is seen as a step beyond adaptive capability (Davoudi et al. 2013).

3.1.2 Resilience through system attributes

The point to which a system is capable of absorbing, recovering, adapting, or transforming depends only partly on the magnitude of the changes and the frequency of the shocks to which it is subject. Nonetheless, a system may be more or less predisposed to adopt some response over others based on a set of inherent underlying structural qualities it possesses. Such characteristics or attributes are general, and they are present in all kinds of complex systems.

They are relatively not associated with any definite disturbance but influence the systems' overall behavior. Accordingly, an attribute's presence or absence can increase or decrease the likelihood of a certain behavior manifestation or influence the effectiveness of a system in coping with stresses or shocks (Arup 2014b). Five key device attributes are defined, based on the reviewed literature: a) diversity, b) connectivity, c) redundancy, d) modularity, e) efficiency (Feliciotti 2018). These are the measures we will use in this research to evaluate it and describe it in chapter III.

3.1.3 Resilience through system assets

Although performances and attributes represent overall properties that can be applied to various types of systems, these are still too immaterial to be operationalized in urban systems as such. Indeed, if these are to be applied in relation to a specific area, they need to be translated into more concrete terms applicable to the program under investigation. Social structures, for instance, are made up of actors that are structured on various scales (family, society, as well as organizations) and are bound by institutions and social norms (culture, religion, right, rules and entitlements) in their behavior. Through the point of view of Resilience, assets are domain-specific characteristics (strategies, devices, intellectual or

strategic resources as plans), whose function is to make operational through diverse domains (Feliciotti 2018).

As we have seen previously, unlike performances and characteristics that resolve general as well as specific activities and qualities shared by all forms of complex systems, assets are unique to the system identified and also to the physical, the environmental, social, economic, or institutional domain of implementation. Like the concrete, material (exp: infrastructure) or immaterial (exp: knowledge) resources that a system "has" or "has not" used. Furthermore, while assets' function, as a system and domain-specific resilience improvement features become sensible about attributes and facilitated by attributes, concerning performance; the relationship between the two is not one of simple containment, as the same asset might contribute in more than one way to more than one attribute. Relating to human system resilience, and hence also to urban structures, they are often understood as five distinct types of capital and divided into five separate classes: social/institutional, human, financial/economic, physical, and natural (Feliciotti 2018).

Instances of social or institutional assets comprise public relations engagement, informal sociability and confidence networks, active citizen participation (Wardekker et al. 2010, Sharifi et al. 2017). Risk reduction approaches and regulations for (more or less) predictable shocks and disruptions (i.e., early warning alarm protocols, earthquake prevention building codes) and overlapping organizations and entities are also included in this group (Davoudi et al. 2013). Instances of financial or economic assets include funds allocated to post-disaster rebuilding or business sector diversification (Simmie and Martin 2010).

3.2 The Chosen Urban Resilience Indicators

As it is mentioned above, according to the literature review, there are so many indicators related to urban Resilience. A specific list of proxies that covers all aspects of Resilience is not currently available in the literature. In the following pages, a spatial-temporal scaled

analysis is affected. Although, the bazaars of Medina of Tunis, as an urban form, in a purpose to understand the process that is under its maintenance and its surviving. Analyze provided by five indicators (proxies) chosen according to a multidisciplinary literature review conducted by authors (Feliciotti et al. 2015, 2018), outline more than 30 attributes associated with Resilience in the past 40 years. The five most identified with urban types were chosen from this total. The proxies are: 1) Diversity, 2) Connectivity, 3) Redundancy, 4) Modularity, and 5) Adaptability.

3.2. The chosen indicators (by author)

3.2.1 *Diversity* in urban resilience

Diversity defines a system with multiple elements, which operate simultaneously or interlink in time, for a variety of non-overlapping functions (Godschalk 2003, Albers and Deppisch 2013, Dhar and Khirfan 2017). A highly integrated and functional diversity program can address many needs simultaneously without any structural change and can work under a range of circumstances.

The literature review, Diversity, and its variables considered in urban Resilience as a measure key attribute (Suarez et al. 2016). As well as an essential feature in urban design, the variety of land use and urban forms architecture contributes to sustainability, healthier lifestyles, and even economic development in the region. (Bentley et al. 2010, Jacobs 2007) Multifunctional urban spaces support diversity that is crucial for the absorption and regeneration of disturbance (Sharifi and Yamagata 2016, Gharai et al. 2018). For that reason, a multifunctional and highly diversified urban fabric is known in thriving cities as a near-universal characteristic.

For historic towns, this consistency is particularly evident, where the process of gradual change, over time, has facilitated the organic evolution of the fabric, balancing the need to maintain a unique identity and feature, and incorporating new elements in response to changing requirements. Consequently, a robust urban infrastructure would aim to make a difference on each morphological scale (Feliciotti 2018). Nevertheless, the intrinsic capacity of places to sustain its existence, despite changing economic conditions, technologies, and cultures, is regarded as crucial to diversity (Montgomery 1998). In urban design, the topic of diversity is promoted as a stimulus for other valued urban characteristics, including economic sustainability, sociability, and plurality by many theorists (Jacobs 1961, Carmona 2010, Burton et al. 2013) and practitioners (Rudlin and Falk 2009, Tarbatt 2012, Adams et al. 2013).

Diversity can be studied in two views:

- Functionally
- Spatially

Functionally, in terms of variety of land uses, whether the availability of different functions in the surrounding area, which refers to mixed use of urban land and a variety of open areas. *Spatially*, in term of spatial distribution, as the shape and size of urban components are heterogeneous, which is connected with the spatial distribution of urban structural features and referring to equitable access to basic public facilities in the region, and a reduction in the risk of disruptions affecting the entire system. (Suarez et al. 2016, Feliciotti 2018). Diversity in the two cases linked to increased space usage and more significant potential to accommodate a range of applications and activities. Furthermore, some authors point out that a diversified economy guarantees overall economic stability when one economic activity fails (Berkes et al. 2002).

3.2.2 *Connectivity* in urban resilience

"Connectivity is a property of cities that links urban form and function." (Ahern 2010:153).

Connectivity defines to what point different systems or elements are connected within a single system. Connectivity principles include accessibility, interconnectedness, integration, collaboration, and inclusion (Biggs et al. 2015, Sharifi and Yamagata 2016; Kim and Lim 2016). In a limitedly connected network, at least one path connects each pair of components. Nonetheless, there are many connections between components with different strengths in richly linked networks.

Furthermore, connectivity is often correlated with redundancy, as the more connections a network is connected, the more connections are likely to be redundant. (Salat and Bourdic 2012b, Feliciotti 2018).

In urban design literature, connectivity is essential. While connectivity is a double-edged sword in the literature about Resilience, it is considered crucial in urban design as a means of promoting sustainable mobility, live efficiency, and quality of life to productive cities (Feliciotti 2018). Connectivity is spatially the extent to which various urban areas are internally and externally linked to their surroundings. High connectivity enables the exchange of individuals and commodities and promotes increased social and economic activity (Porta et al. 2012). Besides, the promotion of advanced interaction among urban fabric elements stimulates the development of new patterns and functionalities (Dhar and Khirfan 2017).

Connectivity as an indicator defines the ease of mobility in and around a city in terms of urban spatial and morphology analyzes, i.e., an interconnected urban area and its transport network and roads. The connections structure within the regulated road network specifies the points of contact between elements of the urban area and, as such, the location and potency of activities. This increases both short-term and short-distance accessibility levels, which means improved access to numerous urban destinations and intern connections of the city (Gharai et al. 2018).

On the scale of sanctuaries, the main urban roads, whose intersection pattern defines size and type of sanctuary areas, play a unique role for connectivity. Their proximity to each other should be adequate to facilitate travel through different areas at reasonably pedestrian-friendly speeds but not beyond to cover a range of internal quiet and secure local roads, characteristic of more suburban areas, according to Porta et al. (2014).

Block patterns can show the connection between various city areas. At that point, various authors have defined many of the geometric features of blocks linked to connectivity, such as the concept of small and short blocks by Jacobs (1961) as crucial elements for connected urban fabrics. Likewise, Stangl (2015:2) states that “The basis for employing block size as a measure of connectivity is that a block is an impenetrable area, therefore the larger the

block, the greater its obstruction of movement through the environment... On the other hand, a limited block size… more directly relates to the goals of good connectivity".

Moreover, According to Feliciotti (2018), while bigger blocks limit the direct path between the source and the destination of a walking or cycling tour, smaller blocks allow for more convenient access for pedestrians to walk around. Indeed, "the connectivity of the street network is a critical aspect of transport resilience. Creating enough intersections multiplies the number of possible routes, reduces distances and traffic jams, and makes places more easily accessible to pedestrians" (Bourdic et al. 2012: 5).

3.2.3 *Redundancy* in urban resilience

"Redundancy is defined as multiple elements or components providing the same, similar, or backup functions" (Ahern 2010:148).

Redundancy is a mechanism that includes many overlapping options for performing the same task (Ahern 2010, da Silva et al. 2012, Sharifi and Yamagata 2016) and which is connected by several pathways (Salat and Bourdic 2012b). Duplicated functions and pathways could be or could be inactive in redundant structures in the form of reserve stocks to be used as needed occurs (Dhar and Khirfan 2017). The related Concepts are available for redundancies that are reserve, storage, buffering, reserve capacity, substitutability, response diversity, and insurance.

According to Gharai et al. (2018), redundancy is far more than just duplication, but it also requires an amount of variation in how the same, similar, or replacement functions are supplied and in how their components are related; both aspects are essential to the robustness of the system. Redundant systems display high recovery potential as they can solve flow interruptions by rapidly redirecting them to the undamaged section of the system and mobilizing excess accumulated resources to replace the missing (Kim and Lim 2016).

Adaptive and innovation capacity are also correlated with redundancy. The possible choices of paths and options to provide service, on the one hand, encourages adaptation. On the other hand, in the face of changing circumstances, the availability of dormant resources that can be transformed and activated promotes self-organization and structural change (Gharai et al. 2018). This usually stands for the capacity of a system and its subsystems to fulfill its functional necessities and keep them operating while facing disruption and loss of components (Xu and Kajikawa 2017). The more redundant elements effort into the system will boost its Resilience. It is because those elements could provide recompense for the loss of capability to avoid the collapse of the system. Even though redundancy is a resilience source, the contribution of a single system source is restricted, whereas a combination of various resilience features is needed (Xu and Kajikawa 2017).

Redundancy is related to other indicators like connectivity, but it is not the same: while an internally connected street network is not automatically redundant, it only increases redundancy if communication between destinations increases the number of alternative routes. Therefore, Redundancy in the street network depends on the choice in destinations accessible that each city user can choose and the variety of choice of routes to reach them (Ibid). In addition, Diversity also is closely related to redundancy. The diversity indicator includes a range of urban components, for instance, different land uses, whereas the redundancy indicator contains many specific urban components, e.g., multitudes of main urban streets (Gharai et al. 2018). Diversity (spatial, temporal, topological, geographical or operational) provides alternatives, rather than usual, to systems in search of a new mode of adaptation. Contrary to this, the redundant system is built before perturbation, although system diversity does not involve detailed design. In the context of a disorder, diversity will provide redundant and alternate outlets and resources (Xu and Kajikawa 2017) “Although it has overlaps with redundancy, their overlapping functions could ay key roles in creating opportunities such as diversity in institutions for reorganization and learning while coping with disturbance and risks.”

3.2.4 *Modularity* in urban resilience

Modularity describes a system with an organizational structure defined by a degree of compartmentalization (Walker and Salt 2012, Anderies 2014). Components are grouped in a modular system into functional units, known as modules, which are delineated by their environment by close-range interactions, and are loosely connected to other modules by a variety of long-range connections. Thus, these modules develop concerning each other in a regime of relative autonomy while maintaining continuous interaction with other modules and through the system (Anderies 2014, Suárez et al. 2016). According to Ahem (2010), Modularity is known as the use or construction of standard units that allow flexibility and usage variability. Modularity also relates to the design and operation of separate, interconnected subsystems instead of centralized systems. Systems made up of interchangeable and modular parts can often be incorporated into higher organizational levels.

Modular systems are very robust since their relatively compartmental feedback loops restrict the degree to which shocks disturbing a part of the system cause more massive cascading failures, retaining the functionality of the entire system **(**Tyler and Moench 2012, Feliciotti 2018). Therefore, because modular systems are poly-centered, the system is more likely to self-organize and re-establish function with a higher recovery capacity when specific modules are affected by shocks (Walker and Salt 2012, Anderies 2014). However, Modularity can also harm system stability and Resilience, as is the case with connectivity. For instance, overly modular systems are susceptible to fragmentation: if the links between units are too few, their deactivation can cause damage to the entire integrity of the system. Enough linkages of modules are also essential to encourage adaptive capacity, as this facilitates a process of shared learning from experiences and experiments in other modules (Feliciotti 2018).

In urban form, a modular urban structure consists in organizing various morphological components into highly integrated and

relatively separate groups, but still consistently comport as coherent wholes. An essential assumption of most urban morphology theories is that the city fabric can be conceptually constructed as an integral component of a nested hierarchy, where every component assembles with a similar-scale one to shape a coherent higher-level whole in an upward hierarchy. Every morphological scale includes or frames of lower-level components in the urban form: street frame-blocks; blocks with street borders; street borders are compound of a set of plots; plots have buildings and open areas; composing a hierarchy.

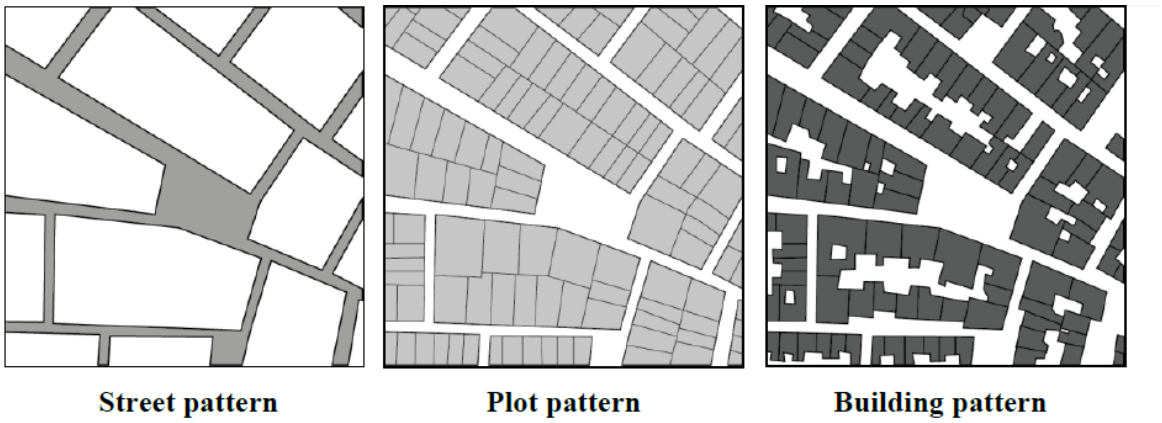


Figure 3.3. Street pattern, plot pattern, and Building pattern (Feliciotti 2018)

As mentioned by Kropf (2014:48), "the levels of the compositional hierarchy are defined in two directions, from below by the domain of its potential parts and from above by the position of the element as a part in a composition…. A building is both a composition of rooms and an element that is part of a plot".

The multi-scaled interaction systems are self-regulation, as slow processes can be used to define fast processes and fast processes to check and introduce (Feliciotti.A,2018). Modularity is thus highlighted in the urban form when each compositional hierarchy level is recognizable by itself and also composed of a set of lower-level components. On the contrary, this is undermined when is lack or under-representation of certain structural levels, such as a single entity, fills more than a level at the same time. (like the case of a

plot occupying a whole urban block or a building having a single room). This phenomenon was defined according to Kropf (2014) as *coextension*.

In traditional urban fabrics, the size of plots will continue to differ to a certain degree, but plots will seldom coextend to the extremity of street edges. Likewise, the street edges may differ in size, but they would rarely coextend with the scale of blocks; blocks can be small or extensive. However, it is incredibly unusual to have a block that coextends to the region of its sanctuary area (Feliciotti 2018). Therefore, the more modular the fabric is, the more its structure can change its inner configurations; all scales are essential for its Modularity. Furthermore, many works (Panerai et al. 2004, Porta and Romice 2014) confirmed that when streets subdivided into several small plots have higher longevity than those with just a few large plots, ensuring Modularity, a prerequisite for structural complexity and, therefore, efficiency, is maintained over time. According to Feliciotti (2018), The urban structure that is characterized by a fine-grained plot is related to more spatially distributed, direct and locally-based forms of territorial control that allow faster, more effective, and less costly adaptations to respond to contextual changes.

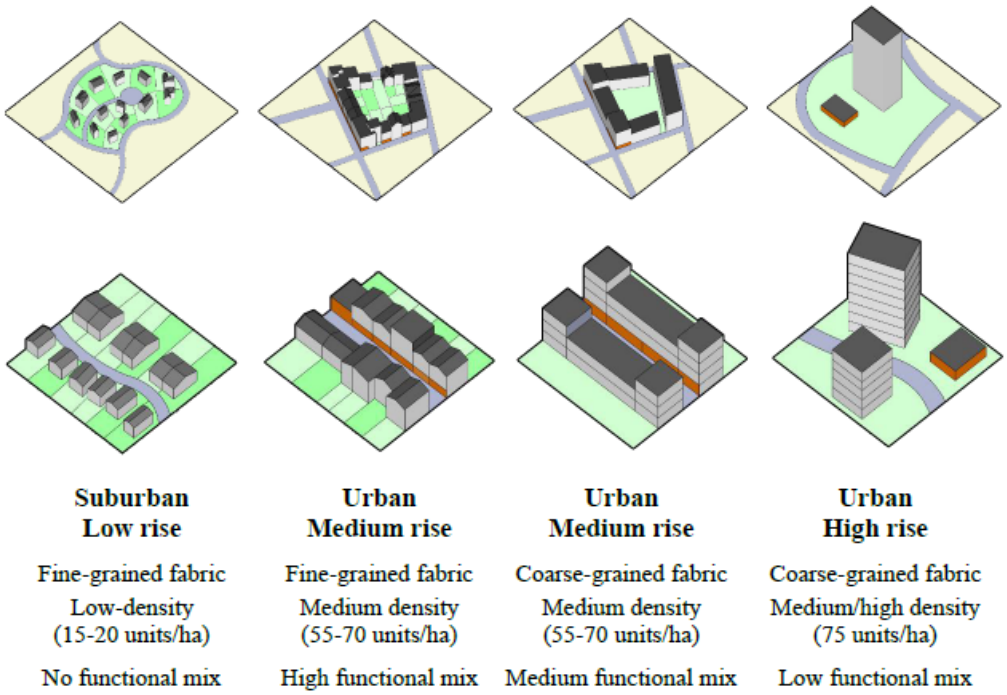


Figure 3.4. Comparison of different types of blocks (above) and street-front (below) grain in relation to density and Modularity (Feliciotti 2018)

On the contrary, loss of Modularity occurs when the urban grain is eroded. For example, due to successive speculative growth phases or by monolithic borders and blocks that are originated in the contemporary urban development, where a single plot may fill up an entire street or block and become particularly dull and unruly in the sense of changing contexts conditions and less likely to demonstrate emerging properties, for which they were not explicitly programmed at the outset (Feliciotti 2018).

3.2.5 *Adaptability* in urban resilience

Adaptability is defined as the ability to adjust without radically abandoning previous conditions to changing external circumstances (Feliciotti 2015). It is considered to be an essential part of resilience. Besides, it is viewed as the flexibility to adapt in response to new demands that can lead to the sustainability and ultimate success of systems (Fiskel 2003).

According to (Folke et al. 2010, Galderisi 2013), adaptability is the capacity to adapt its responses to evolving internal processes and external so that progress can take place along existing routes in the existing stability region.

It refers to the capability of the urban system and its elements to accommodate expected and unexpected future environmental, economic, social, and technological needs, through incremental and non-traumatic changes. Furthermore, Spatially, being a diverse and modular urban structure allows immediate, quick, and relatively inexpensive adaptations or replacement, such as upgrades, improvements, and conversion buildings or infrastructure (Feliciotti 2015).

Adaptability building needs a change from a short-term mentality that favors specialist single-use buildings to a long-term approach that focuses on resilience and adaptability (Carmona 2010) And makes it easy to reorganize, transform and reuse (Moench 2014).

Nevertheless, according to Feliciotti (2015), Socially speaking, flexible buildings and places are more able to accommodate different kinds of households and lifestyles; local communities well regard them.

Adaptability is presented in some studies as the capacity of an urban system to learn from its previous disturbance to reduce its weakness in pre disruption and to strengthen its capacity to adjust to changing conditions.

