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Prof. Dr. Ayşe SİREL

Loss of Identity in the Urban Character: Examining the Sameness in Urban Skyline Due to Mass-Produced Architecture in Abu Dhabi


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Abstract: *This article embarks on a comprehensive exploration of globalization and mass-produced buildings; specifically focusing on Abu Dhabi's urban character, highlighting concerns about regaining unique identity and localization. Employing historical research and case study analysis, it explores factors contributing to urban sameness, including standardized construction practices, limited building material diversity, and cross-cultural influences. Focusing on projects like Abu Dhabi Central Market and Louvre Abu Dhabi, the research unveils a complex interplay of forces shaping the city's identity. Acknowledging the study's limitations, it emphasizes the necessity of a broader global architectural discourse. The findings advocate for future urban planning practices that prioritize sustainability, uniqueness, and a break from the cycle of sameness in Abu Dhabi's urban identity.*

Keywords: *Sameness, urban identity, modern architecture, urban skyline, globalization*

Kentsel Karakterde Kimlik Kaybı: Abu Dabi'de Seri Üretim Mimarisi Nedeniyle Kentsel Silüetteki Aynılığın İncelenmesi

Özet: *Bu makale, küreselleşme ve seri üretilen binalar ile ilgili kapsamlı bir incelemeyi amaçlamaktadır. Çalışmada Abu Dabi'nin kentsel karakterine odaklanarak, özgün kimliğin ve yerel karakterin yeniden kazanılmasına dikkat çekmektedir. Tarihsel araştırma ve vaka incelemeleri yapılarak, standartlaştırılmış inşaat uygulamaları, sınırlı yapı malzemesi çeşitliliği ve kültürler arası etkiler gibi kentlerdeki benzerlik faktörlerini ortaya çıkarmaktadır. Abu Dabi Merkez Pazarı ve Louvre Abu Dabi gibi projelere odaklanan araştırma, kentin kimliğini şekillendiren karmaşık etkileşimleri açığa çıkarmaktadır. Çalışmanın sınırlılıklarını kabul edilirken, daha geniş bir küresel mimari tartışmanın gerekliliği vurgulanmaktadır. Elde edilen bulgular, Abu Dabi'nin kent kimliğindeki benzerlik ve aynılaşma döngüsünden uzaklaşarak, sürdürülebilirlik ve özgünlük temelli mimari ve planlama uygulamalarını savunmaktadır.*

Anahtar kelimeler: *Aynılaşma, kent kimliği, modern mimari, kent silueti, küreselleşme*

1. INTRODUCTION

Globalization initiated a repetition of the characteristic similarities among the identity of the urban patterns in most of the different megacities in the world. The proliferation of mass-produced housing in Abu Dhabi raises concerns about the diminishing uniqueness of its urban character. The pervasiveness of matching architectural compositions and configurations has led to this investigation of the causes behind this homogeneity. This study contributes practical understanding of the discourse on urban identity loss due to mass-produced housing in Abu Dhabi. This study aims to track the complicated connotations between mass-produced housing and how it influences the loss of urban identity in the urban character of Abu Dhabi. By illustrating the dominant resemblance in the architectural language of the various dwelling projects in Abu Dhabi, the study aims to determine the factors contributing to the sameness in the urban's distinctive character.

Adopting a dual methodology of historical research and a case study analysis, this research documents the evolution of the urban character of Abu Dhabi. The historical research facilitates the pivotal moments that shaped Abu Dhabi's identity, while the case study focuses on specific project examples such as Abu Dhabi Central Market, Louvre Abu Dhabi and Bulgari Pavilion. The research provides a contemporary lens to detect the patterns contributing the sameness. Mass-produced housing mechanism instructs immediate construction, it generates standardization and repetition in planning and character. Therefore, dwellings work as a product, and they become identical. The research includes techniques of standardized construction practices, influence of specific architects or firms, limited diversity in available building materials and cross-cultural exchange shaping architectural preference, height and scale, and matching exterior facades are some of the findings from the case study that cause sameness in urban character of Abu Dhabi. Potential limitations of the research may include the scope of the study, this topic in general is part of a global architectural conversation and it should be done in every metropolitan area to bring new materials to the big picture. The texture of each metropolitan area is unique and their associations are complex to discuss without diving deeper into terms such as historical, geographical, and ecological background. Abu Dhabi has a multidisciplinary urban texture with an extraordinary founding narrative, which is affected by globalisation therefore it was reasonable for the research. The study elaborated a multifaceted understanding of the convoluted dynamics between mass-produced housing, globalization, and the urban character in Abu Dhabi. By alleviating care and importance on the challenges posed by sameness in Abu Dhabi's urban fabric; the research desires to broadcast the findings of the breakdown for forthcoming architectural and urban planning practices moreover promoting sustainable and unique urban development to break the cycle of sameness in urban identity in future.

2. THE EVOLUTION OF URBAN CHARACTER DUE TO MASS-PRODUCED ARCHITECTURE

The revival and the rapid spread of the globalization concept brought most of the metropolitan city into sameness. Globalization is an outcome of the growing interdependence of the world's economic, cultural exchange and demographic changes, and advancements in both communication and transportation. With the technological developments, the construction sector has revised. Standardized, no-risk-taking developments are involved in order to build faster. In numerous metropolitans, notably in the developed world, investors have not diversified their portfolios and consequently enclose familiar street assets and skyscrapers. Capital skyscraper market flows also have been influenced by global architectural language. In essence, due to the need for housing, metropolitan areas became a concrete jungle. From the street to the roof, the rooms pile up one on top of the other, while the tent of a horizonless sky encloses the entire city. But the height of city buildings is a purely exterior one. Horne has become mere horizontality [1]. In the quest for a globally recognizable urban essence, the unique features that traditionally allocated cities surrender to an unbearable uniformity.

2.1. The Dominance of Mass-Produced Buildings in the Urban Character of the Cities During Modernism

Modernism corrupted the continuity between urban spaces and architecture. Therefore, urban design appeared to manage deficiencies in modern planning, leading to the development of future approaches in city design [72]. Metropolitan areas define vast urban regions characterized by high population density, financial dynamism, and complicated social facilities. The evolution of megastructures came as an effect of several social and technological developments. The term first came into use during the 1880s, after the first construction of skyscrapers in Chicago. It originally represented buildings with ten or more stories although by the late 20th century, it started to define buildings higher than thirty or forty stories as skyscrapers. The following century witnessed a rapid growth of the race to the sky, with designers pushing the limits of engineering and design. The increase of migration from rural to urban slowly became an outcome for commercial centres and resulted in a more increased necessity for living space. A house is a machine for living in [3]. The 20th century led to an era of groundbreaking initiatives manifested by the Chrysler Building and the Empire State Building in New York City. (Figure 1) The Empire State is a building with no other program than to make a financial abstraction concrete -that is, to exist. All the episodes of its construction are governed by the unquestionable laws of automatism [4] (Figure 2).

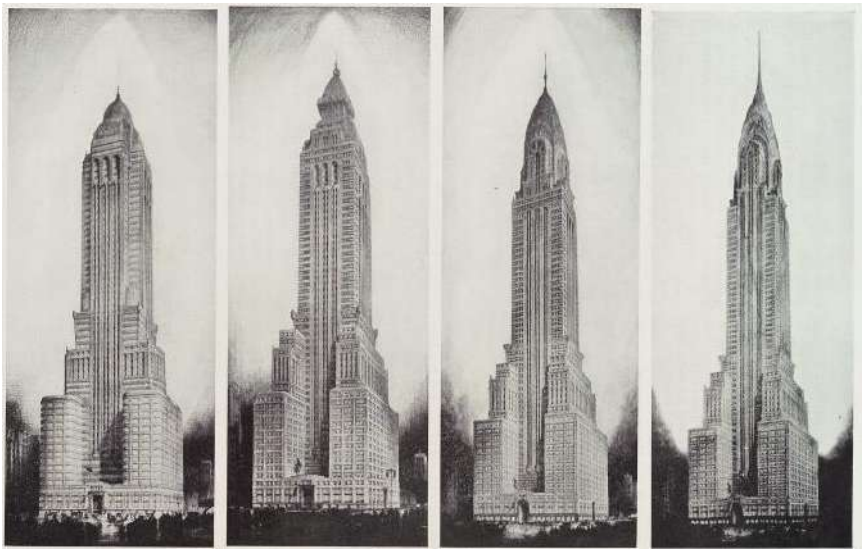

Figure 1. Stages in the design for the Chrysler Building, New York [5]

Figure 2. Empire State Building, New York [6]

The predominance of corporate architectural samples and standardized design practices engenders an architectural homogenization transcending geographic confines, deteriorating the cultural nuances and historical richness integral to urban character. As urban topographies merge into a seemingly undifferentiated panorama, the simultaneous loss of identity becomes detectable. Given that urban artifacts and places as spatial types are complex constellations of use, form and meaning, the interconnective webs that comprise urban typologies of buildings and spaces must somehow be disassembled before travelling, remembering that the buildings and landscapes themselves are not circulating [2].