Adaptability, however, means recognizing that the system components are fundamentally vulnerable, providing pertinent information and the assessment for priority tasks in crisis times, and the ability to respond rapidly. A resilient urban system should include "adaptive" cycles alternating between long aggregation periods and resource transformation and

shorter times which provide opportunities for innovation, thereby ensuring system survival (Sharifi & Yamagata 2016).

Complementary characteristics of a resilient system are adaptability and transformability (Walker and salt 2012). Adaptability (or adaptive capacity) is a general resilience since attributes of both usually overlap (Walker and salt 2012).

3.3 Summary of The Indicators Classified According to Different Aspects

The following table presents different aspects of the chosen indicators, given some features that a resilient city could be or could have. This table is a combination of different research adopted, from among other scholars, e.g., Parivar et al. (2013a), Sharifi & Yamagata (2014), Sharifi & Yamagata (2014), Feliciotti (2018), Gharai et al. (2018).

Table 3.1 Summary of the indicators divided according to different aspects, adopted from Parivar et al. (2013a), Sharifi & Yamagata (2014), Feliciotti (2018), Gharai et al. (2018).

	Human	Social/ institutional	Economic	Physical
Diversity	Social and cultural diversity: ethnicity, religion, etc.	Involvement of a diverse set of organizations and institutions.	Diversity across the economic sector.	Multiple land uses and spatial distribution.
Connectivity	Strong sense of community, local identity, and cohesion.		Open trade, extended networks, and partnerships between different destinations.	Street networks with linkages between different areas.
Redundancy		Redundancy in administrative, governance, public services, and structures.	Specialization within existing economic sectors.	Redundant road and land use.
Modularity		Decentralized institutions and decision-making centers.	Internal economic cohesion and decentralized economic sectors.	Modular urban structures.

Adaptability		-Overlapping functions. -Capability to upgrade buildings, infrastructure, and places.	- The ability of economic sectors to adapt and follow the people's life cycle and needs.	-Adapt to the quick globalized changing of lifestyles.

4 RESULTS and DISCUSSION

This chapter presents the selected case of study Medina of Tunis and its bazaars. In the following pages, an overview of Islamic bazaars as an introduction defining the urban morphology, the spatial distribution, and the main elements that identify it is explained.

The historical background of the chosen area is provided, which is an essential part to highlight the transformations and changes that affected the bazaar area of Medina of Tunis through centuries.

In the last part of this chapter, the analysis is provided according to the chosen indicators, and features of resilient cities including different aspects.

4.1 Overview of Islamic Bazaars

Bazaars are considered to be the uniqueness or quality of the Islamic City. The bazaar was the major characteristic feature between cities in the Islamic and European worlds for orientalists. In contrast, in new theoretical frameworks, the bazaar is seen as a quality rather than a physical realm, as a fragment of the developmental process. The bazaar has the propensity to recount the history of social development, change, and even revolution.

For many centuries, people from around the world have come together so as to trade, buy, and sell goods in their communal and commercial centers. These markets have often functioned as an essential part of the community and have given many names, meanings that are specific to their respective cultures. The bazaar is the marketplace or assembly of shops in which various goods and services are purchased and sold.

The term *'Bazaar*' has attained three distinct meanings: the market as a whole, the market day, and the marketplace. However, it could also refer to a part of the bazaar, for instance, a street belonging to a particular guild. Deriving from the Aramaic word *shuka*, the bazaar is equivalent to the Arabic word '*souq*,' which means the commercial interchange of goods or

services as well as the place where that exchange is usually is conducted (Bianquis and Guichard 1997, Bonine 2000, Gharipour 2012).

Although suq and bazaar are used in the majority Islamic countries, other pertinent terms (e.g., khan, qaysariya, badistan, and sarai) may be ambiguous in that they have various regional meanings or emphasized on different structures in the bazaar marketable complex (Um 2003). A single term can refer to a number of different structures with different purposes.

Bazaars have played a vital role in the cultural, economic, and even political alterations of cities all over the Islamic world. Such an essential role has defined it as a fundamental part of the city, frequently a generator of urban form, as well as defining the elements of the city. Furthermore, the bazaar is defined as the heart of most cities in the Islamic world. Its spatial and symbolic link to key parts of the city, for instance, religious, residential, or administrative quarters, has gotten the bazaar to eminence in the built city, but in the political realm as well. Controlling the economy and trade, bazaars are capable of establishing a strong relationship, sometimes a coalition, with the forces of power (Guichard 1997, Gharipour 2012).

4.1.1 Institutional properties

- ***Guilds***

The Guilds are one of the fascinating medieval Muslim culture phenomena. Thus, it is seldom possible to recognize specific municipal authorities or other permanent urban systems which are all about cooperation and unity spirit. The government's interrelationship, the bazaars (local traders), and the intricacy of the bazaar business necessitated some kind of organization, which was the guilds (Lewis 1937).

All retailers in the bazaar were clustered according to their wares in separate quarters of the market. In different countries, the guild had different denotations. Guilds (plural) were referred to *asnaf* in Persia, *asnaf, naqabat,* or *tawa'if*in Arab countries, and *loncalar* in Turkey. The guild comprised of people involved in the same kind of business or craft (e.g., blacksmiths, coppersmiths, dyers, and shoemakers).The guilds have also become Islamic societies and trade unions. Typically every guild or group of traders had their own position on the market, a practice that often made it easier for consumers to find top-quality and best-priced products and services. Usually, the guild provided *waqf* money supporting local mosques, not only out of piety but also in support of the religious authorities (Gharipour 2012).

- ***Waqfs***

The waqf, Islam's distinctive form of confidence, is another contributor to the economic achievements of the Islamic world and also to its subsequent economic pause. From the eighth century to modern times, beyond law and order, Muslim-governed states explicitly offered few public goods. They left the provision of public goods primarily to decentralized waqfs established.

Several sultans, emirs, and great men of state were of great significance for the establishment of many Waqfs at the scientific, medical or caring level. These efforts were most often personal and nonofficial. However, the great imperial waqf of the Ottoman period is the product of an urban-development program that simultaneously changed the architectural landscape and shaped the growth of the fabric infrastructure. Where the reasons for the political elites' dedication to the establishment of waqfs were always personal, their acts nevertheless played a significant religious, science, and cultural role in all areas of our society: mosques (masjid, jämi s), Koranic schools (madrasas), zawiyas and khanaghas. The waqf subsidized hospitals (bimaristans) play a significant role in medicine and education growth (Sroor 2010).

Usually, the guild provided *waqf* money supporting local mosques, not only out of piety but also in support of the religious authorities (Gharipour 2012).

4.1.2 Functional and architectural properties

Nassehzadeh (2011) defined the bazaar in the architectural sense as a closed public road, bounded by shops and stores on two sides. The bazaar's architectural and spatial design relied heavily on the city's climate, culture, and economic strength. The most popular structural framework in roof construction was combining dome and vault. In several of the instances, geometric pattern moldings were used to decorate the inner surface of the roof, including several colors. The form of decoration and materials depended heavily on local culture and the environment.

Gugu (2009), regarding the architecture of covered Bazaar, states, " Besides the retail function, bazaars are one of the focal points of the community (in addition to the mosque) in the Muslim cities. They include workshops fountains, mosques, schools, music chambers, and public baths and act as is a cultural, social, commercial, educational, and sanitarian area".

In Islamic bazaars all over the world, the features and interconnections between the inner and the surrounding space are nearly identical. A variety of Special shops have been assembled under a single roof and function as an articulation point in the pattern of urban land use as an architectural characteristic of the Bazaars (Nassehzadeh 2011).

Islamic bazaars are generally constructed in time, with changes in terms of city and street layouts organic patterns. No matter how they were constructed, bazaars always had links with important and prestigious religious, governmental, and public buildings and identified the main streets of urban fabric connecting two main entrances, especially from the small towns (Nassehzadeh 2011).

4.2 History Transformation of The Historical Bazaars of Medina of Tunis

The Tunis medina is situated in a fertile plain, north-east of Tunisia, a few kilometers away from the sea. The Tunis medina is one of the first Arab-Muslim cities in the Maghreb (698 AD). A city of many dynasties of universal radiation, it is a human institution that experiences the relationship between architecture, urban planning, and the socio-cultural and economic impact of past cultures.

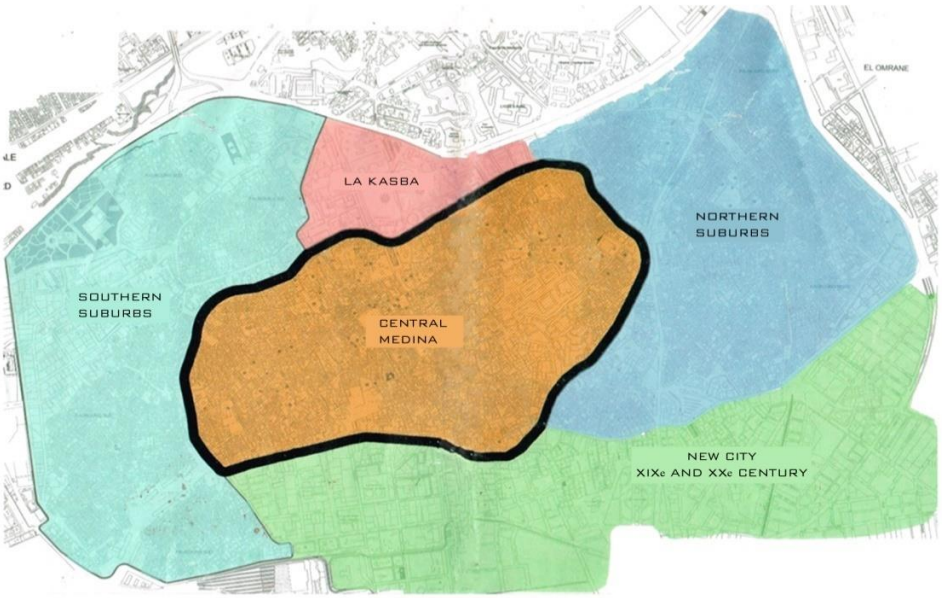


Figure 4.1. The location of the central medina of Tunis (by author Provided by ASM)

The property inscribed occupies an area of approximately 280 hectares and comprises all the constituents of the Arab-Muslim city. This is made up of the central medina (8th century) as well as the northern and southern suburbs (13th century). Between the sixteenth and nineteenth centuries, it was granted several palaces and houses, large mosques, madrassas, and zaouias, etc. (UNESCO 2019).

The medina of Tunis is one of the few Arab cities that is preserved until today. It bears witness to a remarkable architectural tradition, which makes it a source of inspiration;

welcome to draw all those who estimate its architecture at its fair value. It is a very fertile field of analysis to understand the structures and the spatial organization of a traditional urban form. It is a must to go across history and check the important periods and regencies that have affected it.

4.2.1 Historical background of the city and its bazaars

Since Antiquity, the formal configuration in the Medina of Tunis has undergone quite a few changes due to many perturbations, such as war, economic crisis, disasters. However, it reflects an outstanding continuity typo-morphological and function over the course of several centuries. From the 5th century up to our days, the Medina has had a different variation, in particular in its core: the collection of souks.

There are five main periods related to the historical development of Tunis bazaars. These eras were formed according to the different civilizations it dominated.

- ***Under The Zirids or Canhaja (IX - Xth century)***

From the beginning of the Arab occupation in the 8th and 9th centuries, Tunis was equipped with urban equipment cores around the ***Zitouna Grand Mosque***[*], which was established by the first coming Arabs in 695 AD. Who could force out the last Byzantines. According to some archaeological researches, the city existed even before the Arabs conquest (Santelli 1995). Furthermore, it has a neutral urban structure with a destroyed city wall ready to be restored and rebuilt.

The Medina of Tunis went through different evolutions like the reconstruction of the city walls and the redefinition of the city center and principle *Souks* around 'Zitouna' Mosque. It can be said that there were two great redefinitions of the city structure; the city's limits and the city center, which is the 'zitouna Mosque.' One of this redefinition was after the

[*] Zitouna Grand mosque, the most prestigious religious teaching and worship center

destruction and the plundering that happens to the city and its souks around 945, by a man named "the man with the donkey (*Sahip al Himar)*, who destroyed all the Bazaars that surround the Zitouna Mosque and the city walls. Nevertheless, after 949, a Saint man named ***Sidi Mehrez*** (975 -1022 AD), He had the responsibility of rebuilding the medina walls and reorganizing the trade and craft industry by establishing new souks.

Sidi Mehrez was also responsible for the construction of the ***fondouk***[*] "*El hratriya*" which is near his ***zaouia***[†]**.** Furthermore, He has installed the Jews at the Hara of Tunis to support the growth of trade and the success of the craft industry. (Anonymous 1982).

In the tenth and eleventh century, Tunis already had its economic base, with a relatively large and prosperous soukier equipment, complemented by fondouks and *oukalas*[‡] for travelers and traders.

- ***Under The Beni Khorassen (1063-1159 A.D)***

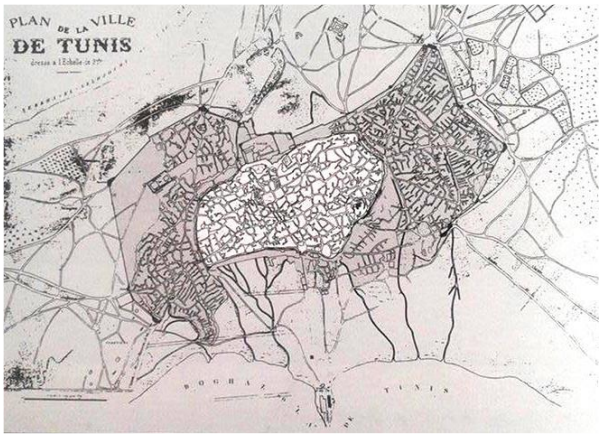


Figure 4.2. The central Medina in the middle of the 11th century under khourassanide (Tira 2017)

[*] Fondouk is a caravanserai or travellers' inn, often placed in or near a medina and common along the old trade routes of the region.

[†] Zaouia or Zawiya is an Islamic religious school or monastery. The term is Maghrebi and West African, roughly corresponding to the Eastern term madrasa.

[‡] oukala, from the Tunisian dialect and which originally designated a pension rented for a short period to single men coming for work in Tunis or for trademen.

It is under the *Beni Khorassen*, and that Tunis becomes the capital of *Ifriquiya* and the center of power (Anonymous 1982).

The existing topographical distribution of the souks already appeared in all around the Grand Mosque. Trade in rural areas forced some trades to be developed at the Medina gates and gave rise to the suburbs. In addition, the external trade was prosperous .The maritime trade was mainly coordinated with the countries of the East (Egypt, Syria). The key source of wealth for Ifriquiya was trade (Santelli 1992). It became a major trading center in the middle of the eleventh century. It was the meeting point of merchants from various coastal countries, such as the Normans of Cecilia, assisted by its geographical position. (Tira 2017).

- ***Under Almohades (1159 - 1228 A.D)***

Under *Abdelmoumen* ; who invaded the territory on July 12, 1159, Tunis became the capital of a great nation, including present-day Tunisia, Tripolitania, and part of Constantine. Tunis was chosen for its geographical position and its strategic position compared to other rival cities such as *Kairouan* and *Mahdia* (Anonymous 1982).

The first architectural achievement undertaken by Almohades is the construction of a Kasba fortress. It contributed to the prosperity of the craftsmen and merchants of the medina and, consecrated to the union of Ifriqiya with the extreme Maghreb (Daoulatli 2009).

The maritime trade turned to Europe, traded under Beni Khorassen, and flourished under the Almohads. This allowed the installation of the first nation fondouks. The Pisans were the first to occupy these fondouks to carry out their transactions. The social and economic situation under the *Almohads* was relatively prosperous, although from time to time, it was affected by crises caused by wars and epidemics (Anonymous 1982).

- ***Tunis Under The Hafcides (1228 - 1535 A.D)***

Abu Zakariya is the founder of this powerful dynasty that reigned long enough (more than three centuries). He is dedicated to the country's political and economic organization. His reign was marked by intense economic activity, and a number of souks were born to those descendants. Such souks have been classified by specialization. The rise of luxury goods was spectacular, including weaving and leatherwork. The majority of the population was oriented towards trading and crafts.

The principal districts of the medina had been endowed by Hafcides, fondouks, oukalas, hammams, maderaças. Among the fondouks, we counted: Fondouk *el Touil*, fondouk *el Yasmina*, fondouk *el Warda*, Fondouk *Ez zit* (oil), Fondouk *el Ghalla* (Fruits),etc.

The corporations grew and multiplied, testifying to the importance of the transactions that were made in the souks.

The Hafcids favored the establishment of the Andalusians, who brought with them new practices in the fields of agriculture, crafts, commerce, and construction. There is the example of Quassim El Jelizi, known to have excelled in the crafts of "Jeliz" (ceramics).

The Jews who were also expelled from Spain had come to enlarge the population of the hara. They engaged in several activities in the souks (including goldsmiths), and financial and land transactions.

The creation of a port in La *Goulette* had not directly influenced the internal economic system of the old town. Indeed, the different transactions, such as import and export, were done through Jewish and Christian commercial agents. The latter ensured the passage of the goods from the external economic system to the internal economic system and vice versa.

In their fondouks out of the enclosure, the tradesmen Christians: Venetians, Pisans, Catalonia, settled in the XII century, took care of these exchanges with the people of the country, which were linked to a rigid and constraining corporative system.

Exports to Europe include products such as canvases, fabrics, Weapons, carpets, etc. On the other hand, a large number of imported products enriched our souks in the form of cereals, silk, metals, etc.

In the Hafcid period, the external trades were prosperous; it had generated conflicts with other countries. These conflicts often ended with treaties signed by Bey. The caravan traffic of gold provided enough capital to the Ifriquiyenne city.

The Hafcid period saw the birth of several souks, which had preserved their typology, and especially their topographical situation in the medina of Tunis. They are often kept their original function until today; Souk El Attarine, Souk El Chammyine, Souk Es saffarine, Souk Er Rbaâ, Souk El Kachachine, Souk El Koutoubi, Souk El Quemech and Souk Es Sagha. In addition, the Hafcid period saw the birth of new crafts such as; Boilermakers, Joiners, Locksmiths, Blacksmiths and The dyers, far from the center. And, other crafts, outside the city gate like The Quallalin, The Halfaouine, The Tabbabin, Souk el Hout (fish markets), Souk el Jazzarine (butchers market) (Anonymous 1982).

- ***Tunis under The Ottoman Empire***

Under the Turks (1535 - 1705 AD)

The Turks had inherited the Hafcides, a well established urban amenities. The confrontation of the two civilizations had led to the rise of the Ifriquian economy. Indeed, during the reign of the Turks, other souks were born because of the introduction of a new way of life in the city.

Historians point out the construction of the souk *Al Trouk* (Turkish souk): the souk of the curlers and tailors of Turkish clothes; until today, it is one of the most beautiful and picturesque souks. The souk sells saddlers, sheltered the corporation which made saddles of horses, embroidered by gold and silver threads, the souk *El Leffa* (souk of the Djerbiens[*]), as well as a large number of souks, were built or rebuilt in the 17th - 18th century.

Another aspect of the internal economy was the growing presence of products coming from the interior of the country, in the markets and souks of the city.

One of the crucial factors at that time was the second arrival of the Andalusians[†] (60,000 to 80,000 people), under the reign of Othman Bey. They would bring new techniques and architectural practices and the manufacture of *chechia*[‡]. Having seen in it a great source of income for the country, the Beys Mouradite built three souks of chachia: the small souk, the big souk of chechias, and the Souk el Hafsia.

The Andalusians had also perfected the techniques of weaving silk while promoting the cultivation of the silkworm. The craftsmen "*hrairiya*" (silk artisans) worked inside their fondouks, far from prying eyes, jealously guard their technique inherited from father to son. These two industries made a large male labor force work in the souks and the fondouks. Women worked in their homes.
The corporations of chachias manufacturers, weavers, saddlers, perfumers were among the noblest families and dignitaries of the country.

The external trades in the eighteenth-century had its golden age and brought wealth to the treasures of the state and the people who practice (usually the state's high officials). These Trades allowed the supply of the country by goods and especially by slaves. It was

[*] Djerba is a Tunisian Island, Djerbiens is the Tunisians that originally from it.
[†] **Andalusians** are the people of the eight southernmost provinces of Spain: Huelva, Seville, Cadiz, Cordoba, Malaga, Jaen, Granada, and Almería.
[‡] The **chachia** is a traditional red wool cap which used to be worn by almost all Tunisian men. This cap had been taken from Andalusian influences in the Medina of Tunis.

suspended in 1814, under the reign of Mohamed Bey, under the express pressure of the French fleet.

The caravan trade was between the Maghreb countries, Egypt and black Africa, for the contribution of slaves and gold dust. From Mecca, Tunis received muslin, coffee, linen, necklaces, and exported silks and chechias.

Transactions with Europe were even more advanced. The existence of the Dutch, English, and French fondouks, in 1660 was reported. They were hired by the Bey to house the consulates and merchants. Tunis received from these countries fine wool, fabrics of all kinds, products for dyeing, weapons, and ammunition, etc.

Tunis under the Husseinites. (1705- 1881 AD)

Hussein Ben Ali succeeded the Turkish rulers in 1705. During his reign, as under the Turks, the domestic trademarked a certain animation: the souks prosperous and full of artisans and goods. The prosperity of the craft industry reached its peak at the beginning of the century. Products were exported to eastern cities, especially chechia, which experienced a real expansion in the 17th and 18th centuries. At the same time, the souks were full of European and foreign products, products of the caravan trade, and especially products of the external trades, especially slaves who continue to erupt on Tunis. Industrialization and machinery had a detrimental effect on the country's artisans, who used simple and archaic methods, and whose products traded to be abandoned for the benefit of industrialized products, come from abroad and sold at lower prices.

In the Husseinite period, we note the construction of some souks such as the Bey souk between 1781 and 1813 JC, by Hamouda Pasha, and the reconstruction of many others; Souk *Es Sakkajine* between 1705-1740J.C, Souk *El Bala*t and Souk *El Blagjia* (1756- 1757 AD) which was built in the fifteenth century. At the same time, the Fondouks of the weavers worked with ardor; they felt the competition of European imported fabrics.

Above all, they felt aggrieved by the introduction of the first weaving machines in the country (early in the nineteenth century) (Anonymous 1982).

As far as the maritime trade was concerned, the predominance and the power of French navigation was already noticed. Its products are introduced without customs fees and taxes. The authority of the Bey diminished to the advantage of the Europeans, especially the French, who already felt their power. The finances of the state were overwhelmed by the abuses of the sovereigns.

Another essential factor that adversely affected the country's economy was the obligation to stop the external trades in 1816 and the definitive abolition of slavery in November 1819. These and other factors, such as the misery of the drought of 1867, finally shattered the country and led to economic and political decadence.

It was mentioned before that the influence of the French kept growing at the beginning of the nineteenth century, the French buildings no longer resided in the French fondouk, but in a large building in *Bab Bhar*, where the core Franc develops more. Besides, by bringing a new mode of production and exchange of capitalist type. The new European merchants settled in the old fondouk. It then becomes the stock market, the place where the most prominent business was, and where the high rates of capital were established.

Towards the end of the nineteenth century, there was a sharp acceleration of the decadence of the economy and the administration, which finally led to the "*Bardo*" Treaty[*] on 12/5/1881

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- ***Under the French Protectorate (1881- 1956)***

After 1881, the French protectorate started to develop, just next to the Medina, the other westernized town inhabited by Europeans. In this new town named the "New Ville" or the

[*] The Bardo Treaty of May 12, 1881 was signed between the Bey of Tunis and the French Government. He established a French protectorate in Tunisia. The bey was obliged to entrust all his powers in the fields of foreign affairs, defense of the territory and the reform of the administration to the "resident general of France".

"European Ville," the old Medinas had a different moral and practical form (ASM). As it was mentioned by Anton Escher and Marianne Schepers, “during the French protectorate, the Medina was viewed by all actors at that time as the antithesis to the Ville nouvelle. This difference is based on morphological opposites (Escher and Schepers 2008).” The ancient Medina was, in fact, a symbol of the socio-economic backwardness of the Tunisians for the French government. Thus, a proper French way of life in the new city was established. This trial took the Tunisians closer to their religion and their national and cultural heritage. In brief, it was the symbol of colonial struggle resistance. It was from the central Medina's cafes, mosques, madrasas, and souks that the main Tunisian leaders of the resistance succeeded in overcoming the French protectorate (Tira 2017).

4.2.2 Current situation of the Medina and its bazaars

Today, the medina of Tunis is a truly changing neighborhood, which has been a UNESCO World Heritage Site for 41 years, covers an area of approximately 300 hectares, and has more than 15,000 dwellings. These comprise of 700 historical monuments which cover seven areas, amongst which the most remarkable ones are the Zitouna mosque (Figure 4.3), the Kasaba mosque (Figure. 4.4), the Youssef Dey mosque (Figure 4.4), the door (gate) of Bab Jedid, the door (gate) of Bab Bhar (Figure 4.5), the Souk el-Attarine (Figure 4.6), the Dar el-Bey, the Souk ech-Chaouachine (Figure. 4.7), the Tourbet el Bey (family cemetery) (Figure 4.8), the patrician houses such as Dar Hussein (Figure 4.9), Dar Ben Abdallah (Figure 4.9), Dar Lasram, the Medrasa Es-Slimanya, and El-Mouradia, the barracks of El Attarine, which has become a national library and Zaouia *Sidi Mehrez*. With its souks (bazaars) economically vibrant, full of economic and craft activities emerging in more than 40 souks, its urban infrastructure, its residential neighborhoods, its monuments, and its gates, the ensemble is a template among the best preserved in the Islamic world (UNESCO 2019).

Figure 4.3. The Zitouna Mosque (Aadnani 2013) (Anonymous 2018)

Figure 4.4. A) The Kasba Mosque (Anonymous) B) The Youssed Day Mosque (Entwistle 2010)

Figure 4.5. Bab Bhar Gate before (Bourial 2016) and nowadays (Fawcett 2013)

Figure 4.6. Souk Al-Attarine before (Anonymous) and nowadays (Anonymous 2020a)

Figure 4.7. Souk Ech-Chaouachine before (Anonymous 2018) and after (Anonymous 2020b)

Figure 4.8. Tourbet el Bey (Anonymous)

Figure 4.9. A) Dar Hussein (Anonymous 2012a) B) Dar Ben Abdallah (Anonymous 2012b)

- ***The main elements of the city***

In Tunis, the new city quadrille, the lowlands, located between the Medina and the port, and the old city port (Bab el Bhar) is now a vital hub of the whole city. In contrast, the citadels that the military imperatives had once constructed at the uppermost point of each site are logical now, whereas they remain the opposite of the modern cities (fig.4.10). Consequently, the axis of the new city kasaba (barracks) can establish a reference orientation in the medina of Tunis. Besides, this axis presents well-marked characters in the medina itself. There is invariably a large mosque with weekly preaching located there (J'maa) and the souks, which is the district of commerce and craft from which the residence is practically excluded, spread primarily around this mosque, with additional developments in the direction of the Kasbah (Lowy 1980).

4.10. The main elements of Medina (Lowy 1980)

The Tunis medina offers a particular urban framework, the center of which is the al-Zaytouna Mosque. The mosque is the aspect by which the city, whatever it may be, operates; since it is from the mosque that the group of believers adopts its customs and behaviors related to religious norms. It is a consideration that every city is a city, and every urban society is a society of believers. It is the great unifier of urban space. Appreciations to the mosque that urban dispersion finds its unity within faith indivisibility. The shopping streets and crafts that make up the Souks district are clustered around this great mosque; outside this main area, there are residential neighborhoods (Saadaoui 2001). The Souks are called according to their company and have the flexibility to be structured, each job having a fixed location, and each product is sold in a precise location.

- ***Definition of the Souk Area***

The term "souk" derives from the Akkadian suq, which meant "loosely enough streets and all public roads." This would have been echoed in Aramaic in the form of Šûq to mean street and place (Mermier 2005).In Arabic, this term would have been used to mean, "at the origin, the place where one drove (sâqa, yasûqu), the animals that one wanted to sell" (Ibn Manzûr provides this definition in his Lisân al-'Arab).

According to Arthur Pellegrin, in the 8th century, there were 37 different souks. The Medina Central of the Tunis Medina of (ASM) presently covers an area of 100 hectares. Under the Hafsids regency, the textile industry has established a variety of new forms, such as silk, wool, cotton weaving, spinning, trimming, and dyeing. This improved appearance of new bazaars over the regency that succeeded (fig. 4.11) can be recognized in three different circles. The first includes El Attarine, El Chammaine, El Saffarine, El Rbaa, El Kachchachine, Koutbia el Qmech, and Sayghiyya el. The second circle includes 'el Najara, which still exists with a similar purpose; el Haddedin, el Sabbaghin, el Qsaderjiyya,' situated in the Medina's outlying districts. Lastly, the third circle, including 'el Qallalin, el Halfaouin, el Tabbabin, el Jazzarin, Souk el Hout (fish market), which is found outside the city walls (Tira 2017).

The names of their professions had a significant impact on the urban nomenclature, which shows the craftsmen and tradesmen's role in Tunisians' social life. The names of the various existing commercial activities have been mentioned. (Ibid).

The trade’ name indicated three corresponding authenticities: the marketplace where traders and craftsmen carried out the operation; the professional organization which assembled them and whose center was that geographical point; and lastly, the place that the name ended by ascribing itself, the toponymy of which stopped to have any technical importance (Raymond 1985).

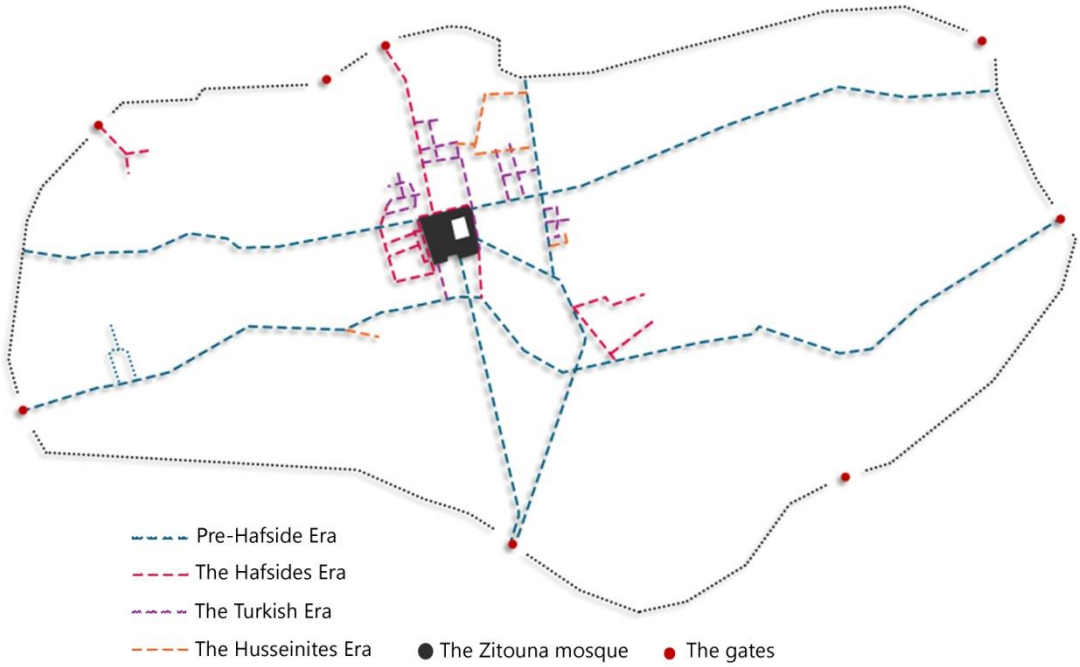


Figure 4.11. Evolution of the souks (bazaars) (by the author provided from ASM)

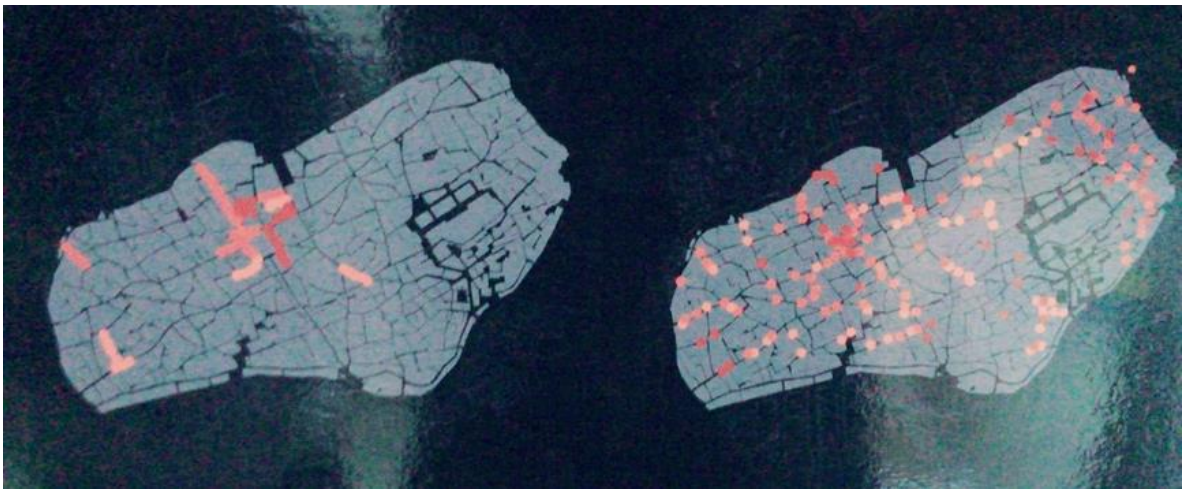
Many products manufactured locally or imported from outside have not been equally distributed in the region. Some conventional rules govern the flow of financial functions in the medina and the exemption of these operations from the suburban region. Nowadays, the souk is an urban economic structure. It is made up of a central aisle and a double row of merchants and artisans' shops and workshops. Each souk is generally characterized by the operation taking place there (ASM).

In most of the souks, a single corporation is grouped; there is no distinction between the functions of production and that of marketing products.

The great mosque is bordered by the souks "Al attarine," "El qmech," "El souf," and "El fekka." These souks are specialized in rich craftsmanship, not very noisy; they are covered with crossed and barrel vaults, paved and far from the residential districts of the old city. Certain rules governed the souks; it was the degree of noise and visual pollution, the

pollution caused by the activity, the size of the products, and their financial and fiduciary value. The more the craft activity is noisy, polluting, and exhales terrible smells, the more it is expelled towards the Medina; it is the case of Dabbaghine, Quallaline. This hierarchy de facto of souks presides over their distribution in the central medina. It has been maintained for centuries thanks to the authority of the "*Amana*" and "*sheik*" of the medina who oversee the exercise of the profession outside the perimeter of the souk (ASM).

However, certain evolutions have been felt. The disappearance of certain market places: place "SidiMardoum" and the change of use of certain souks following a downgrade such as manufacturing candles (Chammaine). In some cases, the network of souks overflows on the neighboring streets, which become, in fact, souks without having status (figure 4.12) (ASM).



4.12 Evolution of the bazaars, Before and nowadays (provided from ASM)

The medina thus preserves the memory of streets specializing in certain trades which have retained their names: souk "*El haddadin*," souk "*El ghrabliya*" souk "*El sabbaghin*."

The Medina's souks are not established in the urban fabric in an anarchic way, but on the contrary, their topographic position constitutes an adequate response to a well-determined need.

4.2.3 Conclusion

The historical bazaar area in Medina of Tunis underwent many changes over centuries and dynasties due to wars, epidemics, human destructions, economic crises, etc. Although these disturbances, the Medina of Tunis, together with its bazaar, reflects a remarkable continuity through its typo-morphology, urban spatial configuration, bazaar functions. It survives every time, absorb inconveniences, and adapt to new changes.
This bazaar area still exists, maintaining its identity, its main functional and architectural properties, and preserving its importance in the city's economic development.
It proves that the historical bazaar area in Medina of Tunis has a resilient urban system.

Despite all the disturbance that has experienced, the resistance of the Medina of Tunis is a result of a long process and facts that characterize it. In the next pages, in line with the indicators of a resilient urban form that is studied in the first two chapters, detailed analysis is performed on the medina and its bazaars to decipher the process under its resilience.

4.3 Resilience Indicators Studied on Medina and Its Bazaars

The following concepts are mentioned in other parts of the thesis. However, these concepts take place in this part to analyze the reason Medina of Tunis' bazaars has preserved its existence for centuries is due to its features regarding resilience; Diversity, connectivity, modularity, redundancy, and adaptability.

4.3.1 Diversity

As we defined in the previous chapter, A system characterized by high structural and functional diversity can respond to multiple needs simultaneously without requiring any structural change and can perform under a great variety of circumstances (Feliciotti 2018). Diversity can be studied in different aspects;

- Human,
- Social/ institutional,
- Economic,
- Physical.

The physical aspect can be divided into two views functionally, in terms of variety of land uses, whether the availability of different functions in the surrounding area, which refers to mixed use of urban land and a variety of open areas. Moreover, spatially, in terms of spatial distribution, as the shape and size of urban components are heterogeneous, which is connected with the spatial distribution of urban structural features and referring to equitable access to basic public facilities in the region, and a reduction in the risk of disruptions affecting the entire system. (Suarez et al. 2016, Feliciotti 2018).

The economic aspect can be deliberate as the diversity across economic sectors in the city. The social aspect of diversity can be studied in terms of socio-cultural diversity; Ethnicity, religion, etc. Also, in terms of a diverse set of organizations and institutions.

- ***Diversity in term of variety of land uses***

In Tunis, the medina is a full-fledged district. It is an area of residence, but it is still an important developmental field. In addition to the souks, we also noticed religious buildings, public buildings, schools, cultural buildings, commercial buildings, etc.

- ***Public buildings***

Figure 4.13. Public buildings (Marrou 2007)

The majority of public buildings are based around the old Kasba, mainly ministry and municipal buildings. We can find a homogeneous distribution of public buildings in the medina, aside from these institutional structures, such as museums or community structures (daycare center, youth center, etc.).

- ***Religious Buildings***

Figure 4.14. Distribution of places of prayer (Marrou 2007)

The diverse places of prayer are very homogenously distributed in the medina. The Zitouna Mosque, which is the main mosque, is located at the center of the urban structure, but then all the neighborhood mosques are an efficient local network. More than mosques, there are also *Zaouias* and *Tourbets* (not included in the figure).

- ***Schools and training buildings***

Figure 4.15. Distribution of schools (Marrou 2007)

There are several schools on the territory protected by the medina. These are either integrated public schools or free schools, some exclusively for girls. Many of them are tiny but cover all the old town communities.

- ***Commercial activity***

Figure 4.16. Distribution of commercial activity (Marrou 2007)

The primary sector of the medina remains commercial activity. Commercial spaces include places of sale, storage, processing, carpentry, copper works, etc. This study deals with commercial activities in Medina (Souks) and makes these places of activity significant.

- ***Different types of equipment (social and institutional)***

The attractiveness of the medina is mainly due to its numerous cultural facilities. The ministries located mainly on the northwest side coordinate a large number of workstations.

The continuity in the medina of Tunis is the unique attribute of the revitalization steps that are held at the head office of the Tunisian government and the Nation of Tunisian with their

location in the former kasbah. In all, there have been nine Ministers and other official buildings, the newly-built National Bibliothèque, the University of Tunis I, and the National archive, situated here or near to the kasbah. (Escher and Schepers 2007) (Figure 4.16).

As a result of the government district's location and its close spatial connection with the medina, many palaces and townhouses situated in the core of the Medina are restored by the state to accommodate state institutions and cultural and social facilities. (Escher and Schepers 2007).

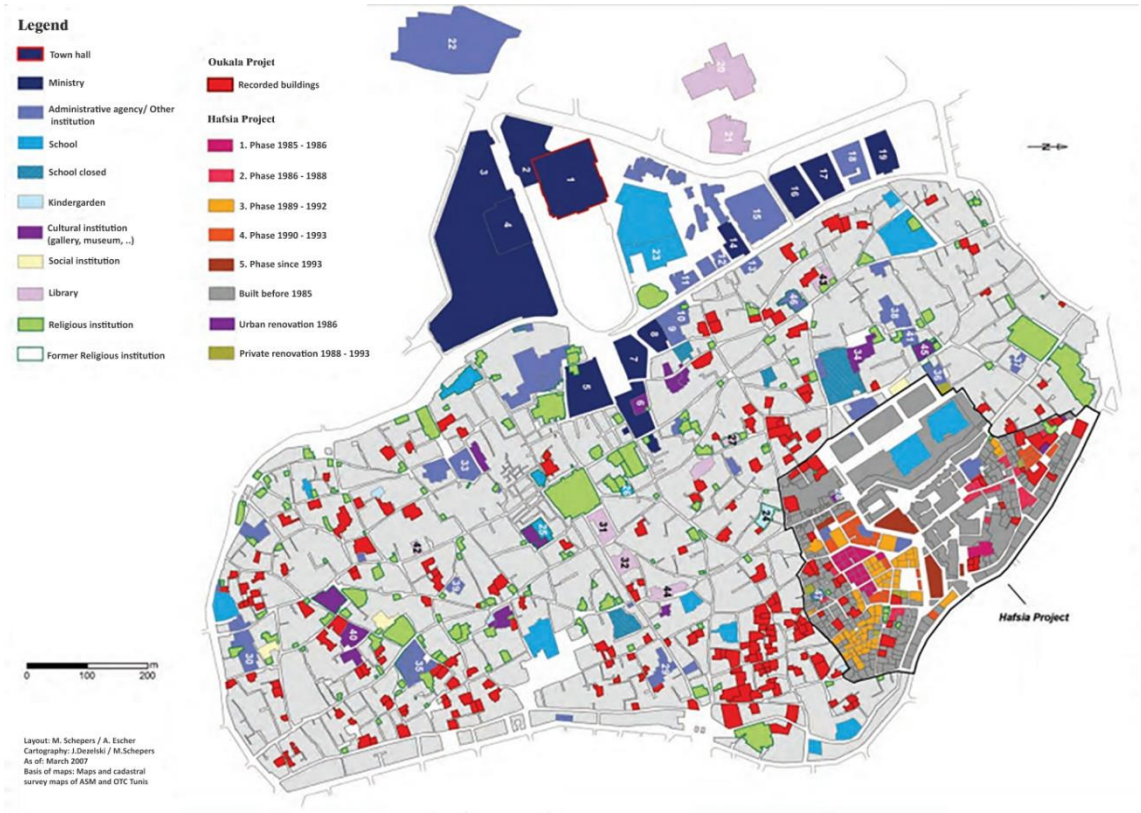


Figure 4.17. Land uses and different types of equipment of Medina I (by Author adapted from Escher and Schepers 2007)

Furthermore, several revitalization initiatives focus on two boulevards, the rue Dar el Jeld and the rue Sidi Ben Arous are extending into the rue Du Pascha. In contrast with the rest of the medina, these streets stand out, as there is an unusually high density of remodeled houses, jewelry shops, galleries, and first-class restaurants.