The community's relation to space is multifaceted. It activates practices of care and exchange, processes of production and social reproduction as well as the construction of shared world views [7]. Post-World War II, the sensation circulated globally, with cities like Chicago, Hong Kong, and Tokyo joining the skyline race. The Seagram Building in New York (1958) (Figure 3). and the John Hancock Center in Chicago (1969) (Figure 4), displayed the lines and structural invention characterizing the International Style. Architectural pioneers made progress in construction materials and methods to push the limits of design. Glass and steel structures have been used more globally. In 1947, glass was selected to prevent indoor spaces from heating issues, necessitating air conditioning. By 2010, advanced glass in Burj Khalifa filtered heat, rendering air conditioning a luxury [60].

Figure 3. The Seagram Building in New York [8]

Figure 4. John Hancock Center in Chicago [9]

In Tokyo, the post-war period witnessed a vibrant modification of its urban material (Figure 5). The Kasumigaseki Building, completed in 1968, was a pioneering structure that Japan's entry into the era of high-rise construction. (Figure 6) It set the stage for Tokyo's future as a metropolis pictured by towering

structures that coordinated functionality with avant-garde design. Shifting to Europe, London's Centre Point, completed in 1966, symbolised a considerable release from conventional architectural norms. It played a basic role in redefining London's skyline and influencing ensuing results in the city's architectural topography. (Figure 7).

Figure 5. Mount Fuji and Tokyo Skyline [10]

Figure 6. Kasumigaseki Building [11]

Figure 7. London's Centre Point [12]

In Australia, Sydney's Australia Square Tower, completed in 1967, became a symbol of modernity and progress (Figure 8) (Figure 9). The megastructures are wholly internalized environments, with their own life-support systems [13].

Figure 8. The Square Tower, Australia [14]

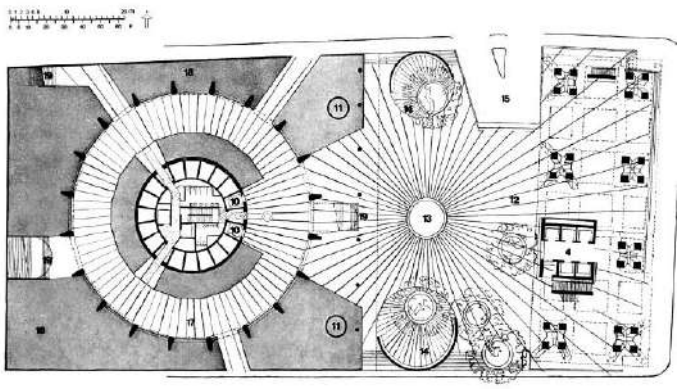

Figure 9. Plan of the Square Tower [15]

The dominance of these machines in urban landscapes was used as an answer to maintain the needings of basic functions for users however it built about a modernist architectural era slowly after the corruption of the historical and cultural identity of a city, replacing traditional architecture with a more standardized, globalized aesthetic. Destruction has always been associated with architecture, both with reconstruction and with new construction, and almost dramatically with ruin, which always emerged as a sublime entity due to its loss of stability [16]. The city grows as the original nucleus, enclosed within the walls, extends itself according to its own specific nature: and to this formal individuation corresponds a political individuation [17]. The most successful node seemed both to be unique in some way and at the same time to intensify some surrounding characteristics [18]. Planning will not go away; no, it will never again be depoliticized, as some once hoped [19].

Sameness in architecture is often born from a conjunction of design elements, building materials, and global sensations that surpass geographical boundaries. One of the major factors contributing to architectural homogeneity is the consequence of architectural styles. The globalization of design trends, such as the prevalence of modernism in the mid-20th century, has led to the replication of similar structures worldwide. Each moment can be seen to have a different capacity for geographical mobility and transitions inevitably entail some kind of spatial movement [20]. Hence architectural trends are also moving across the continents. For instance, the Seagram Building in New York City (Figure 10) and the TD Centre in Toronto (Figure 11), promote a sense of sameness across completely different urban terrains. Physical and historic conservation is threatened by private and public development, expanding institutions, office buildings, commercial complexes, and transport systems [21].

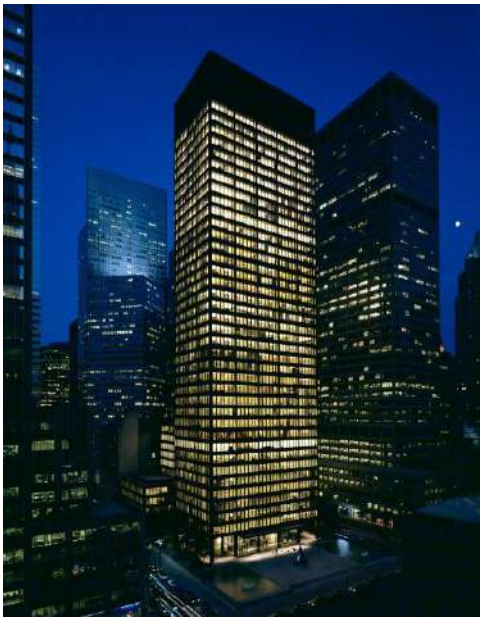

Figure 10. Seagram Building New York [22]

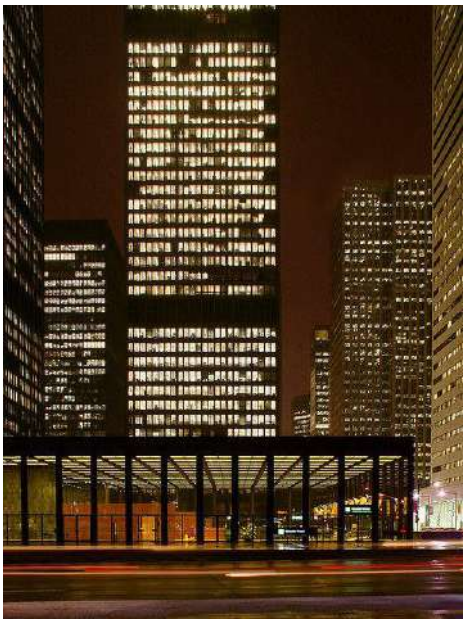

Figure 11. TD Centre, Toronto [23]

Another aspect is the standardization of building materials. Leaving parts of the building uncooked; and using materials and forms that are inexpensive to change around [24] causes repetition of identity. With the construction initiatives, the use of universally available materials such as glass, steel, and concrete has become across the board. This standardization not only encourages cost-effective construction but also donates to visual uniformity, as seen in the proliferation of glass-clad skyscrapers in major cities like Dubai and Shanghai. The change in suburban areas indicates accomplishment of urbanization and future vision and is a mirror to the light and the shadow of China's modernization [25]. Therefore standardization drags the construction process into an endless repetition. We must shift from a way of life that valorizes consumption, in which we take our identities from the branded characteristics of the goods we purchase to one that enables us to develop our talents and our individuality, to realize our truest selves through our work and other activities [26]. The global interconnectedness of economies,

cultures, and information has stimulated the immediate diffusion of architectural trends (Figure 12) (Figure 13).

Figure 12. Shangai's Urban Character [27]

Figure 13. Dubai's Urban Character [28]

Architects, designers, and developers are exposed to a shared pool of similar ideas, leading to the repetition of structures from different parts of the world. Competition among local governments to attract new investment and development operates the same way an economic market does [29]. The design of shopping malls often follows a standardized approach, with atriums, even storefronts, and matching interior layouts. Mall designs, such as the Mall of America in the United States, influence the architectural terminology of commercial spaces worldwide (Figure 14). The rebuilding of public spaces since the 1980s shows signs of the same homogenizing forces of redevelopment [30]. On the other hand, dominant architectural movements are another feature that causes sameness. Modernist, postmodernist, and contemporary architectural styles, for example, have influenced the aesthetics of urban landscapes.

Figure 14. Mall of America, Bloomington [31]

The emergence of luxury residential condominiums with shared features such as floor-to-ceiling windows, contemporary designed interiors, and co-living spaces is a multidisciplinary phenomenon. Developments like the Marina Bay Sands Residences in Singapore and the Shard Residences in London can be examples of a shared architectural vocabulary in high-end residential projects (Figure 15) (Figure 16). Moreover, mass production and efficiency also play a higher role in urban planning. With the rapid growth of standardized construction methods, similar designs and materials are involved in the construction process. Some modern airport terminals exhibit similarities in design, featuring expansive glass walls, open spaces, and streamlined layouts. Terminal 5 at Heathrow Airport in London and the Incheon International Airport in Seoul, have an identical interior concept for airport design. (Figure 17) (Figure 18).