At the edge of the medina, in the north of the district and across the District Court (Palais de Justice), many posts of clerks, paper, and copying stores, as well as a large number of shops for food, have settled.

In the medina, over 140 food outlets, restaurants, and cafés with various price and class categories, where the workers from the government district, surrounding establishments, and visitors can eat there.

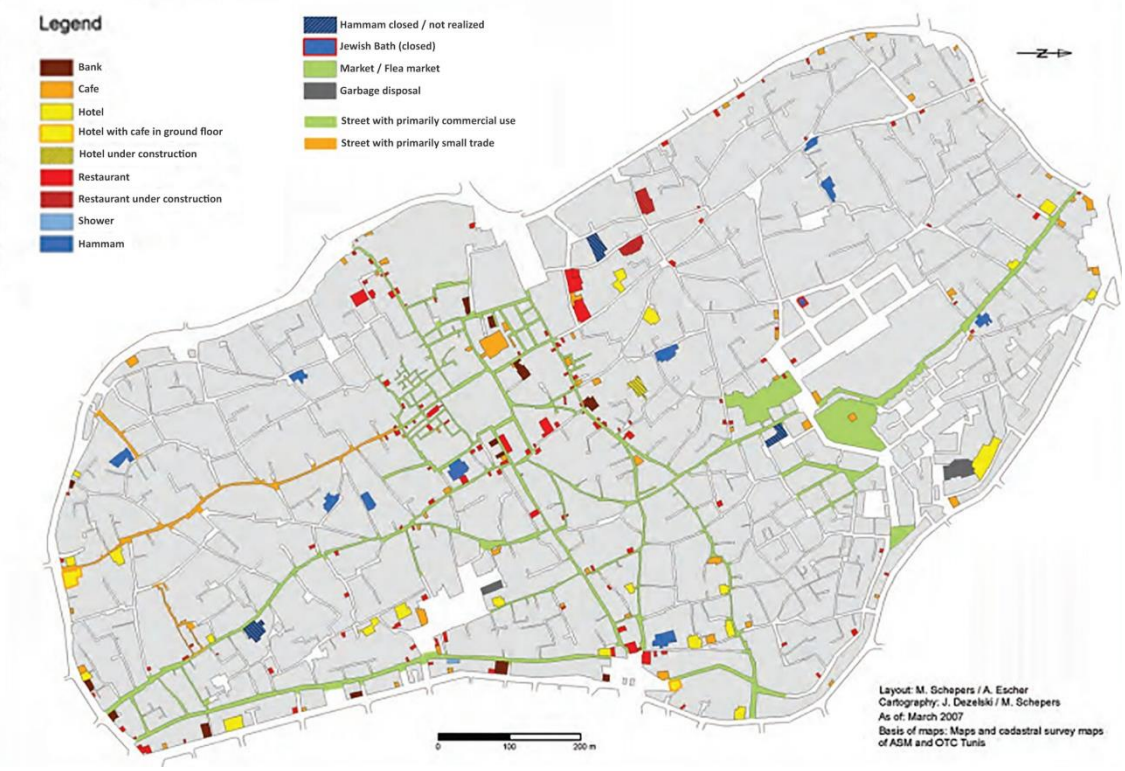


Figure 4.18. Land uses and different types of equipment of Medina II (by Author adapted from Escher and Schepers 2007)

- ***Diversity in term of the spatial distribution***

The spatial distribution is a network whose elements are urban centers (mixed-use commercial, office, cultural, etc.) centers on the whole scale of the city and its districts and regions, important transportation routes (main roads and metro lines), principal functional axes, and significant land use (on the scale of the city and its districts and regions).

The diversity of its spatial distribution defines the bazaar area in Medina of Tunis. Its diverse building and functions exist in every souk other than stores; Mosque, Fondouk, Medrese, Hamam, Midha.

- **Mosque**

The mosque is the element by which the city (whatever it may be) exists because it is from the mosque that the community of believers takes its habits and behaviors related to religious norms. For this reason, the mosque is the factor for which every city is a city, and every urban community is a community of believers. The mosque is the great unifier of the urban space. Thanks to the mosque, urban dispersion finds its unity in the indivisibility of the faith.

- **Fondouk**

The fondouk is a term of Greek origin which designates a closed place. It is a place of accommodation for travelers, a stable, a warehouse, and a workshop for craftsmen. The square or rectangular shaped fondouk is a series layout of open-air cells often lined with porticoes.

Like the place in the city, the court of the fondouk constitutes an organizational space of distribution and connection between the different entities. It is also a place of gathering and social exchange between travelers and craftsmen (Chirchi 2017).

The Medina of Tunis is vibrant in fondouks. Some of them are transformed into restaurants, or galleries, Culturel centers, etc. The other ones are not used and not conserved. One of the famous ones is Fondouk des Français" or "French Fondouk" and Al Attarine Fondouk.

Figure 4.19. A) French Fondouk (Falgas 2008) B) Al Attarine Fondouk (Djellouli 2019)

- **Medresa (Koranic school)**

Medresas appeared during the Hafsid era, from the thirteenth century; the medresa provides two essential functions: accommodation of students and teaching that takes place in a prayer room belonging to the building. Generally, the construction of madrassas results from the generosity of sovereigns or pious patrons. The main components of the medresa are: a prayer room, which is the most crucial element of the building because assigned to both worship and education, a courtyard (often framed by porticos) which constitutes the space around which the layout of the various elements of the building is arranged, cells or rooms of small dimensions intended for the housing of the students and finally a room of ablutions generally occupying a reduced space of the building.

In the Medina of Tunis, it is possible to distinguish two types of madrasas: those built under the Hafsid dynasty are characterized by the preeminence of their functionality on the architectural and decorative aspect; most of them are buildings of great simplicity. The medresa El Mountaciriya and the medresa Ech-Chamaiya are good examples.

Figure 4.20. Medresa Ech-Chamaiya (Bourial 2019)

In opposition to the austerity of the Hafsid medresas, those built during the Beylical period (mainly in the 17th and 18th centuries) are characterized by a greater scale in architecture, resulting first of all in the treatment of exterior facade carefully decorated: monumental doors and large windows framed with moldings. The El Bachia madrassahs (Rue des Libraries), Mouradiyya (Cloth souk), Slimania, and Médersa Al Khaldounia (El Attarine souk) are typical examples (ASM).

- **Hammam, place of social and politique life**

Some hammams existed since the Hafside period (1200-1500), and many are now endangered (see our two testimonies). The oldest of the hammams dates from the first century AD (989). One of the oldest hammams in the souks area is Hammam Kachachine. It is located in the heart of the medina, in the souk of booksellers. It is easily recognizable by its painted door with black, green, and red stripes. This is one of the famous and ancient Turkish baths of the city, as it dates from the Ottoman period. It is only for men (Figure 4.20).

Figure 4.21 Hammam Kachachine (Anonymous 2014)

Before, most hammams were strategically built near the mosques because they were used for ablutions. Today, the newly built places no longer obey this architecture that wanted the hammam to be an integral part of a community that included the mosque and the school.

According to Blaise and Sbouai (2014), in their article *Hammams, forgotten heritage* that during the colonization, specific measures had been taken by the French, who also mistrusted the place as a means of political gathering. With the mosque, the hammam was the only place where people could discuss politics without being bothered. The hammams were very much watched by the colonists because one could find separatists there. The hammams were also used to hide Jews during the Second World War.

The 50 historic hammams reported in the 19th century in the municipal tax book, only 26 hammams were able to maintain their activity (Figure 4.21). Seventeen were destroyed, and seven others are closed (Blaise and Sbouai 2014).

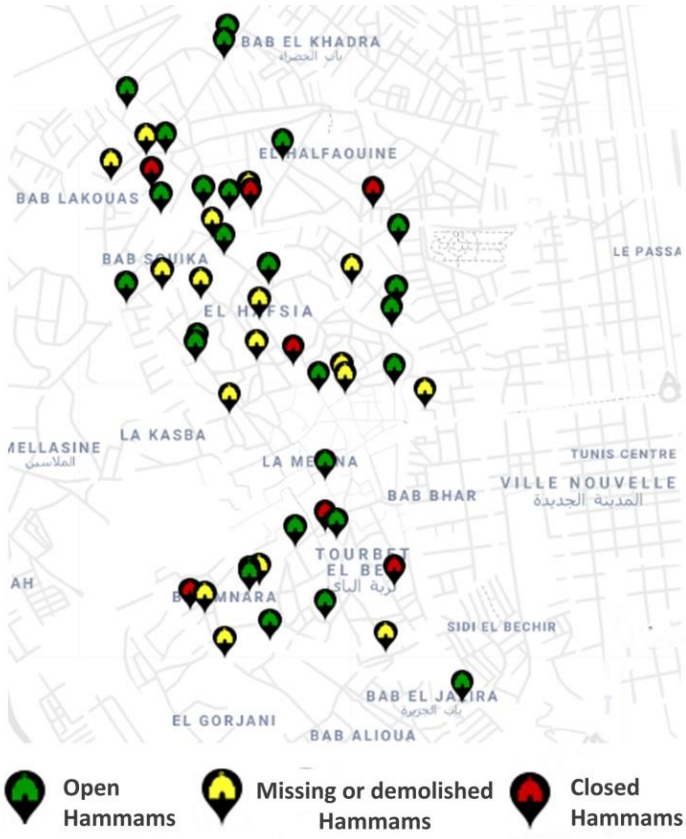


Figure 4.22 The existed Hamams in the central medina and its suburbs (Blaise and Sbouai 2014)

The traditional Hammams always had an essential place in the core of Islamic cities. The hammams have now become a cultural object, a heritage to be preserved. However, In Medina of Tunis, the traditional hammams are falling into oblivion. The lack of maintenance and the loss of the practice slowly exclude them from heritage memory.

- **Midha (ablution)**

Adjoining the great mosque Al Zaytouna, the ablution room at the bottom of the impasse Khaldounia is little known to the general public because it is not exploited in heritage networks. This "midha" was founded by the Hsidian Sultan Abu Amr Othman in the middle of the fifteenth century. Arches and galleries surround a small courtyard in the middle of

which is an octagonal fountain. The sultan's "midha" is in the heart of the Souk el Attarine and many people are unaware of the existence of this most endearing monument.

Figure 4.23. Midha (Bourail 2017)

- ***Economic Diversity***

The souks of the Tunisian Medina are renowned for their craftsmanship and trade diversity. Thanks to its strategic position in the Mediterranean, trading between the Mediterranean countries has been extraordinarily active since the 19th and 20th centuries, encouraging the variety of souks and sold goods. The diversity has remained unchanged, preserving the crafts passed down by a generation and maintaining the names and the function of the souks.

According to the study carried out by Paul Lowy on the density and commercial functions of the souks in the medina of Tunis, corporate traditions mark the distribution of retail trade; it is possible to simply figure the locations of branches of activity and trades. The linear threshold of 60% was used to qualify a dominant commercial branch (Figure 4.23).

Figure 4.24. Dominant Commercial brunch (Lowy 1980)

As the figure (4.23) shows that there are eight main branches of it, which strive to take into account not only classical functional distinctions but also a characteristic duality of the center: the juxtaposition, sometimes competitive, of handicrafts and manufactured objects. Thus two categories of clothing businesses are established, two categories for equipment-maintenance and a special category of manufactured second-hand goods, and finally, a category reserved for tourist bazaars.

concerning the study of the souks district (Lowy 1980), in the center of old towns, traditional crafts have a very great importance, which still play a key role of the economic developpment.

Detailed studies on the medina's souks described: the souks covered the outskirts of the Great Mosque Al-Zitouna are dedicated primarily to the noble trades. Wedding candles, perfumes, spices and sumptuous embroidered fabrics are skillfully presented with the galleries between massive columns painted in a red color and wrapped with white snakes below. The barrel vaults where the rays of light fall from one place to another. At this unique craftsman, the setting is more discreet. Only the area of the weavers is in souk el Beransia, and it shows a strong activity. The steady rhythm of the arms trade invigorates the streets with the making of haiks and blankets. Almost all trade in manufactured goods or souvenirs for tourists takes precedence over the manufacture and sale of handicrafts for daily consumption.

Few shoemakers work under the long whitewashed vault of the souk el Belghadjiya which sells slippers and shoes. The tailors of the souk ed-Dziria, the saddlers of the souk es-Serrajine, and the craftsmen of the small souk of the dyers whose neglect contrasts with the bright colors of the souks, are becoming increasingly rare. However, despite the eruption of the manufactured product and the wandering of the tourist, most of the Tunisian souks retain their old appearance.

The goldsmith souk with its modest blue wood workshops where women draped in white always come to sell or buy the old silver jewelry for family ceremonies, heavy and dull bracelets, finely chiseled rings, and earrings disproportionate. The boilermakers of the souk en-Nahhasin handling large tinned copper couscousers are squatting on the dirt floor. There again in the souk of the Chechias, the chaouachis in their spacious carved wood workshops consider themselves a bit like the aristocracy of the souks in each shop, a gallery of family portraits testify to the nobility of the master, heir a long line of old Andalusian stock.

- ***Social Diversity***

During the 18th and 19th centuries, diversity was a prominent feature of society due to the country's geographical location invaded by the East and West invaders—representing throughout the history of civilizations and different peoples.

Therefore, an inter-political approach to this society's ethnic accumulations becomes essential from a historical aspect to redraw its reality and determine the position of social actors inside it.

According to the study was conducted by the researcher Karim Ben Yedder; is a researcher in the economic and social history of the city of Tunis in the modern period, studying the crafts and artisans of Medina of Tunis distributions according to their origins amounts to 31 sectors. The distribution was as follows:

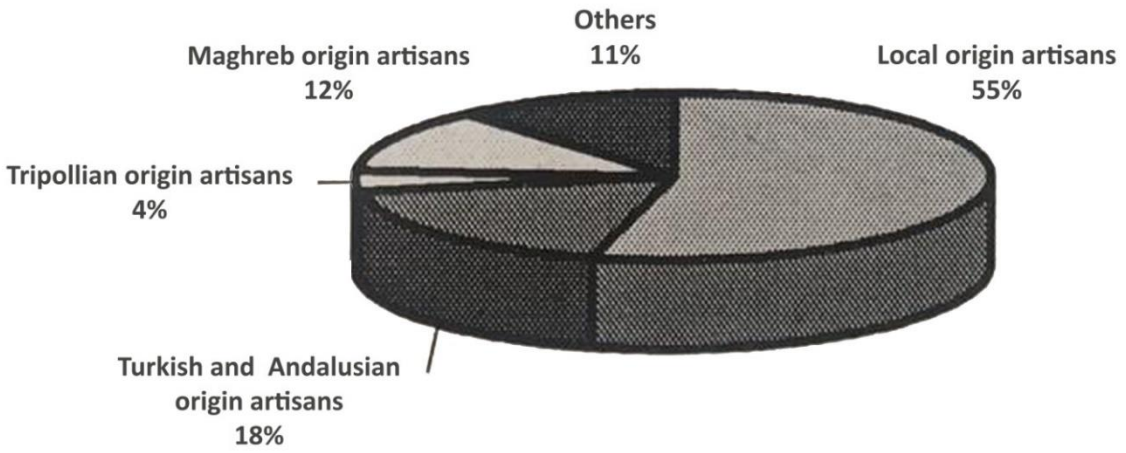


Figure 4.25. Distribution of origins of the artisans in the last half of 19 century (by author adapted from Ben Yedder 2007).

- ***Local origin artisans***

During the 19th century, the city of Tunis collapsed with migratory flows from the various areas of the country, some of which were initiated from rural areas, including which has brought to the present a new population of urban origins (Ibid).

- ***Turkish and Andalusians origin artisans***

Turkish and Andalusians origin artisans represented 18% of our sample. Therefore, they were the second-largest numerical group after those of local origin. They also represented an important tributary of historical civilization, in particular the Andalusians. Among them who "were more than for Tunisia, they represented a pump for urban culture." Their additions were evident in this area, primarily through the trades they made, which were not only a source of income for them but a positioning factor within the "community of the town-commune."

- ***Maghrib and Tripolians origin artisans***

They came from different countries of Maghreb, and they can be divided according to their numerical importance into two groups:

- "Moroccans" are the descendants of the west, that is, from Algeria, Morocco.
- "Tripolians" they are from Libyan origins.

- ***Jewish artisans***

Jewish artisans existed mainly in 6 crafts sectors, according to Ben Yedder (2007).

-Goldsmiths

-Tailors

- Burnous craftsman

- Shoemakers

-Silk knitting

The Jew distribution within these sectors has been characterized by their monopoly over them, except for the silk weaving sector.

Moreover, Al-Jabaiba (Jebba* craftsman) remained until the last third of the nineteenth century the jurisdiction of the Jews, and we hardly find one literal non-Jews in these sectors.

This professional specialization of the Jews can be explained by their unique position within the Tunisian agency, as by virtue of the fact that they have always represented a minority with a limited social impact, they were forced either; to pursue challenging professions in order to be able to compete or go to the sectors where there is a vacuum or that require high accuracy and proficiency.

- ***European craftsmen***

Unlike the rest of the craftsmen, Europeans are almost exclusively absent from them in the documents we have adopted, due in part to the limited number of them until the mid-19th century and their specialization in a limited number of crafts and to the fact that these craftsmen were subject, like other Europeans, to the authority of their consuls and had no relation to local craft institutions.

The most important part of this category belongs to the Italian Yen and the Maltese Yen, especially whom they specialized in two necessary craftsmanship activities, namely the trade of the Al-Tartushi board and the letter of construction, including the carving on the stones, as a small number of them were found in the blacksmith and the trade of Al-Safayah.

* Jebba is a loose garment which constitutes the main part of the traditional male costume in Tunisia.

The number of these Europeans was limited compared to the sum of the city's craftsmen, few of whom stood inside the walls. Their presence in the city did not increase until after the middle of the 19th century.

There are many forms of solidarity among artisans. They were linked to the organization of the craft world as a whole. The system of values that prevailed within this world was seen as solidarity, just as custom and various craft authorities devoted this either consciously or spontaneously. The form of solidarity took on professional and technical dimensions.

- ***Forms of professional and social solidarity***

Belonging to the same craft would automatically generate in the craftsman a sense of belonging to something like a family, mainly since the crafts were located in the same souk area, which supported this feeling.
Solidarity was a corollary of that, as artisans cooperated. By consulting in everything related production process, the new teacher used to turn to the older teacher for advice on technical or other matters. It is also one of the most prominent professional solidarity by participating in production or stores to reduce costs. Besides, the "teachers" exchange among themselves the tools of work and raw materials and even manufacturers whenever some of them needed it.

Also, affinity is one of the most striking forms of solidarity among artisans, whether they belong to the same profession or different craft specialties. These marriages were motivated by the common belonging of the two sons to the world of crafts.

It includes solidarity between craftsmen, even those of them belonging to different races. The presence of Jews in many trades alongside Muslims did not prevent the emergence of forms of solidarity.

Although the social diversity (origin, race, religion, etc.) of the artisans in Medina of Tunis, the multiplicity of aspects of corporation and solidarity exists between them. However, it does not mean that there are no differences and conflicts. These conflicts have always existed and have multiplied causes, but they did not represent a distinct phenomenon for the artisan community, which is only dominated by the character of solidarity.

4.3.2 Connectivity

According to Ahern (2010:153), "Connectivity is a property of cities that links urban form and function". In this part, we are trying to analyze and show the connection of the site of the souks with the main buildings inside the Medina walls and with the outside retracting the principal axes.