Figure 15. Singapore [32]

Figure 16. London [33]

Figure 17. Heathrow Airport, London [34]

Figure 18. Incheon International Airport, Seoul [35]

2.2. The Influence of Urban Landscape On the Urban Character

Urban landscape refers to the spatial arrangement of various borders within an urban area. It is about thinking in the bird's view and corresponding to the complicated relationships that most of the urban areas. It contains the layout of streets, buildings, open spaces, and additional physical qualities that collectively shape the overall structure of a metropolis. The urban design include aspects such as the grid layout of roadways, the distribution of land uses, and the overall design of the urban environment. Urban landscape is the collective composition of the physical characteristics and features of the land within an urban area. It includes the natural and artificial elevation, gradients, water bodies, geographical elements, social life and movements that contribute to the terrain the city. Urban landscapes can be classified as an inseparable combination of the natural and cultural specifications of a region [61].

The sequence of the patterns for a design, as generated by the language, is therefore key to that design [36]. The urban landscape is a dynamic unit in the urban character in which people experience the city. It is where the story happens. Urban users witness anything and everything related to the routine right there on the sequence. They extend from one line to another, including the building borders, edges, land uses, and setbacks that define each side. They offer space for movement and facilitate a variety of stories routines and uses. Sequences could conduct the daily routine of the users. It could shape their daily life. A good physical framework for life between buildings and for communal activities is, in all circumstances, a valuable, independent quality, and – perhaps – a beginning [37]. From buying coffee or using public transportation to reach school or work; streets are the connectors of the storyline of the users. The streets are like pipes into which men are sucked up [38] (Figure 19). The feeling of

identification which makes people a part of the world, arises from five areas: the building, the street, the neighbourhood, the city, and the region [39].

Figure 19. Dubai Streets as the example for pipes [40].

Designing a structure on a micro-scale leaves a mark on the macro scale and builds a story with the social life of the urban. The legibility of places and spatial perception are affected by the characteristics of urban morphology. Individuals' orientation and the clarity with which they experience those spaces are specified by the nature of urban morphology. The forms and arrangements of physical components that constitute urban character shape and change spatial perception [73].One of the essential qualities of a town is that it is a gathering together of people and utilities for the generation of civic warmth [43]. The design should harmonise with the natural surroundings, creating a seamless integration between the built and unbuilt spaces. Localization is part of the architecture that portrays an approach that surpasses the conventional paradigms of design, containing a comprehensive concentration on the cultural, environmental, and social contexts ingrained in a specific zone. At its core, a perspective lies which conveys, acknowledges the play between the atmospheres, the built surroundings and the distinctive elements of a place. Modern building is now so universally conditioned by optimized technology that the possibility of creating significant urban forms has become extremely limited [44]. This global repetition approach enables a sense of continuity, where the architecture becomes an extension of the land it occupies. Likewise, as some architects or urban planners do not copy-paste the plan they draw to every zone; localization could break the cycle of repetition in urban metropoles. Consider the case of Battersea Power Station in London, a superior sample of the mark of modernization on urban character and authority (Figure 20). Once an iconic symbol of the Industrial Revolution, the power station faced a transformation into a luxury outcome project.

Figure 20. Battersea Power Station, London [45]

Environmental considerations are essential in the urban design procedure. Analyzing the local climate, adopting tolerant design methodologies to harmonize with natural elements. This extends to the utilization of region-specific materials and construction techniques, ensuring that the ecological footprint is minimized, and the project contributes to the sustainability of the surrounding environment. On the other hand, this is what is not happening in the global architectural language. The language that has been built has a lack of connection between nature and the structure itself. The things themselves, the people, the air, noises, sound, colour, material presences, textures, forms –basically every feature moves the users, and builds a connection between users and the space itself [42].

The modernization process involved repurposing the site into a high-end residential and commercial space, necessitating the removal of original architectural elements. As the iconic chimneys were reconstructed, the site's industrial heritage gave way to a standardized, upscale format. This metamorphosis not only resulted in the loss of a unique urban character that once defined London but also signalled a shift in authority. The European avant-garde fell in love with American factory buildings [46]. Architect as we know him at present, the purveyor of primarily structural solutions, is only one of a number of competing environmentalists, and what he has to offer no longer carries the authority of either necessity or unique cultural approval [47] (Figure 21).

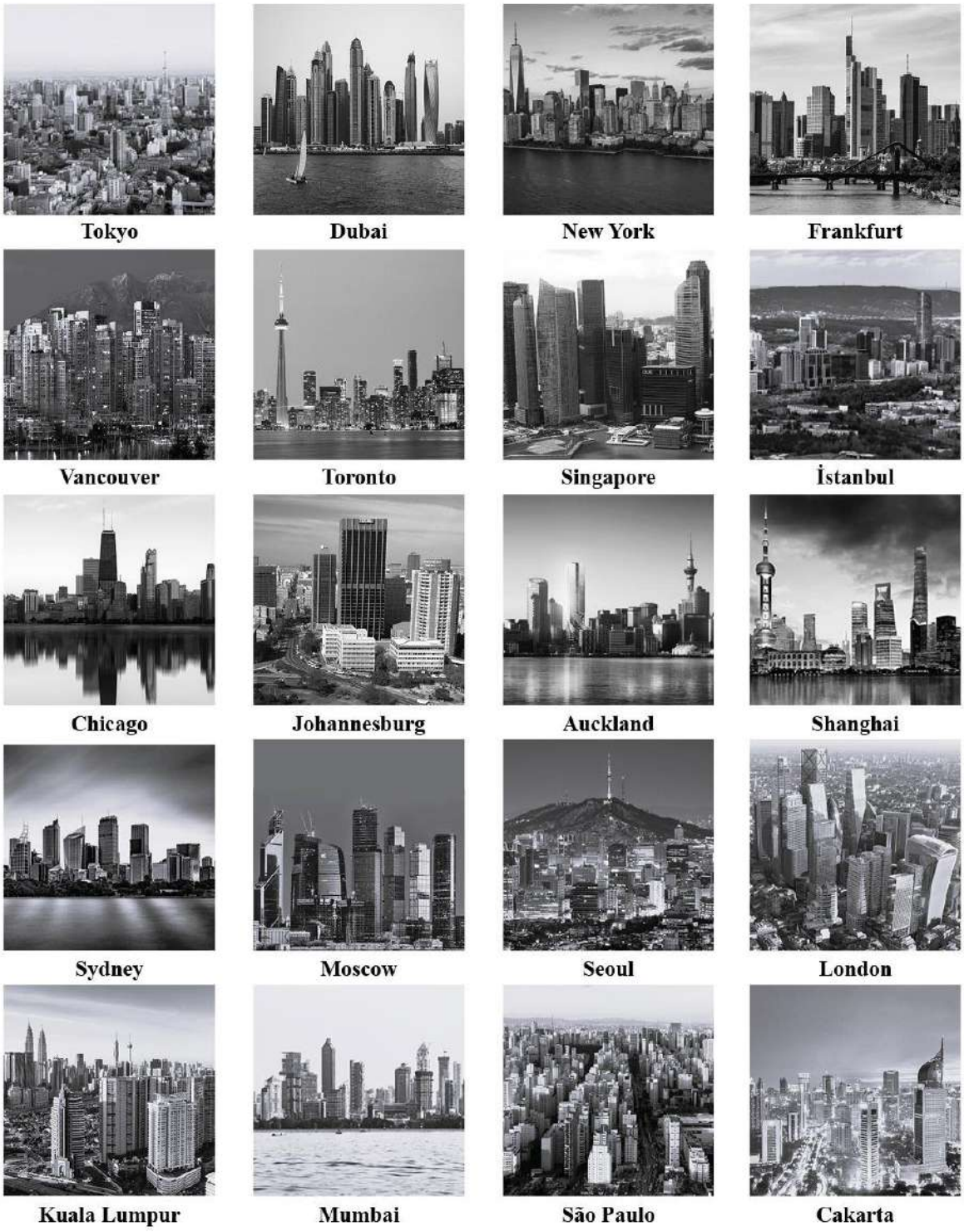

Figure 21. Urban Skylines [48]

3. URBAN CHARACTER OF ABU DHABI

Abu Dhabi, despite its undeniable allure and modernity, grapples with a distinctive sense of sameness in its urban character. This phenomenon is palpable in the city's urban landscape, where towering structures and opulent developments often adhere to a homogeneous design resemblance. The skyline, designed with glass facades and contemporary structures, reflects a prevailing uniformity that can be

perceived as both a testament to rapid development and a potential challenge to diversity. The reasearch is aimed to dive deeper into history. Then focuses on the specific examples from Abu Dhabi.