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- ***Connectivity inside the Medina***

Figure 4.26. Streets where the commercial activity is important (Marrou 2007)

In the past plans, looking closely at the major commercial sites, we can see that the main streets are two, one "perpendicular" to the other (Figure 4.25).

Those streets throughout history lead to the main streets of activity. Regional roads are easily accessible for pedestrians by links to the central Medina. Via its pedestrian arteries, Medina is linked to the outside. Therefore, through pedestrian interaction, there is a sense of continuity between the Medina and its immediate urban background. The layout of the bazaars can be said to have continuity with the layout of the region. An outside façade which separates the current colonial capital from the old city center around the Zaytouna Mosque is not present.

The medina's souks are not established in the urban fabric in an anarchic manner, but on the contrary, their topographic position constitutes an adequate response to a well-determined need.

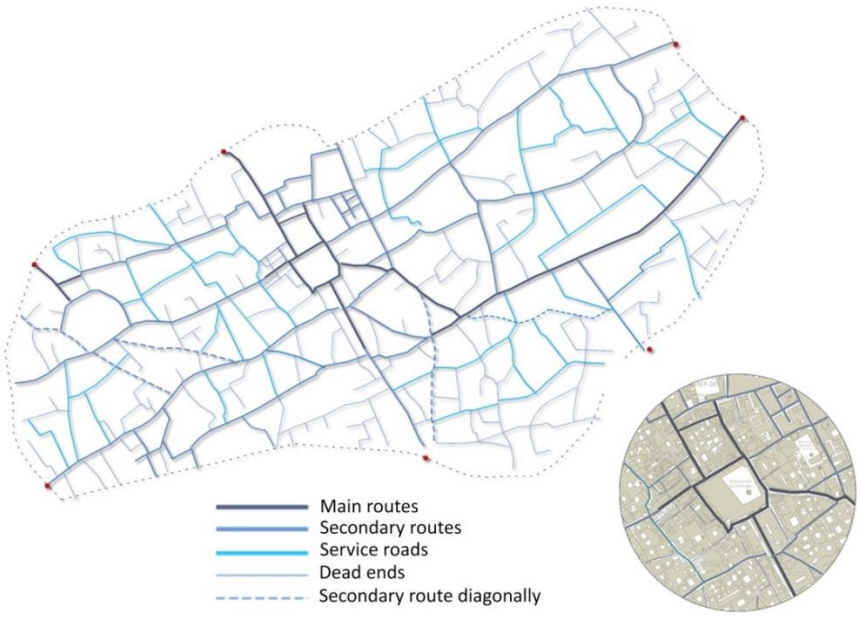

Figure 4.27. Route maps of the city (by author provided by ASM)

The key connection points between interior and exterior are the two main gates of central Medina', "Bab Bhar" from the east and "Al-Kasba" from the west. These main entrances control the passage. Though, the "Bab-Bhar" gate remains in its traditional form. Other gates have also been kept, like "Bab-Bnet," "Bab Alkhadhra," "Bab-Laasall," "Bab-Souika" (fig.4.27).

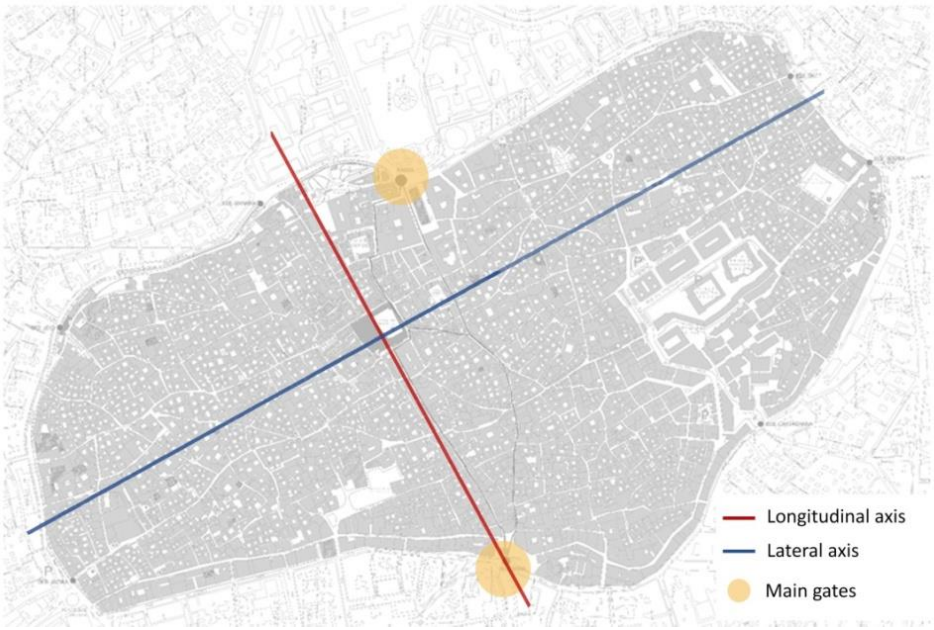

Figure 4.28. Axes and main gates of the central Medina (by author)

The axis that goes from the "Al-Kasbah" to the "Bab-Behar" extents across the "Al-Zaytouna" Mosque and concentrates the majority of the covered streets. The location of the region is considered sensitive as it is connected to the "Dar-Al Bey" building of the prime ministry, which function was maintained since the first "Mouradit Beys" was founded in the 16th century. This boundary is known as the "Al-Kasbah frontier," established in the mid-12th century by the Almohads. Because of its large scale, 1/14 of the entire Medina region, the Regency palace was treated as a small independent city (Tira 2017).

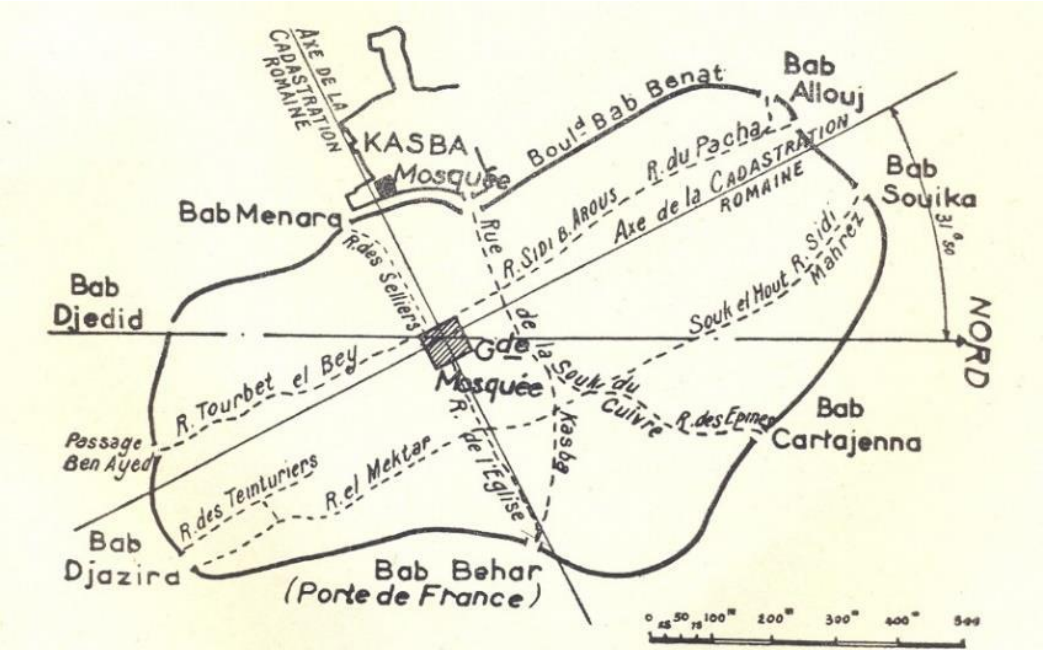

Figure 4.29. Main gates and axes of the Medina (Tira 2007)

- ***Connectivity with the outside***

The gates link the interior to the exterior of Medina. As is widespread, the doors improve safety by regulating access to the Old Town. The walls, constructed under the rule of the Almohads, were incorporated to defend the city against attacks. The gates linked the town with various parts of Tunis.

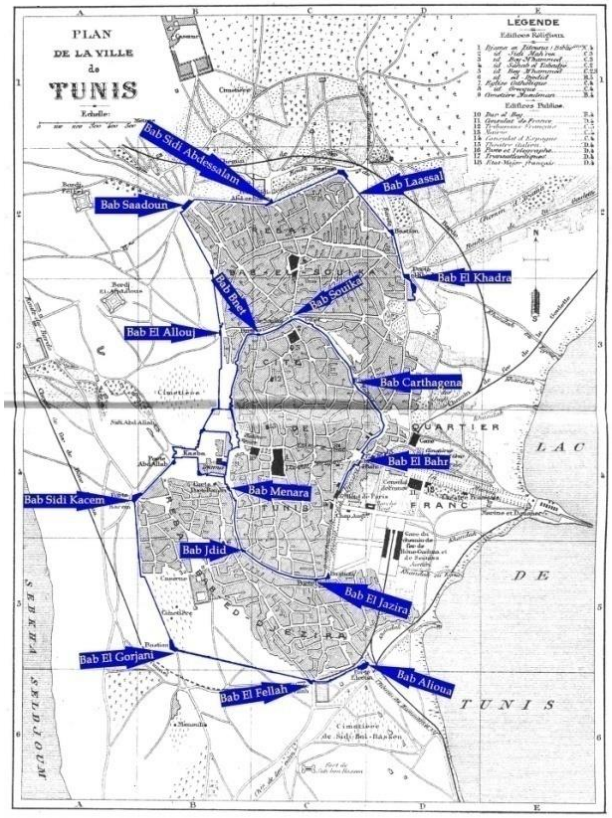

Figure 4.30. The Gates of the city (Anonymous 2011)

There were five gates in this initial wall: Bab Bhar (the Sea Gate), Bab Jdid (the New Gate) and Bab Mnara (the Lantern Gate), Bab Cartegena (the Carthage Gate), and Bab Dzira (the Island Gate). “The oldest gate is Bab Dzira, which gave it access to South and Kairouan highways, the Bab Cartagena, which was Carthage's gateway, is the second most significant. It dates from Hijri (722 AD) of the second century,” as mentioned by historian Mohamed Habib Azizi. He clarified that the main road for merchants from the sea to the Medina was Bab Bhar (Sea door), as its name suggests. It was rebuilt in 1860, and during the period of the French colonization, it was referred to as the Gate of France.

Ben Saidane explained that as the city expanded, up to 24 gates were added for various purposes, but many were demolished. As defense towers and spots for monitoring of moving people, as an example of Bab Saadoun, overlooked surrounding areas along with

the Medina. Many gates were as entry points for people, while others flourished as markets near the gates.

4.3.3 Modularity

Modularity describes a system with an organizational structure defined by a degree of compartmentalization (Walker and Salt 2012, Anderies 2014). According to Ahem (2010), Modularity is known as the use or construction of standard units that allow flexibility and usage variability. Components are grouped in a modular system into functional units, known as modules, which are loosely connected to other modules by a variety of long-range connections. In the following pages presents the decryption of the plan of Bazaar in Medina of Tunis, the modules that compose it.

- ***The decryption of the plan of the city***

The Medina plan consists of dead-end, alleys, residential parts, souks, fondouk, schools, public and religious buildings, etc. it is considered a dynamic entity, articulation among those modules that compose it.

Roberto Berardi attempts to point out the simplest elements that compose the plan, and he used them as a "decryption." These modules are the kind of relations between the city's architecture and the structure of its traditional society. The typologies of Muslim cities are based upon simple elements; cell, courtyard, chicane, door, gallery, path (Figure 4.30). These modules include the wall, columns, beams, arches, vaults, and the dome (Figure 4.31).

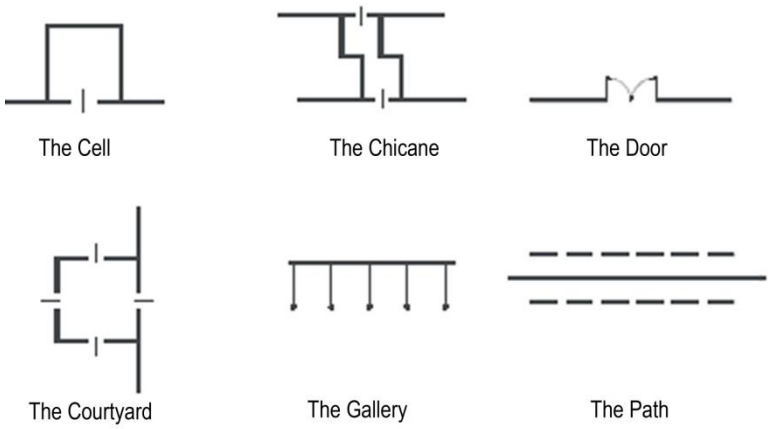

Figure 4.31. Simple elements (Privitera and Métalsi 2016)

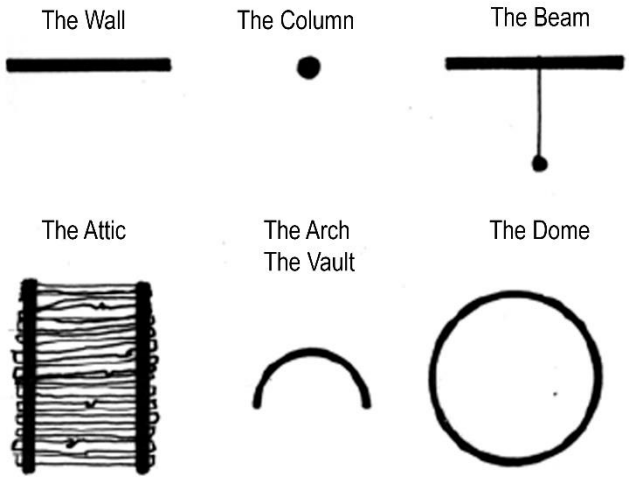

Figure 4.32. Discrete elements (Privitera and Métalsi 2016)

According to (Privitera and Métalsi 2016), **The cell** is defined as an orthogonal diagram network of four walls. The drawing of the plan demonstrates this operation. Semantically, it is a place of exclusion from the general space that contains it. **The chicane** articulation is the same form as cell articulation. However, the addition of two step-by-step passages indicates its function: it is the passageway where the situation shifts. **The door** is an omnipresent element that can completely transform the meaning of a configuration. We

have already observed the incident of the cell with a door that becomes chicane with two doors. The door is consequently an operator of transformations.

- ***Modularity in the souk site***

Shops are the essential cells of activity. Each souk consists of a limited number of shops, one next to the other. The shops generally of small dimensions, longer than wide, and raised above the ground (example Souk el Attraine).

Figure 4.33. Plan of Souk el Attarine (Provided by ASM)

Figure 4.34. Section representing the succession of shops (Provided by ASM)

The door of the shop is made from wood and is secured with an extended bolt. Over the doors, the windows are usually low and very elongated.

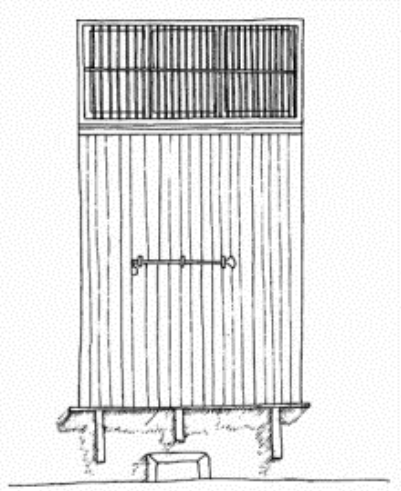

Figure 4.35. Explanatory drawing of the doors of shops (Provided by ASM)

Throughout the study of discrete elements, Berardi (1970) referred to their capacity to integrate and create spatial entities with each other. The combination with the elements of the operator (the gate or path) results in this. These variations are called 'operations.' The operations carried out on the discrete elements arise from the groups (Privitera and Métalsi 2016).

- The souk (1): the parallel arrangement of two series of cells facing each other along a path with a door at the end.

- The Building typologies in the souk area (2): the mosque; medersa; oukala; sanctuary (mesjed, marabout, zaouia), fondouk: networking of cells; addition of a central courtyard; addition of a chicane; addition of a door.

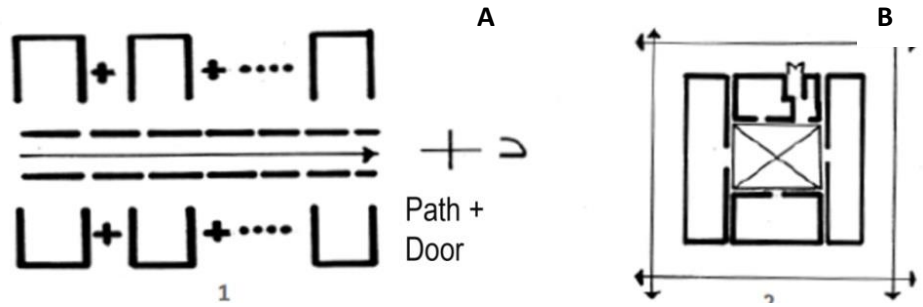

Figure 4.36. A) Souk, Source: Ibid B) Building typologies in the souk area (Privitera and Métals 2016)

Series Disposition Forms: first operation: a series of cells, followed by a double series-parallel arrangement along a two-gate path. By observing the organism of the souk, it can be concluded that a sequence of disposals of cells leads to a path supported by the doors. The following serial arrangement provides the succession of aligned souks (Privitera and Métalsi 2016).

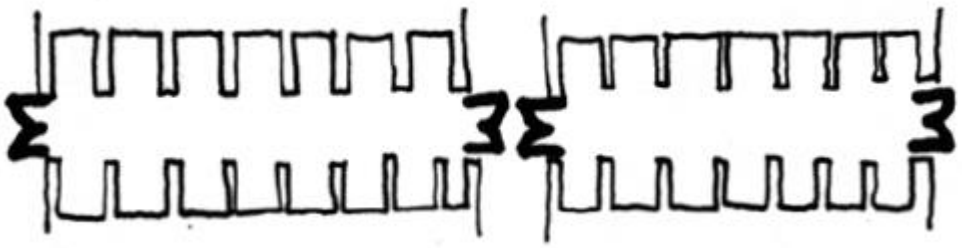

Figure 4.37. Series disposition form (Privitera and Métals 2016)

Addition forms: It appears the networking, through which the linear organism (souk) becomes capable of delimiting and concluding a surface. The networking of two souks (or four) is considered in space as an intersection of two (or four, as in the example) separate organisms. The angle solution is its rigorous proof. The intersection cell is decomposed into two cells, one of which is in series with the cells of a souk, the other with those of the souk

which crosses it, which is a new form of addition names networking (Privitera and Métalsi 2016).

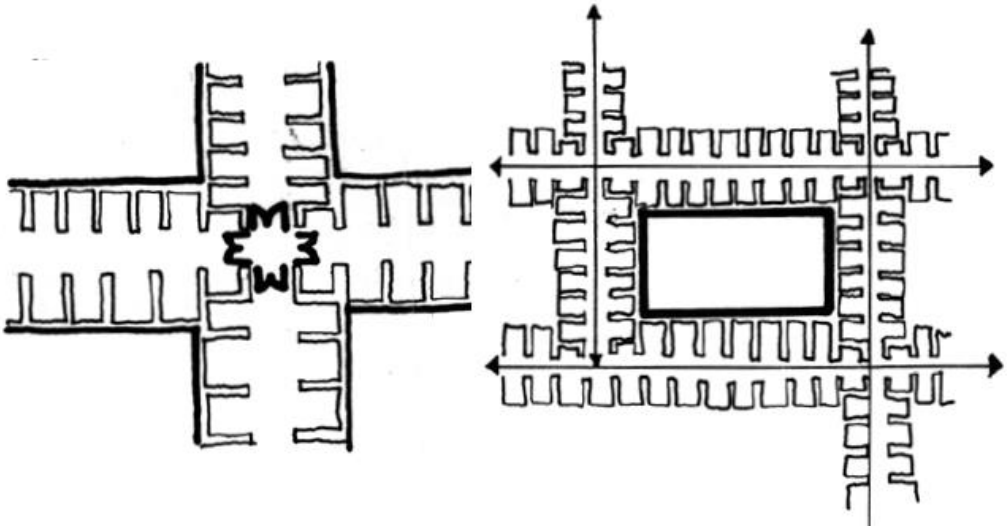

Figure 4.38. Addition form (Provided by ASM)

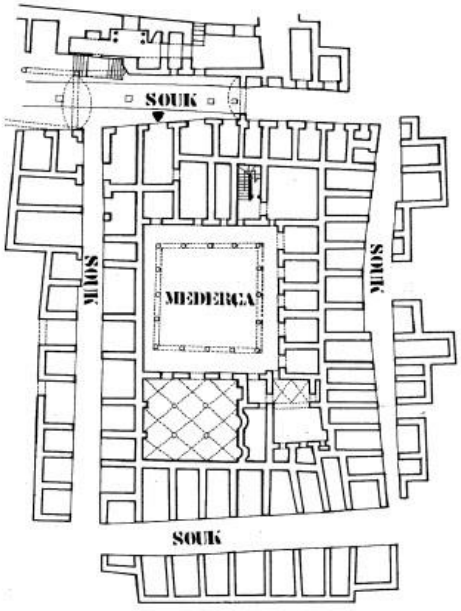

Figure 4.39. Example of networking, souks, and medersa (Provided by ASM)

The souk site has two different forms; series linear form, which is connected in parallel with two or more souk successively linked with doors, and the additional form, which is put in networks of two to n souks and releases in the middle a closed space. That closed space indeed gives us the notion of "fondouk" or "Medresa" (Figure 4.38).