3.1. Historical Evolution: Abu Dhabi's Journey Through Time

Abu Dhabi stands as a testament to the synthesis of iconic architectural elements, expansive commercial domains, green golf expanses, perfect sandy shorelines, opulent lodgings, and a harmonious blend of diverse races and cultures, collectively encapsulating the embodiment of a 21st-century city. However, an intellectual investigation into the city's historical narrative reveals a markedly disparate Abu Dhabi, a compelling saga etched in the annals of its rich history. Archaeological findings substantiate the existence of a prolonged human habitation spanning over 100,000 years in this geographic expanse. A climactic juncture in the historical continuum occurred in 1761, when the Bani Yas tribe, rooted in the Liwa oasis, unearthed potable water on a remote island, now recognized as Abu Dhabi. Immersing in time-honoured practices such as fishing and pearl diving to their counterparts in Dubai, the Bani Yas tribe initiated a settlement that would burgeon into a thriving modern metropolis (Figure 22) (Figure 23).

Figure 22. Abu Dhabi's Urban Skyline [49]

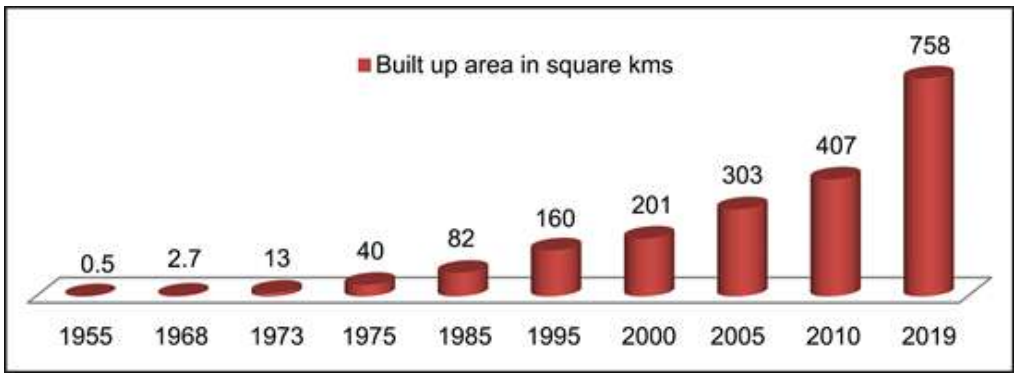

Figure 23. Abu Dhabi's Built Area From 1955 to 2019 [62]

Centuries developed, precipitating seismic transformations in both industry and influence. Outstanding among these shifts was the advent of oil and gas in recent decades, heralding a revolutionary epoch in Abu Dhabi's development. The perceptive onset occurred in 1958, with the advantageous finding beneath a historical pearling bed in the Gulf. This milestone precipitated Abu Dhabi's inaugural venture into oil exports in 1962, orchestrating the prelude to a remarkable orbit. In 1966, the venerable Sheikh Zayed bin Sultan Al Nahyan ascended to rulership, subsequently catalyzing the formation of the United Arab Emirates in 1971. His sagacious stewardship provided the bedrock for a nation that embraces its cultural heritage, embraces enlightened governance, and underpins its strength with a robust economy. Chronologically, the Bani Yas tribe's establishment on Abu Dhabi Island in 1761 marked the inception of settlement. Successive decades witnessed the ascendancy of Sheikh Shakhbut bin Dhiyab Al Nahyan in the 1790s, positioning Abu Dhabi Island as the de facto capital of the Bani Yas tribal confederation. Towards the concluding years of the 1810s, Sheikh Tahnun bin Shakhbut Al Nahyan assumed leadership, navigating the region through intricate diplomatic manoeuvres.

Between 1820 and 1853, a General Treaty of Peace was negotiated between the British Government and the rulers of Sheikhdoms, culminating in the establishment of the Trucial States, later evolving into the United Arab Emirates. The 19th century bore witness to leadership transitions, from Sheikh Tahnun's governance to the succession of Saeed bin Tahnun Al Nahyan in 1845. The cover of rulership spanned through influential leaders such as Zayed bin Khalifa Al Nahyan. The following century unfolded with important moments, from Sheikh Zayed Bin Khalifa Al Nahyan's death in 1909 to the establishment of the Abu Dhabi Petroleum Company in 1939. The oil discovery on Das Island in 1958 marked a transformative phase, culminating in the city's maiden oil exports in 1962. The historic amalgamation on December 2, 1971, heralded the formation of the United Arab Emirates, with Sheikh Zayed bin Sultan Al Nahyan assuming the mantle of the inaugural President. Subsequent decades witnessed the rapid modernization of Abu Dhabi, with landmark achievements such as the compplетion of the main road (E11) in 1980 and the establishment of the Gulf Cooperation Council (GCC) in 1981 [62]. The shift of Abu Dhabi's status to the capital of the UAE in 1996 signified 25 years of independence and commemorated Sheikh Zayed's 30th anniversary as ruler. The early 2000s witnessed milestones including the inauguration of Marina Mall and Abu Dhabi Mall in 2001, the launch of Etihad Airways in 2003, and the passage of Sheikh Zayed Bin Sultan Al Nahyan in (Figure 24).

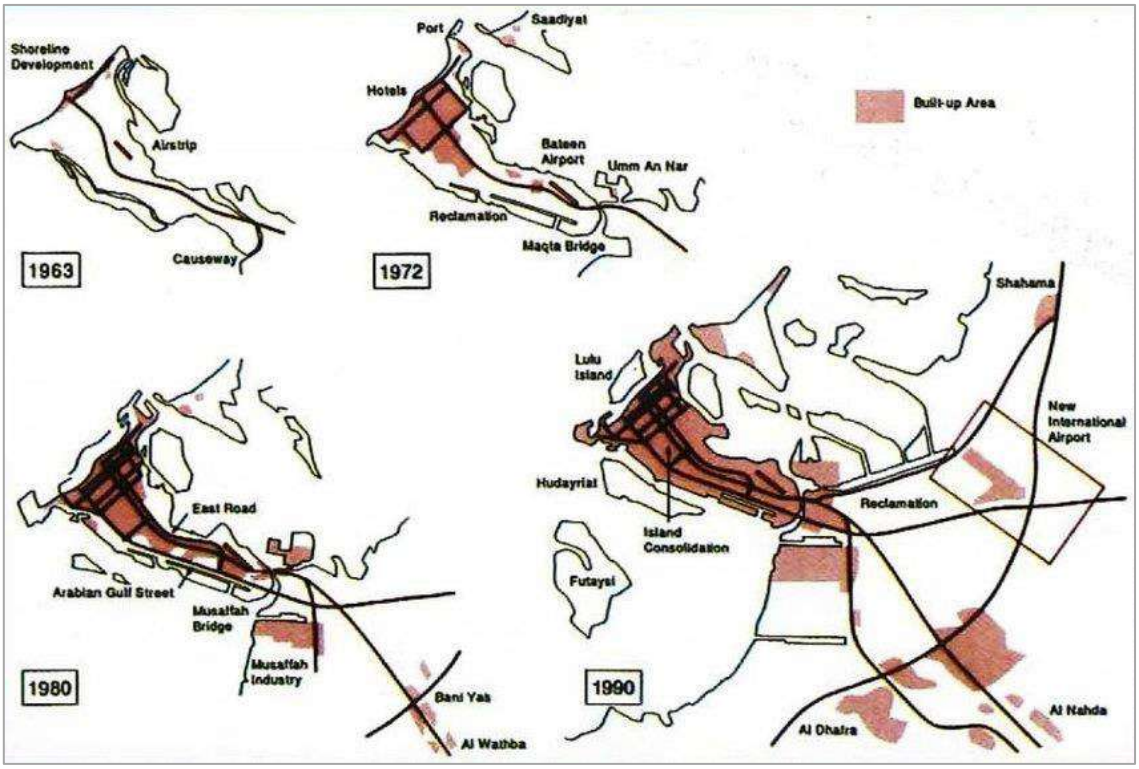

Figure 24. Abu Dhabi's Urban Evolution [65]

Urban landscapes evolved with the construction of landmarks like Emirates Palace in 2005, Zayed Mosque in 2007, and the inauguration of the Abu Dhabi National Exhibition Centre in the same year. Following years marked achievements such as the establishment of public transport through the Abu Dhabi Bus service in 2008, the initiation of the F1 circuit and the opening of Yas Island in 2009. Cultural and educational institutions were introduced, including Ferrari World in 2010 and the establishment of the New York University campus in 2012. Yas Mall, the city's largest mall, opened its doors in 2014, while 2017 witnessed the inauguration of the Louvre Abu Dhabi. In reflection, Abu Dhabi's narrative unfolds as a profound testimony to resilience, adaptation, and the relentless pursuit of a brighter future. Its architectural odyssey, from ancient tribal roots to a global powerhouse, reverberates through the corridors of history, leaving an indelible imprint on the evolving canvas of urban development [62]. As Abu Dhabi's journey continues, it emerges not only as a geographical entity but as a paradigm of architectural metamorphosis, embodying the symbiosis of tradition and modernity (Figure 25) (Figure 26).

Figure 25. Constructin of Louvre Museum [50]

Figure 26. Louvre Museum [51]

3.2. Louvre Museum & Neoliberal Architecture

Louvre Abu Dhabi, an architectural marvel by Jean Neuvel, surpasses traditional paradigms by harmonizing elemental climatic considerations and ecological touch with a sophisticated aesthetic vision. Aiming for seamless integration within its geographic milieu, the museum surpasses sheer translation, bypassing the trappings of redundancy and convention. Rather, it aspires to spotlight the allure of unusual encounters, offering unparalleled access by boat or foot—a testament to the extraordinary spatial planning that precedes one's entry into a realm of captivating collections and cultural indulgence. The nucleus of this architectural opus is a monumental dome, spanning 180 meters in diameter, a variation from traditional Arab architecture. Its special design, a result of huge collaboration between Ateliers Jean Nouvel and BuroHappold Engineering, unveils a complex pattern meticulously layered in stainless steel and aluminium. This practice orchestrates a mesmerizing 'rain of light,' with 7,850 stars illuminating the nocturnal panorama. The intricate interplay between sun, dome, sea, and land manifests as a tranquil haven for art, making Louvre Abu Dhabi an exemplar of architectural invention, seamlessly woven into the texture of its cultural and climatic context [41]. However, it only occurs because of a neoliberal capital. To be able to build something gigantic like this at in the skyline in a urban; it would be unrealistic to concider the economical process (Figure 27) (Figure 28).

Picture 27. Louvre Museum Inside [52]

Picture 28. Standalone Megastructures [53]

Neoliberal architecture, a manifestation of the broader neoliberal economic ideology, has definitely shapes the contemporary urban landscapes and the architectural techniques. The neoliberal approach tends to prioritize aesthetics that cater to market trends all around the world. The result is often a sameness in the urban character. Iconic, flashy structures may dominate skylines, but their contribution to a city's identity and social fabric is often lose its identity. This contribituan is a massive architectural success although it should create a discussion about the does neoliberal capital could be a beginning phase of standalone megastructures in the urban character. Moreover, the neoliberal paradigm tends to prioritize the role of star architects and global architectural firms, sidelining local expertise and vernacular practices.

3.3. Abu Dhabi Central Market & Reimagining the Urban Relationships

Abu Dhabi's Central Market, an antique city landmark, undergoes a transformative revival rooted in Gulf-inspired traditional architecture. From the usage of natural light, material choices, the senario of the space services to users. Departing from the same shopping mall sterotype, this scheme redefines the market, bestowing the city with a renewed civic nucleus. Embracing a modern interpretation of regional vernacular, the market seamlessly blends luxury boutiques, food markets, and craft-based trades within an architecturally curated environment. Designed for year-round comfort, the interior integrates the beautiful sunlight, vibrant shades, and water features, fostering a dynamic interplay of squares, courtyards, and alleys. Making a scenery atmosphere within the structure is a extraordinary example. The permeable boundary between indoors and outdoors facilitates a connection with public routes and squares, establishing a central venue for festivities. Roof panels, influenced by Islamic arts, adapt to climatic conditions, enclosing the space when needed. The octagonal-patterned panels echo traditional

zellij tilework, intertwining with Abu Dhabi's lush landscaping [63]. A cluster of towers, designed as a cohesive family, rises above, utilizing reflective facades and internal shading to harmonize with the arid desert milieu (Figure 29) (Figure 30).

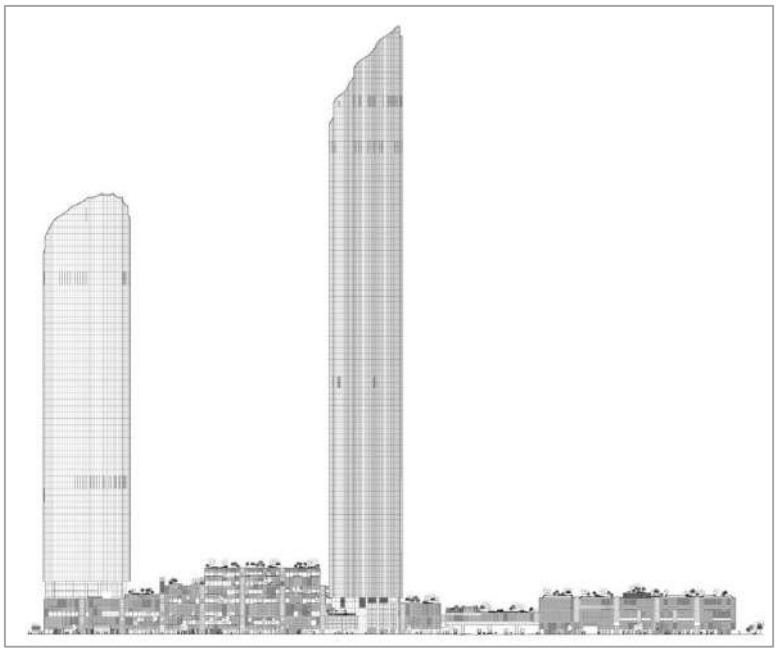

Figure 29. Central Market Section [54]

Figure 30. Abu Dhabi Central Market [55]

3.4. Bulgari Bavilion & Reimagining the Urban Landscape

Authorized by the respected Bulgari, the temporary Bulgari Pavilion, conceived by Not a Number Architects, graced the Abu Dhabi Art event. Positioned at the entrance, the Pavilion served as an exclusive VIP lounge for celebrities, seamlessly blending luxury with innovative design. The architects sought to materialize Bulgari' ethos within a space that respects the heritage. The design hinged upon reappropriating prosaic elements, altering acrylic tubes into a self-supporting architectural wonder, symbolizing Bulgari's unique approach. Through meticulous prototyping and experimentation, the team crafted arches, arcades, and cupolas, forming a recognizable yet ethereal enclosure. The bespoke reference technique using polycarbonate dowels and pins not only streamlined assembly but also enhanced aesthetic cohesion. The pavilion has more than two thousand tubes, with ten thousand individual connections, weighing almost six tons, epitomize the fusion of familiarity and novelty [65].

Collaborating with Artisan, the lighting design aimed at creating a dynamic interplay of sunlight during the day and a mesmerizing nocturnal spectacle, where light flowed through the structure like water, continually revealing and concealing its facets (Figure 31) (Figure 32) (Figure 33).

Figure 31. Craft [56]

Figure 32. Pavillion [57]

Figure 33. Urban Skyline of Abu Dhabi [58]

4. FINDINGS AND RESULTS

The findings of this study listed towards resemblance in the urban character of high-density metropolitan areas, underscored by various indicators and resultant features. Architectural global language, as a unifying force, manifests through shared design elements, materials, and forms that transcend geographical boundaries. Globalization and modernization are the main contractors of a sense of visual sameness. Standardized construction practices emerge as a significant factor, emphasizing efficiency and cost-effectiveness over unique architectural expression. The result of specific architects or firms heightens this phenomenon, as their signature styles become symbolic of an urban identity. Zoning regulations and building codes, while essential for urban planning, inadvertently contribute to the standardization of built environments, influencing the height, scale, and overall aesthetic of structures.

Furthermore, the preferences for sameness, often driven by economic considerations, further entrench the replication of design elements across projects. Architectural competitions, intended to spur innovation, paradoxically contribute to sameness as winning designs set precedents for emulation in subsequent developments. These indicators collectively shape the urban fabric, fostering a landscape characterized by similar building materials, structural forms, and exterior facades. Encouraging citizens about this global issue might be the beginning of the first steps. Manipulating the neoliberal economy into systematic and unique architectural planning would be another critical issue for building resilient and unique urban character (Table 1).

Table 1. Main Phases & Issues Behind Them

Main Phases:	Issues Behind Them:
Phase 1: Beginning of Urbanization and Economic Growth	Rapid urbanization leading to a deficit of natural elements and a pervasive adherence to standardized urban character.
Phase 2: An Awareness of Environmental Predicaments	Depletion of green spaces and the emergence of a nature deficit within the urban planning framework.
Phase 3: Investigation of the New Urban Character	Imbibing nature into urban design, countering monotony, and nurturing a distinctive architectural identity.

Phase: 1. Beginning of Urbanization and Economic Growth

Problem:

The rapid urbanization at the onset leading to a deficit of natural elements and a pervasive adherence to standardized urban character (Table 2).