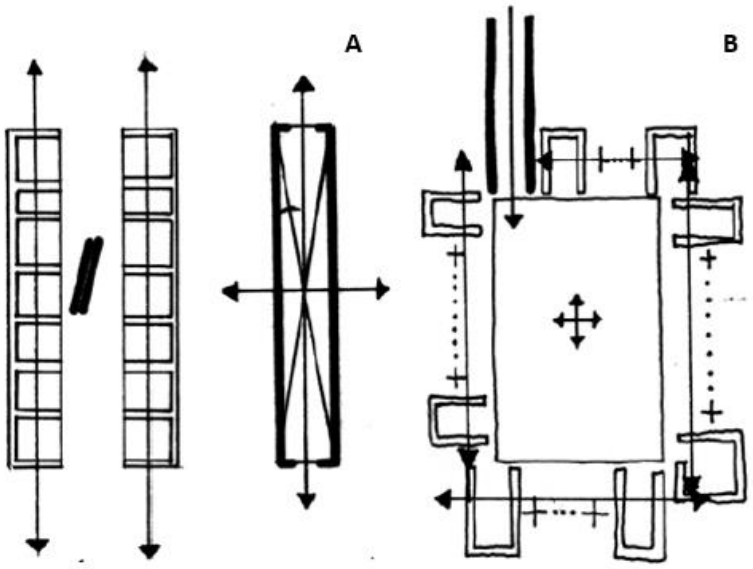

Figure 4.40. A) Parallelization of two linear series(ASM) B) Networking of n linear series (Provided by ASM)

The "souk" and the "fondouk" composed of modules that repeat and which adds up variously. "Souk" and " fondouk" as organisms constituted by the same discrete elements, obtained through different operations. There is thus an essential element common to it, which makes them homogeneous and allows reversibility.

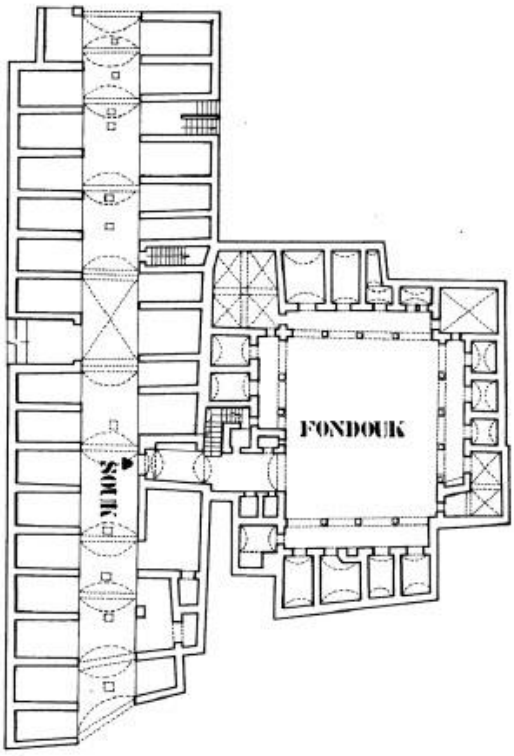

Figure 4.41. Example of Souk and fondouk composition (Provided by ASM)

4.3.4 Redundancy

According to Ahern (2010), "Redundancy is defined as multiple elements or components providing the same, similar, or backup functions." Redundancy is a mechanism that includes many overlapping options for performing the same task (da Silva et al. 2012, Sharifi and Yamagata 2016, Ahern 2010).

In this part, redundant elements of Medina of Tunis are cited in line with its function. In Medina of Tunis and its bazaars, redundancy is so high, as we can find different elements with the same functions in the same area, especially when it comes to the city's main elements, like, for example, mosques, shops, gates, roads, etc.

- ***Redundancy in term of similar functions***

- **Mosques**

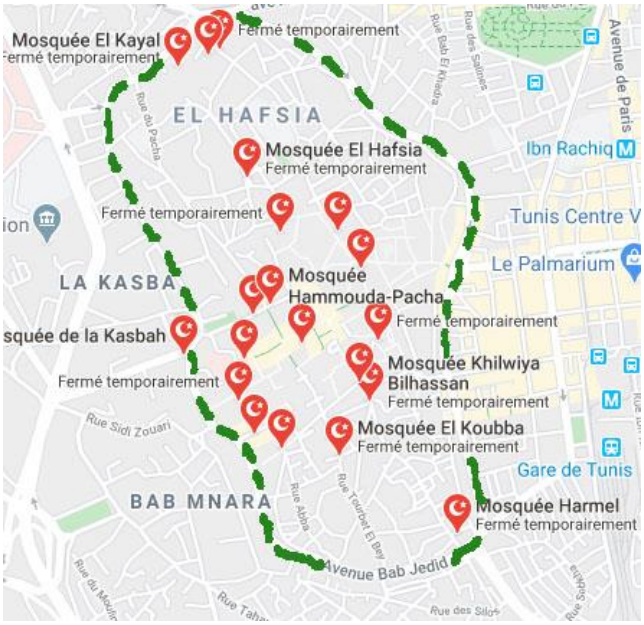

Figure 4.42. Mosques and Masjids located in the city (by author adapted from Google maps)

In Medina of Tunis, many mosques exist, most of its localized in bazaars areas. The important ones are open, but the rest are temporarily closed.

The open Mosques; Mosque al Zitouna, Mosque Hammouda Pasha, Mosque Youssef Dey, Mosque La Kasba, Mosque Sahib Al Tabaa, Mosque El Ksar, Mosque Bab El Jazira, Mosque Mohamed Bey, Mosque Zitouna Barrani, Mosque El Mehras.

The Closed ones: Mosque Etarraz (closed), Mosque El Koubba Mosque El-Ishbili (closed), Mosque Khilwiya Bilhassan (closed), Masjid Sidi Amer (closed), Mosque Harmel (closed), Mosque Sidi Yousef Dey (closed), Mosque Al Sarrajine (closed), Mosque El Habibi (closed), Mosque Bechmaria (closed), Mosque El Fokhae (closed), Mosque Errahma

(closed), MosqueMosque Hentati, Masjid Al Amana (closed), Masjid Sinoun (closed), Mesjid Ettawba (closed), Mesjid El Fell.

The Zitouna Mosque is the main mosque in the medina of Tunis. Attached to Malikism, it is the oldest and most significant sanctuary in the capital of Tunisia.

Figure 4.43. The Zitouna Mosque (Belhaj 2019)

Mosque Hammouda-Pacha built by the mouradite bey Hammouda Pacha Bey in 1655. It is located at the corner of rue Sidi Ben Arous and rue de la Kasbah and adjoins the zaouïa Sidi Ben Arous.

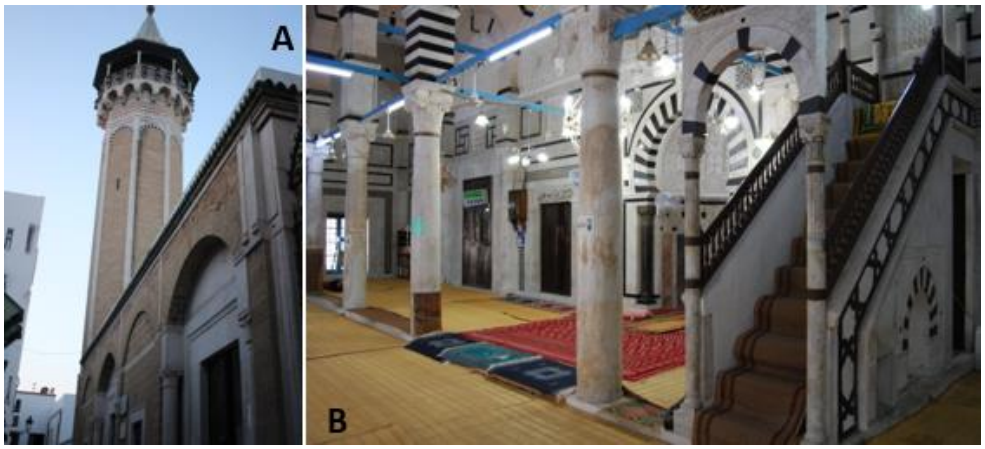

Figure 4.44. A) Hammouda Pasha mosque (by author) B) Hammouda Pasha mosque (Anonymous)

Mosque Mohamed Bey was built at the end of the 17th century (between 1692 and 1697) and built on the model of the magnificent Ottoman mosques, Modelled on Hagia Sophia *at* the only mosque in the city to have two prayer halls, one above the other. Popularly known as the Mosque of Sidi Mehrez from its proximity to the zaouia of that saint, its great white dome still dominates the northern part of the Medina.

Figure 4.45. Mosque Mohamed Bey or Sidi Mehrez (Anonymous 2012c)

Mosque La Kasba built from 1231 to 1235 by the architect Ali ibn Mohamed ibn Kacem on the orders of the founder of the Hafsid dynasty Abû Zakariyâ Yahyâ (reign from 1230 to 1249). It is the first mosque to be built after the Zitouna mosque.

Figure 4.46. Mosque el Kasba (Anonymous)

Mosque Sahib Al Tabaa is located in the Halfaouine area of the city. It is the last great mosque built in Tunis before the establishment of the French protectorate in 1881.

Figure 4.47. Mosque Sahib Al Tabaa (Anonymous)

- **Gates**

Like we said earlier, up to 24 gates have been installed, but several have already been demolished. As defense towers and places for monitoring moving citizens, Bab Saadoun overlooked areas around the Medina and other exits. Many gates were entrances to citizens, while the markets flourished next to the gates.

Figure 4.48. A) Bab Souika B) Bab Menara C) Bab Bhar (Anonymous 2016)

- Bab Souika (called Bab El Saqqayin base) maintains the tactical role of keeping the roads to Bizerte, Beja, and Le Kef (Figure A).

- Bab Menara (first called Bab El Artha) opened the medina in the suburb of El Haoua (Figure B).

- Bab El Bhar, which granted access to the few fondouks where the Christian merchants of Tunis lived, opened towards the lake of Tunis (Figure C).

Figure 4.49. A) Bab Bnet B) Bab Jdid (Anonymous 2016)

• The Hafsids had installed two new gates: Bab Bnet and Bab Jedid, at the beginning of their rule in the 13th century (Figure 4.48).

Figure 4.50. A) Bab el Khadhra B) Bab Saadoun C) Bab Alioua (Anonymous 2016)

- "After a saint, Sidi Bou Saadoun, Bab Saadaun was named. It was first built on the edge of the Bab Souika suburb in 1350. Initially, it only had a narrow arch but was replaced by a three-arched door in 1881. The routes to Beja, Bizerte, and El Kef were also regulated by it, as said by Ben Saidane.

- Bab Alioua, referred to the Caravan Gate because it was the place they control the lines of camels carrying the cereals and oils of Cape Bon and the Sahel passing by to Tunis.

The ruler Hafside Abû praises the construction of a second enclosure of the median and its two suburbs. Six doors were installed on this new enclosure: Bab El Khadra (Figure 4.49 A), Bab Saadoun (Figure. 4.49 B), Bab El Allouj (first called Bab Er-Rehiba), Bab Khalid, or Bab Sidi Abdallah Cherif, Bab El Fellah, and Bab Alioua (Figure 4.49 C).

Four new doors were born during the Ottoman era: Bab Laassal, Bab Sidi Abdessalem (Figure 4.50 A), Bab El Gorjani (Figure 4.50 B), and Bab Sidi Kacem.

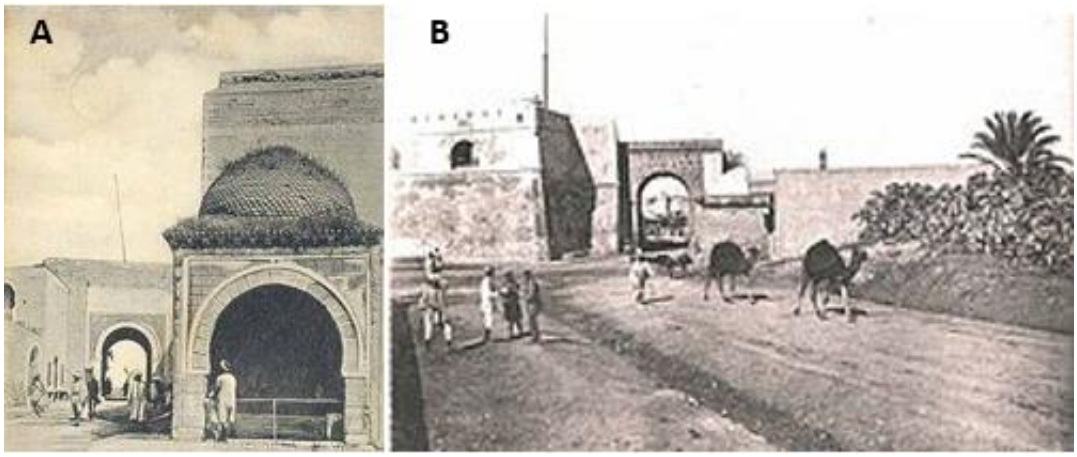

Figure 4.51. A) Bab Sidi Abdesslam, B) Bab el Gorjani (Anonymous 2016)

Today the city of Tunis has kept only four doors: Bab Jedid, Bab Saadoun, Bab El Khadra, and Bab El Bhar. Furthermore, the name of the other gates was kept and given to the streets that connected it.

- ***Redundancy in term of similar retails units***

Souks of the Medina of Tunis consists of a limited number of shops, one next to the other, generally, are grouped concerning their functions. Each souk specializes in a craft trade or a category of specific products. Some of these souks still maintain their function in the same area, as we can mention Souk el Berka, a souk specializing in jewelry, al Attarine specialized in all kinds of perfume. Other shops have changed their functions due to economic crisis or medialization etc. Alternatively, it has changed its place and maintained the same function.

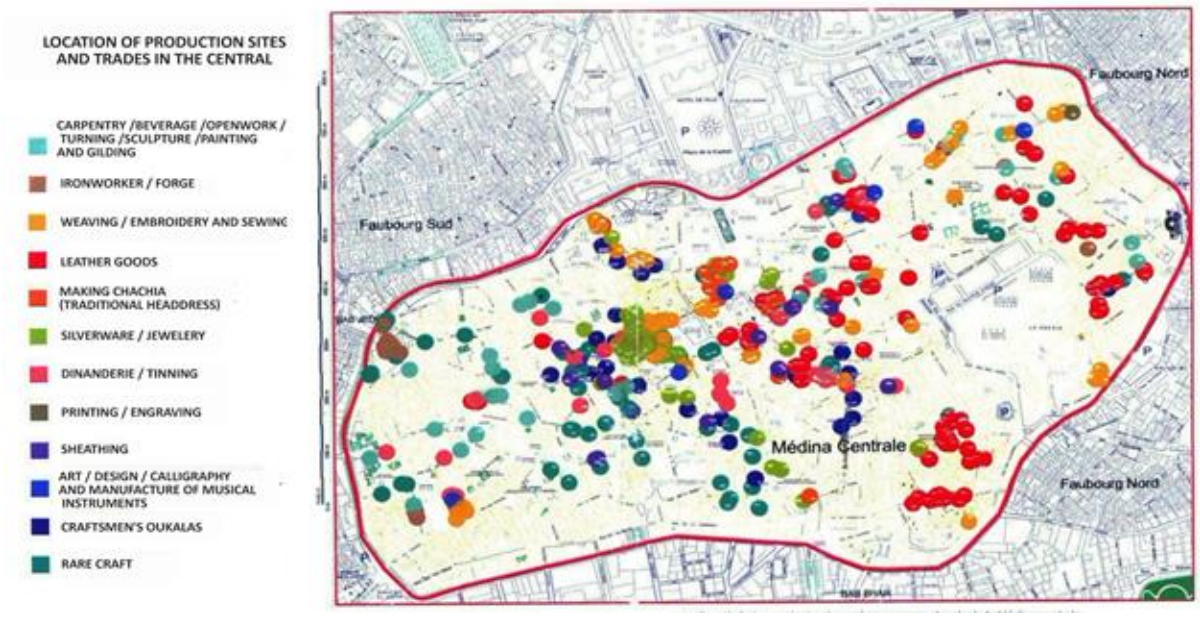

Figure 4.52. The localization of production sites and trades in the central (Provided by ASM)

Following the maps above, we can notice that almost every category of trade or production has multiple shops and product workshops diffused all over the city. Some of them regrouped in the same street or area.

These shops and workshops with similar function existence prevent the fades of the trade; in any case of disturbance, backups shops help its survival.

4.3.5 Adaptability

As mentioned before, in the souks area, we found other building typologies such as; Fondouks, Medresas, Midhas, which most of them lost their function and usability. The ASM heritage association tried in the last years to relive these historical buildings.

- ***Fondouk Al Attarine to restaurant***

Fondouk Al-Attarine is a fondouk in Tunis's Medina, located in the Souk El Attarine, served as a warehouse and residence for perfumers or customers from afar. It was built under the rule of the Hafsids. Nowadays, it has become a restaurant.

In the heart of the souks of Tunis, close to the great mosque of Zitouna, accessible from the Kasba Square and the French Gate (Bab bhar), Fondouk el Attarine is an old caravanserai. It now houses a typical restaurant and a permanent sale exhibition of Tunisian handicraft products.

Figure 4.53. Fondouk Al-Attarine nowadays (Ben Azouz 2018)

- ***Al Berka Souk***

Al Berka souk is one of the famous souks built after 1610 under Yusuf Dey in the Medina's heart. Throughout time, it was a bazaar of black slaves. There is a bazaar, but it has been converted. There is still the Bazar, but the purpose has changed (Tira 2017).

In 1846, Ahmed Bey, the first, signed a declaration on the abolition of slavery. 'Al-Berka' was eventually turned into a jewelry and auction business. It was still in its old condition until today, with 'ASM' having restored only its eastern entrance to the 'Kasbah' after 2000 (Tira 2017).

This souk is an intersection of four paths, forming a small area separated by three pathways with Two-column rows labeled. These columns support the space-related vaults. In 1846, the abolition by Ahmed first took place in Tunisia. The bazaar has thus turned into a trading site for precious metals. Nevertheless, its space configuration remained unchanged.
The existing old benches have been removed to make it easier to move. However, the structure kept the same. As shown in figure (4.53), only the four doors are preserved and used until today. Since goods sold are valuable, the gates close at night (Tira 2017).

Figure 4.54. Al Berka Souk before and now (Anonymous)

- ***Barracks to a National Library***

The institution's history begins in 1885, with its foundation by March 8, 1885 decree, under the name of "French Library." It housed in the building n ° 20 of the Souk El Attarine. In 1910, part of the expanding library fund transferred to the former El Attarine barracks, built-in 1810 by Hammouda Pasha to serve as barracks for Janissary troops and then prison.

Since 1 December 2005, the library has occupied a building modern 35 000 m2 located at boulevard 9-April. His plan is the same as of a barracks; it recalls that of the house, the foundouk, or the Medersa by arranging spaces around an inner courtyard. It is oblong; it is surrounded by galleries on which large open rooms. Some still bear on their facade, the plates bearing the name of the Janissaries' companies to which they were signed (ASM).

Figure 4.55. Transformation of the barrack to a national library (Hamdane 2015)

4.3.6 Summary of assessment the indicators on the area of study

The following table is adapted from among others, Fiskel (2003), Parivar (2013a), Fellicioti (2015, 2018), Sharifi & Yamagata (2014, 2018b).

Table 4.1 Summary of assessment 'Diversity' on Medina of Tunis

	Physical aspects		Economic aspects	Social/ institutional aspects
Diversity	Mix land uses	Spatial distribution	Diversity of retail uses	Social diversity
	-Diversity in land use. -New functional and contemporary city needs. -Several cultural facilities, e.g., ministers, workstations, libraries, galleries, etc. -Divers touristic destination; hotels, hosted houses, jewelry shops, first-class restaurants, etc.	- Divers urban spatial elements. - Sustainability of the main urban spatial elements. -Accessibility of the bazaar from different roads.	- Variety of souks and trades. -Divers shops and workshops brunches. - Diversity of economic resources.	- Multi-raced and Multi-origins society. -Different religious communities. -Diversity of social interaction.