Table 2. Phase One

Phase- 1	Beginning of Urbanization and Economic Growth
Actors:	Architects, Engineers, visionaries, urban planners, governmental entities
Type of Goal:	Economic motivation, infrastructural enlargement.
Role:	Planning process, construction process, economic progress.
Resources:	Land, financial authorisation, specialized knowledge.
Nature of the Stake:	Prosperity and developmental height.
Patterns of Interaction:	Collaborative works and behaviours between government entities and developmental luminaries.
Network Complexity and Density:	A nuanced web with a level of complicatedness is considered moderate, sustaining a density of moderate volume.

Phase 2: An Awareness of Environmental Predicaments

Issue Tackled:

Depletion of green spaces and the emergence of a nature deficit within the urban planning framework (Table 3).

Table 3. Phase Two

Phase- 2	**An Awareness of Environmental Predicaments**
Actors:	Ecological advocates, municipal authorities, grassroots organizations.
Type of Goal:	Identification and resolution of environmental challenges.
Role:	Research, policy delineation, fostering public cognizance.
Resources:	Environmental wisdom, Urban Resilience, Research funding.
Nature of the Stake:	Advocacy for environmental robustness and conservation.
Patterns of Interaction:	Collaborative endeavours involving governmental bodies, environmental advocacy groups, nature protectors and community initiatives.
Network Complexity and Density:	A spectrum of interactions marked by moderate intricacy and density.

Phase 3: Investigation of the New Urban Character Issue Tackled:

Imbibing nature into urban design, countering monotony, and nurturing a distinctive architectural identity (Table 4).

Table 4. Phase Three

Phase- 3	**Investigation of the New Urban Character Issue Tackled**
Actors:	Architects, Engineers, Visionaries, urban planners, governmental entities, Local
Type of Goal:	Implementation of sustainable urban blueprints, infusion of nature, and cultivation of architectural diversity.
Role:	Not copy-pasting plans everywhere
Resources:	Funding directed towards eco-friendly initiatives, active community participation.
Nature of the Stake:	Nurturing of a unique urban identity.
Patterns of Interaction:	An complicated meeting with interdisciplinary collaboration
Network Complexity and Density:	A nuanced web with a level of complicatedness is considered moderate, sustaining a density of

Critical Factors and Strategies

Critical Factors:

- Genuine Governmental commitment to sustainability.
- Dynamic local community involvement and boosted environmental awareness of ecology, resilience, urban character and globalization.
- Integration of green spaces as essential components of urban planning.
- Advocacy for architectural diversity and reaching quality and uniqueness in architectural designs and urban planning.

Strategies:

- Strict enforcement of severe and vulnerable environmental regulations.
- Encouragement of green architectural paradigms and infrastructural development.
- Proactive community participation in critical urban decisions.
- Localization, adapting our cities to the local environment. Not copy-pasting the plans to everywhere.
- Fostering of diverse architectural aesthetics, coupled with the discouragement of standardized patterns.

The following table provides details regarding the indicators and outcomes of the similarities. (Table 5).

Table 5. Indicators and Results of Sameness

Indicators in the sense of architectural global language
Architectural design trends standardized construction practices influence of specific architects or firms cost-effective design choices zoning regulations and building codes developer preferences for uniformity architectural competitions
Result of sameness in urban character of high-density metropolitan areas
Similar building materials used similar structural forms matching exterior facades uniformity in height and scale consistent use of technology

5. CONCLUSION

Cities are not just spaces of consumption; they are spaces of struggle and resistance [59]. The co-occurring challenge of sameness in urban character, coupled with the simultaneous sameness, is a relatively contemporary phenomenon attributed to the globalization of urban design. The pervasive influence of globalization in shaping metropolitan urban language has impacted even the vibrant urban landscape of Abu Dhabi. To balance this trend, a shift towards localization, prioritizing the unique local context over global sameness, emerges as a potential strategy for mitigating the urban deficit disorder in Abu Dhabi and many other cities. Focusing on the preservation of nature and the cultivation of resilient, sustainable urban character stands as a transformative approach with far-reaching implications for the city's identity. Furthermore, the urban character is deeply intertwined with the socio-economic factor, still influencing and being influenced by the distribution of resources, opportunities, and power.

Recognizing the potential for localization within the urban landscape is crucial for addressing issues of economy and technology. In essence, the urban character of high-density cities can stop being a machine playbox that could ship to another city easily and on the other hand, it can be a source for interplay of diversity can redefine the narrative of urban character. Abu Dhabi's skyline has changed over time, and numerous plans and projects are anticipated to occur sooner than previously expected.Understanding the urban character of a city systems are complicated because neither formation nor transformation of urban form are random procedures in spatial materialisation of colonial associations. Apparently, there

must always be some regulations, encoded in form of proscriptive or prescriptive rules -as laws, normative acts, or as customary practices, that governs these processes [67].

When building our future cities urban identity of the cities should be formed by taking into consideration its associations of the environmental, historical, sociocultural and spatial values. In order to analyze the complex relationships between cities of our world, multiple case studies have to be performed to comprehend the distinctive features and characteristics of the cities. This approach allows for a detailed investigation of the parallels in urban characteristics. Such research is crucial for future studies and the future of architectural design and urban planning, highlighting the significance of viewing the consequences on a city's skyline.

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Architectural Engineering Construction Quality Control of Concrete Structures Perspectives



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Abstract: *The construction industry requires affordable and resource-efficient building plans and techniques that utilise sustainable energy sources to produce high-quality structures. The quality of concrete structures in civil engineering construction significantly affects overall project quality. With the ongoing urbanisation and construction in China, the demand for concrete products has increased. Effective use of concrete structure construction technology can enhance the stability and safety of an entire building structure, leading to increased project construction revenue. This study focused on the significance of quality control in concrete structures in architectural engineering. Concrete structures are of significant value in civil engineering, and it is essential to guarantee their quality. Therefore, it is crucial to implement rigorous quality control measures during the construction process, including appropriate mixing, effective curing techniques, and regular inspections, to identify and rectify flaws or faults in concrete structures, enhance the durability to enhance the durability and long-term functionality of concrete structures, while reducing the risk of structural failures or deterioration.*

Keywords: *Civil engineering; concrete; pouring; vibration, quality control*

Beton Yapıların Mimari Mühendislik Kalite Kontrolü Perspektifleri

Özet: *İnşaat sektörü, yüksek kaliteli yapılar üretmek için sürdürülebilir enerji kaynaklarını kullanan, uygun maliyetli ve kaynakları verimli kullanan bina planlarına ve tekniklerine ihtiyaç duymaktadır. İnşaat mühendisliği yapımında beton yapıların kalitesi, genel proje kalitesini önemli ölçüde etkilemektedir. Çin'de devam eden kentleşme ve yapılaşma ile birlikte beton ürünlere olan talep artmıştır. Beton yapı inşaat teknolojisinin etkin kullanımı, tüm bir bina yapısının stabilitesini ve güvenliğini artırarak proje inşaat gelirinin artmasına yol açabilir. Bu çalışma, mimarlık mühendisliğinde beton yapılarda kalite kontrolün önemine odaklanmıştır. Beton yapılar inşaat mühendisliğinde önemli bir değere sahiptir ve kalitelerinin garanti altına alınması esastır. Bu nedenle, beton yapılardaki kusurları veya hataları tespit etmek ve düzeltmek, beton yapıların dayanıklılığını ve uzun vadeli işlevselliğini artırmak için dayanıklılığı artırmak ve yapısal arıza veya bozulma riskini azaltmak için uygun karıştırma, etkili kürleme teknikleri ve düzenli denetimler dahil olmak üzere inşaat sürecinde titiz kalite kontrol önlemlerinin uygulanması çok önemlidir.*

Anahtar Kelimeler: *İnşaat mühendisliği; beton; dökme; titreşim, kalite kontrol*

1. INTRODUCTION

The engineering society is increasingly focusing on sustainable industries, addressing societal needs, life-cycle costs, and environmental impact. This shift is causing competition between existing and new projects, necessitating the introduction of codes and standards that address both. Future design standards will focus on safety, serviceability, durability, and performance criteria [1] . Performance-based design is needed to address structural safety, reliability, and intervention practices. Additionally, advancements in technology and computer simulation have greatly improved our understanding of concrete temperature [2-5]. Fields and stress issues. These advances have allowed for more efficient and effective measures to control and mitigate temperature-related problems in concrete structures, resulting in improved durability and performance. Concrete structures are made of concrete and steel reinforcement material, which has high tensile and shear strength. Construction firms must employ this type of structure appropriately during civil engineering construction to increase the overall safety of the building structure. Concrete structures are seismically resistant and have significant space advantages, which can increase the construction quality of a building project. Concrete structure preparation is simple, may significantly improve construction efficiency, and is widely employed in a variety of engineering projects. It is important to thoroughly research concrete structure technology in civil engineering construction. As well, establishing a formwork is essential for cast-in-situ reinforced concrete construction. Leak-proof, dynamic load-resistant, easy to install, dismantle, portable, lightweight, and inspect. It should be reusable, recyclable, designed in any shape, size, or height, and deco-friendly. To ensure accurate temperature control in concrete construction, a comprehensive approach is necessary. This includes utilizing various measures, such as optimizing concrete mix ratios, using concrete admixtures for adiabatic temperature rise control, implementing pouring temperature control techniques, and monitoring temperature differentials throughout the curing process.

The durability, safety, and sustainability of the built environment rely on construction quality control for concrete structures. First: According to research findings, precast concrete structures have shown effective quality management and construction efficiency.[6]**.** Maintaining high standards throughout the construction process ensures the structural integrity of precast elements. Second: It is essential to uphold quality assurance construction as per their design improve longevity, functionality, and eco-friendliness [7] **.** Adhering to design specifications and quality standards is crucial for long-term concrete structure performance.

Third: Quality control measures are essential during concrete construction to prevent issues like cracking, spalling, and corrosion... Concrete strength is a critical component of quality control and plays a pivotal role in structural design and construction, as confirmed by[8] **.** Monitoring and predicting concrete strength accurately are guaranteed. Emphasizing the importance of performance-based concrete quality control, compliance with durability requirements, meticulous construction management standards for precast structures, and the impact of material quality and construction processes on structural integrity.

Table 1: Presents the Proportions of Concrete Mixes for Various Strength Grades:

cement	sand	Gravel	fly ash	admixture	Water consumption	water/binder ratio
350kg/m^3	1170kg/m^3	650kg/m^3	140kg/m^3	65kg/m^3	195kg/m^3	0.35

The table above presents the proportions of concrete mixes for assorted strength grades. It comprises columns for cement, sand, gravel, fly ash, admixture, water consumption, and water binder ratio. Each row specifies the quantity of each component in kilograms per cubic meter for a specific strength grade. The table offers a comprehensive breakdown of the components required for various strength grades, aiding engineers and construction professionals in formulating precise concrete mixtures. Adhering to the specified proportions is essential for optimizing the performance and longevity of concrete elements in construction projects.

2. PERFORMANCE ANALYSIS OF QUALITY CONTROL IN CONCRETE STRUCTURES

Concrete structures are crucial in engineering applications, and their quality and performance are essential. Numerous studies have been conducted to analyze and evaluate their performance, including numerical analysis of concrete structures under high temperatures, nondestructive testing methods, Quality Assurance of High-Performance Concrete in Tall Building Construction, comparative analysis of geopolymer and Portland cement concrete beams, and thermo-hydro-mechanical modeling of high-performance concrete at elevated temperatures. These studies contribute significantly to understanding concrete behavior and ensuring the safety and reliability of concrete structures [9], providing valuable insights into methods for assessing their quality and performance.

- **Concrete Mixing And Transporting**

The proper operation of the concrete batching plant depends on strategically placing pumps and producing concrete materials according to the construction site's requirements. Accurate measurement of raw materials during collection is essential for their correct utilization. Concrete slump testing is crucial for meeting project regulations and control measures, including retesting upon arrival at the construction site. It is important to plan transportation routes, improve vehicle scheduling, and optimize transport efficiency while monitoring traffic conditions and managing various aspects to ensure an organized workflow and high-quality supply of concrete.

- **Pre-Construction Temperature Estimation**

To achieve accurate pre-construction temperature estimation, a comprehensive approach is necessary. This involves minimizing prediction bias, ensuring the accuracy of temperature models and data, employing probabilistic models to account for uncertainties, evaluating facility stability, and incorporating contingency estimation into construction management programs. This methodology increases the accuracy of energy production estimation and contributes to the enhancement of project planning and management.

- **Casting of Concrete**

Construction project necessitates substantial concrete pouring, employing a stratified and segmented pouring technique with a one-hour interval. The procedure is bifurcated into two parts, commencing from the southern region and progressing towards the northern region, while being synchronized from both directions. Concrete placement significantly impacts the quality and durability of structures. Efficient concrete delivery, optimized mixing designs, and proper placement techniques are essential for ensuring the integrity of concrete structures [10].Self-compacting concrete (SCC) technology has emerged as a valuable solution for concrete placement, especially in scenarios where traditional compaction methods are challenging, such as closely-spaced reinforcement areas [11].SCC not only enhances placement efficiency but also reduces noise pollution on construction sites by eliminating the need for vibrators during compaction [12].

- **Displacement of Concrete**

To enhance the compaction of concrete construction, employ rapid vibration while pouring. Ensure uniform insertion points and dynamically adjust the duration based on the surface of the structure. Maintain consistent speed and control measures, and fit concrete pumps with three vibrating bars. Confirm compactness and sequentially layer materials according to steep slope conditions. Continuously adapt the duration and quality of vibration for optimal outcomes.

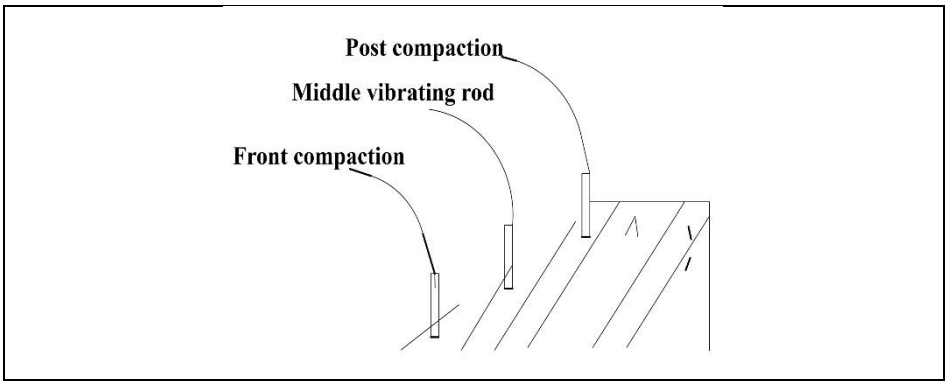

Figure1. Schematic Diagram of Various Of Vibrator Placement Location

The graphic shows the placement of vibrators during compaction, at three specific locations: front, middle, and back. The front position marks the beginning of the process, while the middle vibrator enhances material compaction. The rear placement corresponds to the ultimate phase directed at attaining a high level of material density. Important discoveries and conclusions: Through strategically arranging vibrators in a particular sequence, the compaction procedure is improved, leading to higher material density and stability. Utilizing this positioning technique reduces the likelihood of uneven compaction, which is crucial for ensuring structural soundness. This approach can be applied across various construction environments, potentially improving efficiency and outcomes in material compaction operations.

3. SECURITY REQUIREMENTS FOR THE SYSTEM

The article examined The structural integrity needs to be strong enough to endure the designated loads without significant distortion in case of overloading. This involves assessing and confirming the load-bearing capability according to the specifications outlined in the structural design code, ensuring that the structure's strength meets anticipated and standard loads. seismic design is a crucial element in ensuring the safety of buildings. To minimize the impact of seismic forces and maintain stability, reinforced concrete structures need to be designed with specific seismic performance criteria. This involves incorporating suitable structural form, layout, and reinforcement configuration to ensure adequate stiffness, energy dissipation capacity, and toughness in the structure. As also known Reinforced concrete structures are crucial in civil engineering, and studies have utilized fiber optic sensors for crack monitoring, distributed fiber optic sensing for strain measurements, dynamic properties for bond behaviors, and moment-curvature relationships for column design. These technologies contribute to a comprehensive understanding of reinforced concrete structures' response to different loads [13, 14, 15].

Table 2. Load Data for Reinforcement Concrete

Load/ kn	Strains	Stress/MPa	Deflection/ mm
100	0.002	32	10
150	0.003	40	20
200	0.004	45	15
250	0.005	50	18
300	0.006	55	20

The given table provides information on load (in kilonewtons), strains, stress (in MPa), and deflection (in mm) for different load values ranging from 100 to 300 kilonewtons. Each row in the table represents a distinct load value, accompanied by corresponding values for strains, stress, and deflection. As the load increases from 100 to 300 kilonewtons, there is a corresponding increase in strains, stress, and deflection. The relationship between load and stress can be observed, demonstrating how the material reacts to increasing loads. The data in the table can be utilized to analyze the behavior of the reinforced concrete under various load conditions. Higher loads lead to higher strains, stress, and deflection in the reinforced concrete structure. The table comprehend the performance of the structure under differing load conditions. Engineers can utilize this data to design structures that can withstand specific loads without failure.