Table 4.2 Summary of assessment 'Connectivity' on the Medina of Tunis

	Physical aspects	Economic aspects	Social/ institutional aspects
Connectivity	- Street network with diverse linkages between areas. - Connection of the souk site with the main buildings insides and outsides the walls of the medina. -Hierarchies of networks. -Accessibility for pedestrians. -The gates link the Medina with various parts of Tunis.	- Open trades extended networks and partnerships with different destination because of the accessibility of the port.	-A strong sense of community appears in solidarity between different society members.

Table 4.3 Summary of assessment 'Redundancy' on the Medina of Tunis

	Physical aspects	Economic aspects	Social/ institutional aspects
Redundancy	Redundancy in the city's main elements: roads, gates, mosques, souks, etc.	-Shops and workshops with similar functions. -Redundant retail units.	- Similar institutions function; schools, medreses, municipality, associations, etc.

Table 4.4 Summary of assessment 'Modularity' on the Medina of Tunis

	Physical aspects	Economic aspects	Social/ institutional aspects
Modularity	- Modular units of trades. -Modular urban structures.	- Decentralization of the bazaars, every souk is separated from the other.	- Every souk had its guild. -Decision taking from different community sides.

Table 4.5 Summary of assessment 'Adaptability' on the Medina of Tunis

	Physical aspects	Economic aspects	Social/ institutional aspects
Adaptability	- Transformation of functions for some buildings, taking into consideration the preservation of the identity of its.	- Adaptation of the product sold in the bazaars in parallel with the advancement of technology and the changing lifestyle and needs.	

5 CONCLUSION

Since ancient times, Medina of Tunis has been a place of cultural exchange, and its historical Bazaars are one of the most significant trade centers in North Africa and the Mediterranean.

The historical bazaars consist of a variety of interconnected buildings, covering structures and enclosed areas that have retained their longevity in various functions. The site has survived over centuries despite the unfortunate events; economic crisis, war, epidemics, disasters, etc. Medina of Tunis and its bazaar still maintains its remarkable architecture, typo-morphology, urban local- spatial, cultural identity, and economic status, which is a reasonable reason to wonder about the secrets behind it, as we announced at the beginning of this study.

Despite the lack of official documents and historical records, the Medina's conserved urban fabric is sufficient to enable effective research relaying to different contemporary analysis and research in the fields.

The purpose of this present study is to extract the major features that are behind the resilience of the city, together with its dominant function: the Bazaar.

As mentioned in the second chapter, the concept of resilience is a polysemic concept covering different facets depending on the discipline that mobilized it. The second chapter attempts to define the conceptual framework of the study in order to understand the notion of the concept, its evolution, and its emergence to Urban resilience thinking. Besides, to extract the indicators that distinguish a resilient system. However, it is concluded that there are so many indicators related to urban Resilience. A specific list of proxies that covers all aspects of Resilience is not currently available in the literature. Recourse to a multidisciplinary literature review conducted by authors (Feliciotti et al., 2015 & 2018 & 2016; Galderisi 2013; Sharifi et al., 2017, Sharifi & Yamagata 2014; Fiskel 2003; Ahern

2011, Suarez 2016), outlining more than 30 attributes associated with Resilience in the past 40 years. We concluded with the most common five which are identified with urban types; Diversity, Connectivity, Redundancy, Modularity, and Adaptability.

The third chapter aims to define and demonstrate the chosen indicators to understand the aspects and methods used in the following analysis of the selected case of study (Medina of Tunis and its bazaars). To summarize, at the end of the chapter, attempts to classify the indicators in relation to physical, economic, social/ institutional, and human aspects, as deeper sight on the methods that will be used in the analysis of the selected case of study.

Through the fourth chapter, in the first place, we were able to extract the most prominent characteristics of the Islamic bazaars by defining the urban morphology, the spatial distribution, and the main elements that identify it. Then, a brief historical outline of the Medina of Tunis and its bazaars. The most important civilizations that rolled over its, which affected its architectural style and urban configurations.

The Medina of Tunis Bazaar, together with its urban spatial configuration and its typo-morphology, had undergone quite a few changes over centuries because of several facts caused by disturbance, especially war, economic crisis, and environmental, epidemics, and man-made disasters. However, it is still maintaining its spatial configuration, main elements, and functions; the Al-Zaytouna Mosque which is the heart of Medina and its bazaars and the most outstanding religious center in the area. The mosque has still been visited daily by locals for praying or for touristic purposes. The Medina walls and its gates have been restored and conserved. The street networks still maintaining its unique labyrinth form is considered as a whole experience for visitors as they lead the way inside the authentics streets and bazaars.

The bazaars are made up of modules, a central aisle, and a double row of shops and workshops of merchants and artisans. Each souk is generally characterized by the operation taking place there. However, the disappearance of certain market places and the change of

use of certain souks have been noticed. Besides, the network of souks overflows in some cases on the neighboring streets, which in fact becomes souks without having status. The medina thus preserves the memory of streets specializing in certain trades which have retained their names: souk "*El haddadin*," souk "*El ghrabliya*" souk "*El sabbaghin*" (ASM).

Along with the literature review that was presented, an investigation of the elements that characterize the selected case of study was illustrated and analysed by surrounding different angles and aspects and classifying them according to the chosen resilience indicators. At the end of the chapter, we summarized the important point that had been found through the analysis.

As it can be concluded, that one of the essential features of the resilience of Medina of Tunis and its bazaars is being diverse, as we could notice it on its many sides and aspects. Physically, the city and its bazaars have a high mix of land uses, which was developed over time, flexibly adapted to the needs of a contemporary city. Not only it maintains its old functions and land uses like; Mosques, fondouk, souks, hammams, etc; but also, several functions have been added which are as follows: Ministry and municipal buildings, cultural centers, museums, youth centers, schools, training centers, first-class restaurants, etc.

Nevertheless, the diversity feature also has been perceived economically. Variety of souks and shop categories can be considered as a sustained feature. Diversity of the exposed products and trades resources are local (from different regions of the country) and imported, along with divers workshops and crafts brunches.

Besides that, diversity also appears socially. The Medina society and artisans communities have always been multi-raced and multi-origins and religion. As it was mentioned previously, the society races pattern mainly mixed between local origin, Turkish origin, Andalusians origin, Tripollians origin, and Maghrebians origin artisans, which until today is reflected in the families surnames. Although the social diversity (origin, race, religion,

etc.) of the artisans in Medina of Tunis, the multiplicity of aspects of corporation and solidarity exists. The presence of Jews in many trades alongside Muslims did not prevent the emergence of forms of solidarity.

It can be concluded that one of the significant features of the city and its bazaars are being redundant. Having a multiplicity of buildings with the same functions, these are considered backup or replacement in any case disturbance happens. It provides the continuity of the functions of bazaars, most especially the Medina's main elements. Redundancy has been perceived in the roads, Medina's gates, mosques, shops. Besides, Medina souks have been organized so that every souk contains similar shops with similar trade categories and functions, which explained the resistance of some souks. How? For example, when some stores are exposed to bankruptcy in a case of the economic crisis, the rest of the shops preserve the continuity of the souk and its crafts.

It has been determined that the medina and its economic core has the flexibility to adapt. It has been illustrated in the previous chapter that many buildings have been preserved by changing its function, taking into consideration the importance of maintaining its identity. Moreover, the adaptation of the product sold in the bazaars is parallel with the advancement of technology and changing the lifestyle and the needs.

It has been mentioned in the third chapter that having a high potential for connectivity is an essential criterion of a resilient system. We have declared that the Medina, together with its souks, have a street network with diverse linkages between different areas; inside and outside the walls. As well as the accessibility for pedestrians to reach the center of Medina through its diverse linkages. Furthermore, Medina has a gate (Bab Bhar) accessible with the port, that has extended its trade networks and partnerships with different destinations. Besides, the connectivity was noticed socially as well. The strong sense of community appears in solidarity between different society members.

As has been explained in the previous chapter, Medina's plan is composed of modules and articulations; the trade unit is considered a module, one next to the other, which is

remarkable in the plan of the city. Modularity had existed when every souk had its guild to organize and to control, which is not the case, nowadays, except few souks like Al-Berka (Gold and jewelry shops). It is considered as an essential characteristic of the self-organization of the Islamic bazaars.

By the end of this research, it can be concluded that according to the resilience indicators that have been chosen, the Medina of Tunis and its bazaars have remarkable features of resilience or "resilience pillars." These features are, directly or undirectly, interconnected to each other. The lack of any of these pillars could affect the resistance of the system. The question that arises are these features sufficient for the resilience of these bazaars and the city in the future?

However, other resilience indicators existed as well; upcoming research might be affected concerning other indicators. In order to further the investigation of other features involved in the resilience of the Islamic Bazaars . Comparative analysis could be done between two conserved Islamic bazaars from different geography.

REFERENCES

Aadnani, R.I., 2013. Courtyard view toward dome. Zaytouna Mosque, Archnet, https://archnet.org/sites/3765/media_contents/87657-(Access date: 14.09.2020)

Abdelkafi, J., 1987. La médina, espace historique de Tunis : enjeux culturel et politique de l'organisation spatiale, Institut d'Urbanisme de Paris, Université de Paris VIII.

Abdelkafi, J., 1989. La Medina de Tunis Espace Historique, CNRS Publishers, Paris.

Adams, D., Tiesdell, S. & White, J. T., 2013. Smart Parcelization and Place Diversity: Reconciling Real Estate and Urban Design Priorities. *Journal of Urban Design,* 18**:** 459-477.

Adger, W. Neil, 2000. Social and Ecological Resilience: Are They Related? *Progress in Human Geography* 24(3): 347 – 364.

Adger, W., Hoghes, T., Folke, C., Carpenter, S. and Rockstorm, J., 2005, Social-ecological resilience to coastal disasters. *Science,* 309(5737): 1036-1039.

Ahern, J. 2011. From fail-safe to safe-to-fail: Sustainability and resilience in the new urban world. *Landscape and Urban Planning,* 100 (4): 341-43.

Ahern, J. 2012. Urban landscape sustainability and resilience: The promise and challenges of integrating ecology with urban planning and design. *Landscape Ecology,* 28(6): 3-12.

Ahern, J., 2010. Planning and design for sustainable and resilient cities: theories, strategies, and best practices for green infrastructure. In Water centric sustainable communities: planning, retrofitting, and building the next urban environment, Ed.: Novotny, V., Ahern, J. & Brown, P, John Wiley & Sons, Hoboken, New Jersey, pp: 135-171.

Albers, M., Deppisch, S., 2013. Resilience in the Light of Climate Change: Useful Approach or Empty Phrase for Spatial Planning?. *European Planning Studies,* 21**:** 1598-1610.

Alberti, M. Marzluf, J. Shulenberger, G. Bradle, C., Zumbrunnen, 2003. Integration Humans into. Ecology: Opportunities and Challenges for Studying Urban Ecosystems. *BioSience,* 169-179.

A**llan, P., Bryant, M., 2011.** Resilience as a framework for urbanism and recovery. *Journal of Landscape Architecture,* 6 (2): 34-45.

Allan, P., Bryant, M., Wirsching, C., Garcia, D., Teresa Rodriguez, M. 2013. The influence of urban morphology on the resilience of cities following an earthquake. *Journal of Urban Design,* 18**:** 242-262.

Allenby.A, Fink, J., 2005. Toward inherently secure and resilient societies. *Science,* 309: 1034-1036.

Anderies, J. M., 2014. Embedding built environments in social-ecological systems: resilience-based design principles. *Building Research & Information,* 42**:** 130-142.

Anonymous, 1982. Etude analytique des espaces de production d'échange dans la Medina de Tunis, *Thesis.*

Anonymous, 2012b. Tunus Medinası (Eski Şehir). http://www.gezialemi.com/DunyaMiraslariAyrinti.asp?ID=140&SAYFA=15-(Access date: 14.09.2020)

Anonymous, 2016. Les portes de Tunis: toute une histoire!. http://www.wepostmag.com/portes-de-medina-de-tunis-toute-histoire/-(Date of access: 14.07.2020).

Anonymous, 2018. Histoire - La Mosquée Zitouna, Au Coeur De La Medina, Lepetitjournal Tunis, https://lepetitjournal.com/tunis/actualites/histoire-la-mosquee-(Acess date: 14.09.2020)

Anonymous, 2019. Les Palais de la Medina: Dar Hussein. Lepetitjournal Tunis, https://lepetitjournal.com/vivre-a-tunis/les-palais-de-la-medina-dar-hussein-53488-(Acess date: 14.09.2020)

Anonymous, 2020a. Urgent : Tunisie – Que se passe-t-il à La Médina de Tunis ? https://www.tunisienumerique.com/urgent-tunisie-que-se-passe-t-il-a-la-medina-de-tunis/- (Access date: 14.09.2020)

Anonymous, 2020b. Souk Ech-Chaouachine, wikidata, https://www.wikidata.org/wiki/Q21787623-(Access date: 14.09.2020)

Anonymous,2012b. Dar Hussein – Siège de l'Institut National du Patrimoine. http://188.165.237.85/medinatunis/index.php/fr/palais-et-grandes-demeures/dar-hussein-(- (Acess date: 14.09.2020)

Anonymous. 2011. The Gates of the Medina, Tunis, Tunisia. http://tunisiapictures.blogspot.com/2011/06/gates-of-medina-tunisia.html-(Acess date: 14.09.2020)

Anonymous. 2014. Hammam spectacle la tradition. http://www.medina.com.tn/fr/divertissement/hamam-sauna-massage-167.html-(Acess date: 14.09.2020)

Askaripou, J. S. 2014. Designing for Intercultural Interaction, A Local Bazaar for the Future Development Plan of Angered Centrum. *Thesis*, Chalmers University of Technology, Sweden.

ASM, 2012. Tunis Patrimoine vivant. Concervation et créativité (1980 -2012).

ASM, Association of Safeguarding of Medina of Tunis, http://www.asmtunis.com.

Awad, J.A., 1989. Islamic Souqs (Bazaars) in the Urban Context: The Souq of Nablus. *MSc Thesis*, Faculty of Architecture, Kankas State University.

Barthel, S. Colding, J. Grahn, S. Erixon, H. Ernstson, H. Karsten, C. Marcus, L. Torsvall, J., 2013. Principles of Socialecological Urbanism. KTH, Trita-Ark, Stockholm.

Batty, M. 2013a. Big data, smart cities, and city planning. *Dialogues in Human Geography*, 3**:** 274-279.

Baxter, G., Sommerville, I., 2011. Socio-technical systems: From design methods to systems engineering. *Interacting with Computers*, 23: 4–17.

Belhaj, M. 2019. Tunisie: La mosque Zitouna acctuelle une exposition intitulée " le parfum de la civilisation. https://www.aa.com.tr/fr/afrique/tunisie-la-mosqu%C3%A9e-zitouna-accueille-une-exposition-intitul%C3%A9e-le-parfum-de-la-civilisation/1650275#- (Access date: 14.09.2020)

Ben Azouz, I., 2018. Fondouk El Attarine, l'art de vivre tunisien à son apogée. https://www.ideomagazine.com/fondouk-el-attarine-lart-de-vivre-tunisien-a-son-apogee/- (Date of access: 12.07.2020).

Ben Yedder, K., 2007. Crafts and craftsmen of the Medina of Tunis during the 18th and 19th centuries. Merkez al Nacher Al Jamii, Tunis.

Ben-Abdallah, A., 2016. Les Remparts et Les Porte de Tunis. https://plus.google.com/112050842057752012369-(Date of access: 10.08.2020).

Ben-Abdallah, C. B., 1977. Tunis Au Passé Simple. Société Tunisienne de Diffusion STD Publishing, Tunis.

Bently, I. Alcock, A. Murrain, P. Mcglynn, S. Smith, G, 2010. Responsive environments; Designer's Guidebook. Translation by Behzadfar, B Fifth Edition, University of Science and Technology, Tehran.

Berardi, R, 1970. Lecture d'une ville la médina de Tunis. Architecture d'aujourd'hui, pp.38-43.

Beyhum, N. David.J.C., 1992. Espaces du public et du négoce à Alep et à Beyrouth. Les Annales de larecherche urbaine. *Espaces publics en villes*, No: 57-58, pp.191-205.

Belakehal, .A., 2013. De la notion d'ambiance. *Courrier du Savoir,* 17.

Bianquis, Th. & Guichard, P. , 1997. Suk in the traditional Arab World. *Encyclopedia of Islam*, Ed.: Bosworth, C.E., Vandonzel, E., Heinrichs W.P., Legomte, G., Vol 4, pp: 786-789.

Biggs, R., Schlüter, M. & Schoon, M. L., 2015. Principles for building resilience: sustaining ecosystem services in social-ecological systems, Cambridge University Press.

Binous.J , Eckert. H, 1980. Morphologie urbaine. *Cahiers de la Méditerranée*, Recherches d'ethnosociologie maghrébine. 20-21(1): 43-60.

Blaise, L. and Sbouai, S., 2014. Hammam, Patrimoine oublié. Inkyfada, https://inkyfada.com/fr/-(Date of access: 15.06.2020).

Bobkova, E., Marcus, L. & Berghauser, Pont, M. Y. 2017a. Multivariable measures of plot systems: Describing the potential link between urban diversity and spatial form based on.

Bobkova, E., Marcus, L. & Berghauser, Pont, M. Y. 2017b. Plot systems and property rights: morphological, juridical, and economic aspects. XXIV International Seminar of Urban Form. Valencia, Spain.

Bourial, H. 2017. Un monument peu connu de la médina de Tunis : La « midha » des sultans hafsides. http://www.webdo.tn/2017/02/22/monument-connu-de-medina-de-tunis-midha-sultans-hafsides/-(Access date: 14.09.2020)

Bourial, H. 2019. Patrimoine : Les cinq plus anciennes medersas de la médina de Tunis. Webdo, http://www.webdo.tn/2019/06/24/patrimoine-les-cinq-plus-anciennes-medersas-de-la-medina-de-tunis/-(Access date: 14.09.2020)

Bourial, H., 2016. A Tunis, la Porte aux deux noms : Préférez-vous Bab Bhar ou Porte de France ? Webdo, http://www.webdo.tn/2016/06/01/a-tunis-porte-aux-deux-noms-preferez-bab-bhar-porte-de-france/-(Access date: 14.09.2020)

Brand, F.S. et Jax, K., 2007. Focusing on the meaning(s) of resilience: resilience as a descriptive concept and a boundary object. *Ecology and Society*, 12(1): 16.

Bruneau, M., Chang, S. E., Eguchi, R. T., Lee, G. C., O'rourke, T. D., Reinhorn, A. M., Shinozuka, M., Tierney, K., Wallace, W. A., Von Winterfeldt, D., 2003. A framework to quantitatively assess and enhance the seismic resilience of communities. *Earthquake Spectra*, 19**:** 733-752.

Bürkner, H.J., 2010. Vulnerabilität und Resilienz: Forschungsstand und sozialwissenschaftliche Untersuchungsperspektiven [*Vulnerability and resilience: state of research and social science research perspectives*], Erkner: IRS, 43.

Burton, E., Jenks, M. & Williams, K. 2013. Achieving sustainable urban form. Ed.: Berkes F., Colding J., Folke C., Navigating Social-Ecological Systems: Building Resilience for Complexity and Change, Cambridge University Press, Cambridge.

Carmona, M., 2010. Public places, urban spaces: the dimensions of urban design. *Routledge.*

Cerema / Direction technique Territoires et Ville., 2015. Villes et territoires résilients. *Commissairiat Général au Développement Durable*, CGDD, 123: 1-47.

Chelleri, L. & Olazabal, M., 2012, *Multidisciplinary Perspectives on Urban Resilience,* Basque Center for Climate Change, Spain.

Chirchi, S., 2017. Le rue architecturale, P34-35.

Collier, F., Hambling, J., Kernaghan, S., Kovacevic, B., Miller, R., Pérez, A. P., Richardson, E., Macmillan, S., 2013. Tomorrow's cities: a framework to assess urban resilience. *Proceedings of the ICE-Urban Design and Planning*, 167**:** 79-91.

Comfort, L.K., 1999. Shared Risk: Complex Systems in Seismic Response. Pergamon, New York.

Cumming, G. S., Barnes, G., Perz, S., Schmink, M., Sieving, K. E., Southworth, J., Binford, M., Holt, R. D., Stickler, C., Van Holt, T. 2005. An exploratory framework for the empirical measurement of resilience. *Ecosystems*, 8:975-987.

Da Silva, J., Kernaghan, S., Luque, A. 2012. A systems approach to meeting the challenges of urban climate change. *International Journal of Urban Sustainable Development*, 4**:** 125-145.

Daoulatli, A. 2009, *Tunis Capitale des Hafsides*, ALIF Mediterranean Publishers, Tunis.

Daviet, S., Valin, J.L., 2010. En marge des métropoles, le carreau Wendel en Lorraine: de la friche industrielle au projet culturel [Beyond the metropolitan fringe, the Carreau Wendel mining-site museum in Lorraine: from industrial wasteland to cultural project] *Méditerranée*, No:114.

Davoudi, S., Brooks, E., Mehmood, A., 2013. Evolutionary resilience and strategies for climate adaptation. *Planning Practice & Research*, 28**:** 307-322.

Davoudi, S., Shaw, K., Haider, L. J., Quinlan, A. E., Peterson, G. D., Wilkinson, C., Fünfgeld, H., Mcevoy, D., Porter, L., Davoudi, S., 2012. Resilience: A Bridging Concept or a Dead End?"Reframing" Resilience: Challenges for Planning Theory and Practice Interacting Traps: Resilience Assessment of a Pasture Management System in Northern

Afghanistan Urban Resilience: What Does it Mean in Planning Practice? Resilience as a Useful Concept for Climate Change Adaptation? The Politics of Resilience for Planning: A Cautionary Note. Ed.: Davoudi, S., Porter, L., *Planning Theory & Practice*, 13**:** 299-333.
DePlanhol, X., 1980. Forces économiques et composantes culturelles dans les structures commerciales des villes islamiques. *Espace géographique*, 4: 315-322.
DeRosnay, J., 2004. Systémique, complexité et transdisciplinarités: nouvelles méthodes, nouveaux outils. Futuribles International, 30 Novembre, Paris, France, p.4.
Dhar, T. K., Khirfan, L., 2017. A multi-scale and multi-dimensional framework for enhancing the resilience of urban form to climate change. *Urban Climate*, 19: 72-91.
Djellouli, K., 2019. Fondouk attarine. Ideo, https://www.ideomagazine.com/une-journee-parfaite-a-la-medina-de-tunis/fondouk-attarine/-(Access date: 14.09.2020)
Djament-Tran, G., Le Blanc, A., Lhomme, S., Rufat, S., Reghezza-Zitt, M., 2011. Ce que la resilience n'est pas, ce qu'on veut lui faire dire. *Hal archives-ouverte.*
Dovey, K., Pafka, E., Ristic, M., 2017. Mapping Urbanities: Morphologies. Flows, Possibilities, *Taylor & Francis.*
Dovey, K., Wood, S., 2015. Public/private urban interfaces: type, adaptation, assemblage. *International Research on Placemaking and Urban Sustainability*, 8**:** 1-16.
Entwistle, D., 2010. Tunis medina mosque youssef dey**.** https://www.flickr.com/photos/damiavos/4286267800-(Access date: 14.09.2020)
Eraydin, A. & Tasan-Kok, T., 2012. Resilience Thinking in Urban Planning. *Science and Business Media*, 106.
Escher, A., Schepers, M., 2008. Revitalizing the Medina of Tunis as a National Symbol. *Archive for Scientific Geography*, 62 (2): 129-141.
Fache, J., 2012. La métropole nantaise est-elle résiliente ? [Is the Nantes metropolis resilient?]. *Mondialisation et résilience des territoires : trajectoires, dynamiques d'acteurs et expériences*, pp: 41-58.
Falgas, G. 2008. Un lieu de rencontre Orient-Occident: Le Fondouk des Français à Tunis (1660-1860).
file:///E:/Rcherche%20master/Sujet%20de%20mast%C3%A9re/REFERENCE/78-nwvr-122.pdf-(Access date: 14.09.2020)
Fawcett, D., 2013. Bab Bhar-Tunis. https://www.flickr.com/photos/danfawcett/11470674324/-(Acess date: 14.09.2020)
Feliciotti, A., 2018. Resilience and Urban Design: A Systems Approach to the Study of Resilience in Urban Form Learning from the case of Gorbals. *Ph.D. Thesis*, Urban Design Studies Unit, Department of Architecture, Faculty of Engineering University of Strathclyde, United Kingdom.
Feliciotti, A., Romice, O., Porta, S., 2015. Masterplanning for Change: lessons and directions. Ed.: Macoun, M. & Maier, K., 29th Annual AESOP, Congress Definite Space – Fuzzy Responsibility, Prague, CZ., 3051 3065.
Feliciotti, A., Romice, O., Porta, S., 2016. Design for change: five proxies for resilience in the urban form. *Open House International*, 41**:** 23-30.
Fiksel, J., 2003. Designing Resilient, Sustainable Systems. Environmental Science and Technology, 37(23): 5330 – 5339.

Folke, C., Carpenter, S., Walker, B., Scheffer, M., Chapin, T., Rockström, J., 2010, Resilience thinking: integrating resilience, adaptability, and transformability. *Ecology and Society,* 15.
Galderisi, A., 2013. Urban resilience: A framework for empowering cities in face of heterogeneous risk factors. Dipartimento di Ingegneria Civile, Edile ed Ambientale, University of Naples Federico II, 11(1): 36-58.
Garcia, E.J., 2013. The Application of Ecological Resilience to Urban Landscapes. *Ph.D. Thesis*, Faculty of Philosophy, Victoria University of Wellington.
Gharai, F., Masnavi, M.R, Hajibandeh, M., 2018. Urban Local-Spatial Resilience: Developing the key indicators and Measures, a Brief Review of Literature. *International Journal of Environmental Science and Technology* 16:567–582.
Gharipour, M., 2012. The Bazaars in Islamic City: Design, Culture and History. The American University in Cairo Press, Cairo.
Godschalk, D. R., 2003. Urban hazard mitigation: Creating resilient cities. *Natural Hazards Review,* 4**:** 136-143.
Gopalakrishnan, .K & Peeta, .S, 2010. Sustainable & Resilient Critical Infrastructure. © Springer-Verlag Berlin Heidelberg. Sys., pp. 77–116.
Grandchamp. P, 1928. Le Fondouk des Français à Tunis (1660-1861); La France en Tunisie au XVII* siècle (1651- 1660), VI, Tunis.
Gravari, B.M., 1996. Le sang et le sol. Le patrimoine, facteur d'appartenance à un territoire urbain. *Géographie et Cidttire*, 20: 55-72.
Gugu, S., 2009. Skywalks as Heritage: Exploring Alternatives for the Cincinnati Skywalk System. *MSc. Thesis*, University of Cincinnati.
Guichard, P, 1997. Suk, in the Muslim West. Encyclopedia of Islam, Ed., Bosworth, C.E., Vandonzel, E., W.P. Heinrichs, W.P., G. Legomte, 4: 789-791.
Hamdane, M. 2015. Culture et patrimoine de Tunisie en images. http://cultpatr.blogspot.com/-(Access date: 14.09.2020)
Hassler, U., KohleR, N., 2014. Resilience in the built environment. *Building Research and Information,* 42(2): 119-129.
Hernandez, J. 2008. Le tourisme macabre à La Nouvelle-Orléans après Katrina : résilience et mémorialisation des espaces affectés par des catastrophes majeures. *Norois*, 208(3):61-73.
Holling, C.S., 1973. Resilience and stability of ecological systems. Annu. Rev. Ecol. Syst. 4:1-23.
Jacobs, J., 1961. The death and life of great American cities, Random House LLC.
Kelman, I., 2008. Critique of Some Vulnerability and Resilience Papers. 17 November 2008, v1.
Kim, D., Lim, U., 2016. Urban resilience in climate change adaptation: A conceptual framework. *Sustainability,* 8**:** 405.
Klein, R. J. T., Nicholls, R. J. and FranK, T., 2004. Resilience to natural hazards: how useful is this concept? Global Environmental Change Part B: *Environmental Hazards*, 5:35-45.

Lanchet, W., 1996. La Ville entre concepteurs et usagers. Problématique de la sauvegarde à la lumière des initiatives populaires. Cas de la médina de Fès (Maroc), Université de Tours.
Lapie, P., 1898. Les civilisations tunisiennes, Musulmans, Israélites, Européens : étude de psychologie sociale. Félix Alcan, Paris,
Leblanc, A., 2010. La conservation des ruines traumatiques, un marqueur ambigu de l'histoire urbaine. *Belin L'espace géographique* 3(39): 253-266.
Lewis, B., 1937. The Islamic Guilds. *The Economic History Review*, Published by Wiley on behalf of the Economic History Society, 8(1): 20-37.
Lhomme, S., Serre, D., Diab, Y., Laganier, R., 2010. Les réseaux techniques face aux inondations ou comment définir des indicateurs de performance de ces réseaux pour évaluer la résilience urbaine. *Bulletin de l'association des géographes français*, pp. 487-502.
Liefooghe, C., 2006. La flèche du temps et le système, ou comment analyser la résilience d'un territoire. Mondialisation et résilience des territoires: trajectoires, dynamiques d'acteurs et expériences, pp: 21-40.
Lorenzo, C. 2011. From the «Resilient City» to Urban Resilience. A review essay on understanding and integrating the resilience perspective for urban systems. *d'Anàlisi Geogràfica*, 58(2) 287-306.
Lorrain, J. *Les souks de Tunis*.
Lowy, P., 1975. Les villes fermées d'Afrique du nord, méthodes de recherche. *L'espace Geographique*, 1: 31-43.
Lowy, P., 1976. L'artisanat dans les médinas de Tunis et de Sfax. *Annales de Géographie*, 85(470): 473-493.
Lowy, P., 1978. Géographie de la médina de Tunis. *Ph.D. Thesis*, GéoProdig, portail d'information géographique.
Lowy, P., 1980. La répartition du commerce de détail dans les grandes médinas tunisiennes. Espace géographique, 9(4): 323-329.
Mahroug, E., Belakehale, A., 2016. The evolution of heritage atmospheres in the medina of Tunis since the 19th century. *Conference: Islamic Heritage Architecture and Art*,159: 161- 169.
Marcelo, B., 2012. The Medina: Restoration and Conservation of Historic Islamic Cities, I.B Tauris.
Marcus, L., 2010. Spatial capital. *The Journal of Space Syntax,* 1**:** 30-40.
Marcus, L., Colding, J., 2014. Toward an integrated theory of spatial morphology and resilient urban systems. *Ecology and Society,* 19(4): 55-67.
Marrou, C., 2006. P*rojet urbain à Tunis.* Quelle articulation entre ville européenne et médina?, *MSc Thesis.*
Mcguinness, J., 1992. The development of conservation management for a pre-industrial North African city: the case of the medina of Tunis, *MSc Thesis*, Faculty of Social Science Centre for Middle Eastern and Islamic Studies, Durham University.
Meerow, S. Newell, J., Stults, M. 2016. Defining urban resilience: A review. *Landscape and Urban Planning*, 147:38- 49.
Meerow, S., Stults, M., 2016. Comparing Conceptualizations of Urban Climate Resilience in Theory and Practice. *Sustainability*, 8: 2-16.

Mermier, F., 2005. Souk et citadinité dans le monde arabe. *L'urbain dans le monde musulman de Méditerranée*, Maisonneuve et Larose, Paris pp. 81-99.
Mouhli, Z., 2014. Industries créatives et régénération urbaine dans la médina de Tunis. *ASM de Tunis.*
Mouhli, Z., Bejaoui, F., Gazzah, A. Entre les fortifications de la ville arabo-musulmane, conservation et créativité, Association de sauvegarde de la Medina (1980-2012).
Nassehzadeh, S., 2011. Architectural Sustainability of the Covered Bazaar of Tabriz and its Socio-Cultural Aspects, *MSc Thesis.*
Panerai, P., Castex, J., Depaule, J.-C., Samuels, I. 2004. Urban forms: the death and life of the urban block, Routledge.
Parivar, P., Faryadi, S., Sotoudeh, A., 2016. Application of resilience thinking to evaluate the urban environments; a case study of Tehran, Iran. *Scientia Iranica. Transaction A,* 23(4): 1633.-1640.
Porta, S., Latora, V., Wang, F., Rueda, S., Strano, E., Scellato, S., Cardillo, A., Belli, E., Cardenas, F., Cormenzana, B. 2012. Street centrality and the location of economic activities in Barcelona. *Urban Studies,* 49**:** 1471-1488.
Pouzoulet,C., 2003. Visions de New York: De la destruction du world trade center à la recherche d'une nouvelle urbanité. *La Découverte*, 2(109): 97-114.
Privitera, F., Metlasi, M., 2016. Le signe de La Médina, La morphologie urbaine selon Roberto Berardi. *étude éem euro-méditerranéennes.* Raymond, 1985, p. 242.
Resilience Alliance, 2007. Assessing and managing resilience in social-ecological systems: A practitioners workbook, version 1.0, Retrieved from http://www.sustentabilidad.uai.edu.ar/pdf/cs/practitioner_workbook_1.pdf.-(Access date: 04.05.2020) .
Rose, A. and Liao, S., 2005. Modeling Regional Economic Resilience to Disasters: A Computable General Equilibrium Analysis of Water Service Disruptions. *Journal of regional science*, 45(1): 75–112.
Rose, A., 2007. Economic resilience to natural and man-made disasters: Multidisciplinary origins and contextual dimensions. *Environmental Hazards*, 7: 383-398.
Rudlin, D., Falk, N., 2009. Sustainable Urban Neighbourhood: building the 21st century home, Routledge.
Rufat,S., 2012. Existe-t-il une mauvaise résilience ? *Résiliences urbaines, les villes face aux catastrophes,* pp: 359.
Saadaoui, A., 2001. Tunis ville ottomane : trois siècles d'urbanisme et d'architecture. Centre de publication universitaire, Tunis,
Saadaoui, A., 2010. Tunis Ville Ottomane Trois Siècles D'urbanisme et D'architecture. First Edition, University Publication Center, Tunis.
Salat, S. & Bourdic, L. 2012b. Urban complexity, efficiency, and resilience. *Urban Morphology Lab*, CSTB, France, pp: 2-44.
Salat, S., 2017. A systemic approach of urban resilience: power laws and urban growth patterns. *International Journal of Urban Sustainable Development***,** pp: 1-29.
Salat, S., Bourdic, L. 2012a. Systemic resilience of complex urban systems. *TeMA-Trimestrale del Laboratorio Territorio Mobilità e Ambiente-TeMALab,* 5**:** 55-68.
Santelli, S., 1992. Medinas: Traditional Architecture of Tunisia. First Edition, Dar Ashraf Publications, Tunis.

Santelli, S., 1995. La Ville le Creuset Méditerranéen Tunis. CNRS Publishers, Paris.
Santens, D., 2013. Analyse d'un projet territorial sous l'angle de la résilience. Feyzin, des concepts au territoire, travail de fin d'étude.
Santos Cruz, S. Costa, J. Desousa, S., Pinho, P., 2012. Urban Resilience and Spatial Dynamics. Resilience Thinking in Urban Planning, Ed.: Eraydin, A., Taşan-Kok, T., pp: 53-69.
Serre, D., 2016. Concevoir la résilience urbaine: un défi face à des complexités. *Laboratoire Interdisciplinaire des Energies de Demain*, Université Paris Diderot–Sorbonne Paris Cité, pp: 1-16.
Sharifi, A. & Yamagata, Y., 2018b. Resilient Urban Form: A Conceptual Framework. Resilience Oriented Urban Planning: Theoretical and Empirical *Insights* Ed.: Yamagata, Y., Sharifi, A., Springer, pp.167-179.
Sharifi, A., Chelleri, L., Fox-Lent, C., Grafakos, S., Pathak, M., Olazabal, M., Moloney, S., Yumagulova, L., Yamagata, Y. **2017.** Conceptualizing Dimensions and Characteristics of Urban Resilience: Insights from a Co-Design Process. *Sustainability,* 9**:** 1032.
Sharifi, A., Yamagata, Y., 2016. Urban Resilience Assessment: Multiple Dimensions, Criteria, and Indicators. Urban resilience A Transformative Approach, Ed.: Yamagata,Y., Maruyama, H., Springer, pp: 259-276.
Sharifi, A., Yamagata, Y., 2018a. Resilience-Oriented Urban Planning. *Resilience*-Oriented Urban Planning: Theoretical and Empirical Insights, Ed.: Yamagata, Y., Sharifi, A., Springer International Publishing, pp: 3-27.
Sieverts.T., 2012. Entre-ville une lecture de la zwischenstadt. translated from German to French by Jean-Marc Deluze and Joel Vincent, *In-town reading of the zwischenstadt*, Préface de Réne Tabourat, Editions Parenthèses.
Simmie, J., Martin, R., 2010. The economic resilience of regions: towards an evolutionary approach. *Cambridge Journal of Regions, Economy, and Society*, 3: 27–43.
Simmie, J., Martin, R., 2019. An indicator-based methodology for assessing resilience in urban mobility. *Transportation Research,* Part D, 77: 352–363.
Slootweg, R., Jones, M., 2011. Resilience thinking improves SEA: A discussion paper. *Impact Assessment and Project Appraisal*, 29(4): 263-276.
Smith, M. E., 2007. Form and Meaning in the Earliest Cities: A New Approach to Ancient Urban Planning. *Journal of Planning History*, 6(1): 3–47.
Spaliviero, M., 2015. City Resilience Action Planning Tool. Mozambique, Maputo: United Nations. *Human Settlements Programme* (UN-Habitat).
Sroor, M., 2010. Fondations Pieuses en Mouvement de la Tranformation du Status de Propriété des Biens *Waqfs* à Jérusalem (1958-1917), IFPO.
Stangl, P., 2015. Block size-based measures of street connectivity: A critical assessment and a new approach. *Urban Design International,* 20**:** 44-55.
Strunz, S., 2012. Is conceptual vagueness an asset? Arguments from the philosophy of science applied to the concept of resilience. *Ecological Economics*, 76: 112-118.
Suarez, M. Gomez-Baggethun, M. Benayas, J., Tilbury, D., 2016. Towards an Urban Resilience Index: A Case Study in 50 Spanish Cities. Sustainability, MDPI, 8(774): 1-19.
Tarbatt, J., 2012. The plot: designing diversity in the built environment: a manual for architects and urban designers. RIBA Publishing, London,

Tierney, K., Bruneau, M., 2007. Conceptualizing and measuring resilience. A key to disaster loss reduction. *All Hazards preparedness, response, and recovery*, TR News 250, pp:14-17.
Tira, Y. Türkyılmaz, C.Ç., 2017. Resistive Traits of the Tunisian Medina Bazaars, Architectural Spaces in the Globalized World, *Megaron*, 12(2): 184-194.
Tira, Y., 2017. Resistive traits of traditional bazaars in the globalized world Istanbul Grand bazaar and the Medina of Tunis bazaars. *MSc. Thesis*, Departement of Architecture, Yıldız Technical University, Istanbul.
Toubin, M., Lhomme, S., Diab, Y., Serre, D., Laganier, R., 2012. La Résilience urbaine: un nouveau concept opérationnel vecteur de durabilité urbaine ? *Développement durable et territoires*, 3(1): 1-18.
Um, N, 2003. Spatial Negotiations in Commercial City: The Red Sea Port of Mocha, Yemen, during the First Half of the Eighteenth Century. *Journal of the Society of Architectural Historians*, 62(2): 178-193.
Unesco, 2019. Interview with Ms. Souad Abderrahim, Mayor of Tunis. World heritage walled cities, pp: 58-59.
Vale, L. J., Campanella, T. J., 2005. Introduction: The cites rise again. The resilient city: How modern cities recover from disaster, Ed.: Vale, L.J., Campanella, T.J., Oxford University Press, pp: 3-26.
Villar, C., 2014. Villes résilientes, premiers enseignements tirés d'une synthèse bibliographique. Commissairiat Général au Développement Durable, CGDD, No:114.
Vurgin, E.D. Ehlen, M.A., Warren, D.E. Camphouse , R.C., 2010. A Framework for Assessing the Resilience of Infrastructure and Economic Systems. *Researchgate*, pp: 1-38.
Walker, B. & Salt, D., 2012. Resilience practice: building capacity to absorb disturbance and maintain function, Island Press, Washington, USA.
Walker, B., Holling, C. S., Carpenter, S. R., Kinzig, A., 2004. Resilience, adaptability, and transformability in social-ecological systems. *Ecology and Society*, 9**:** 5.
Wardekker, J. A., De Jong, A., Knoop, J. M., Van Der Sluijs, J. P., 2010. Operationalizing a resilience approach to adapting an urban delta to uncertain climate changes. *Technological Forecasting and Social Change*, 77**:** 987-998.
Wells, S., 2011. Planification territoriale et résilience des villes au lendemain de catastrophes naturelles: Regards croisés sur le rétablissement de la Nouvelle-Orléans en Louisiane et de La Baie au Saguenay. *MSc. Thesis*, Institute of urbanism, Planning, Faculty, Montréal University.
Xu, L. Kajikawa, Y., 2017. An integrated framework for resilience research: a systematic review based on citation network analysis. *Sustain sci*,13: 235-254.
Ziari, K. Asadi, S. Rabbani, T. Qelichi, M. M., 2013. Assessment of spatial structure and development of urban development strategies of the new city of Pardis. *Human Geography Research*, 45(4): 1-28.

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