3.1 Building Materials Characteristics: Heat Transfer And Moisture Absorption

As the output of the course to ensure the durability and performance of concrete structures, various factors must be considered. Building materials significantly impact the thermal and moisture performance of buildings. Materials like flax lime, hemp lime, cork-alkali-activated fly ash composites, and hemp-lime plasters regulate heat transfer and moisture absorption, contributing to indoor comfort levels. These materials have low thermal conductivity and high moisture buffering capacity, enhancing energy efficiency and acoustic performance. Hygroscopic building insulation materials, like biobased materials, couple heat transfer with moisture transfer within walls, emphasizing the importance of considering both aspects in building design. Cork-alkali-activated fly ash composites enhance energy efficiency and acoustic performance by passively adjusting humidity levels within structures [16]. Hemp-lime plasters are effective hygric regulators with notable moisture buffering ability, albeit slightly influenced by temperature variations [17]Transfer of moisture and heat in building materials is crucial for assessing their properties and overall performance [18, 19]. Conclusively, research on building materials' characteristics related to heat transfer and moisture absorption emphasizes the importance of selecting materials with low thermal conductivity, high moisture buffering capacity, and passive humidity regulation. Understanding the coupled nature of heat and moisture transfer is essential for designing energy-efficient and comfortable indoor environments.

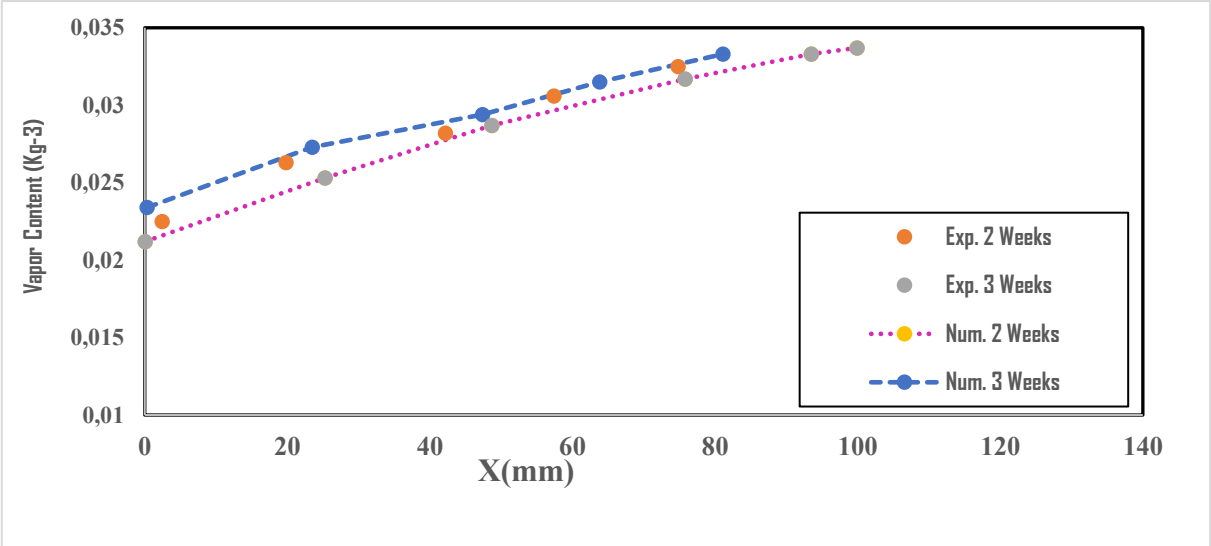

Figure 3: Comparison Between Calculated And Experimental Vapor Content Dispersion

Text discusses the comparison between calculated vapor content dispersion and experimental data, likely presented in a figure showing how well the values align. This comparison helps comprehend the precision of predicting vapor content dispersion assesses consistency of the model or method used for calculations. It also highlights areas where improvements are needed in the calculation method to enhance future predictions.

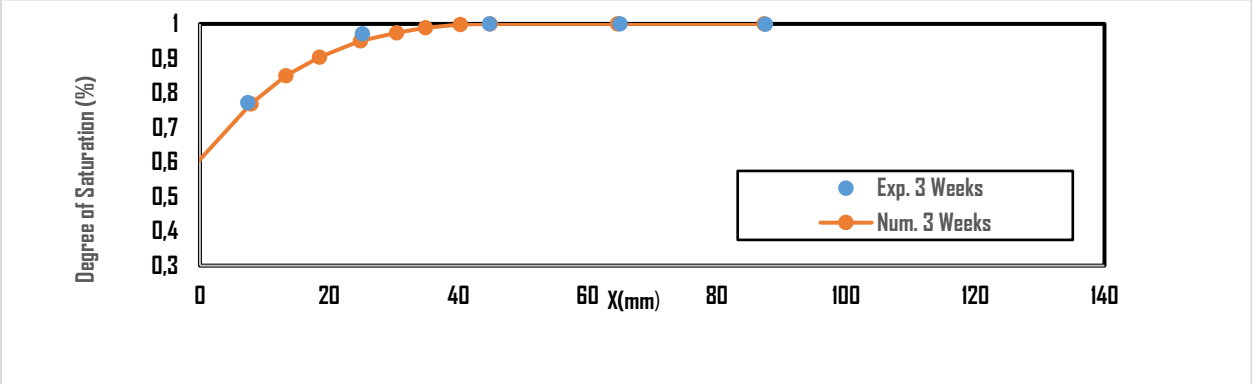

Figure 4: Compares Predicted Saturation with Actual Experimental Data For A3-Week Period In Serious 3.

The excerpt discusses the comparison between predicted and actual saturation data for a 3-week period in series 3. It is likely to involve a table with columns for predicted saturation values and actual experimental data, reflecting different time points within the 3-week period. The analysis may focus on evaluating how closely the predicted values align with the actual experimental results over time, assessing the accuracy of predictions, identifying trends over the 3-week period, highlighting any discrepancies between predicted and actual values, drawing conclusions about model performance based on this comparison, reassessing assumptions if significant differences are observed, and considering implications for future studies related to predicting saturation levels in similar experiments or scenarios.

3.2 The Analysis Work

The work models the propagation of connected particles within multi-layer porous construction materials, considering factors such as temperature and vapor concentration. The numerical solution employs implicit temporal differences and finite differences, with transient patterns of temperature and moisture impacting specimens. A comparison between empirical measurements and calculations for temperature and vapor content distributions shows a strong correlation. Utilizing experimental techniques, it was possible to determine the values. Furthermore, enhancements are needed to incorporate multi-dimensional heat and moisture movement in porous building materials for future studies.

3.2.1. Concrete Structures' Surface Treatment

Due to the excessive thickness of mud on the concrete surface, water seepage is likely to happen. To address this issue, the following approaches might be employed: Utilize the clapper board or a long scraper to pat or scrape the surface, respectively. Prior to the concrete structure's initial setting, employ the iron roller to repeatedly roll and crush the surface. Apply the wooden wedge to grind the concrete structure's surface, ensuring its compactness and flatness. To get a dense and even surface, the concrete structure should be sanded using wooden wedges. If there is water seepage on the surface of the concrete construction, it is essential to channel the water into a lower region and then utilize a small water pump to remove the water. Within 4 to 8 hours after the pouring construction is finished, the surface slurry is thoroughly cleaned, and a long scraper and wooden trowel are employed to perform scraping and rubbing treatments. In the event of cracks emerging on the surface subsequent to the initial hardening of the concrete structure, it is imperative to promptly mobilize staff to undertake a secondary plastering process. This concrete surface treatment is ideal for industrial flooring due to its resistance, durability, and anti-dust properties. It involves a concrete sanding process, a concrete hardener to harden the surface, a sealer to reduce water absorption, and a final sanding to achieve a matte, glossy, or a combination of these finishes. This complete treatment ensures a practical and durable surface. Furthermore, it is essential to consider the use of green infrastructure and efficient building techniques. To reduce heat absorption and increase energy efficiency, building designs can incorporate elements like green roofs, urban forests, and reflective surfaces.

3.2.2. Treatment of Surfaces in Concrete Structures

Due to the excessive thickness of mud on the concrete surface, water seepage is likely to happen. To address this issue, the following approaches might be employed: Utilize the clapper board or a long scraper to pat or scrape the surface, respectively. Prior to the concrete structure's initial setting, employ the iron roller to repeatedly roll and crush the surface. Apply the wooden wedge to grind the concrete structure's surface, ensuring its compactness and flatness. To get a dense and even surface, the concrete structure should be sanded using wooden wedges. If there is water seepage on the surface of the concrete construction, it is essential to channel the water into a lower region and then utilize a small water pump to remove the water. Within 4 to 8 hours after the pouring construction is finished, the surface slurry is thoroughly cleaned, and a long scraper and wooden trowel are employed to perform scraping and rubbing treatments. In the event of cracks emerging on the surface subsequent to the initial hardening of the concrete structure, it is imperative to promptly mobilize staff to undertake a secondary plastering process. This concrete surface treatment is ideal for industrial flooring due to its resistance, durability, and anti-dust properties. It involves a concrete sanding process, a concrete hardener to harden the surface, a sealer to reduce water absorption, and a final sanding to achieve a matte, glossy, or a combination of these finishes. This complete treatment ensures a practical and durable surface. Furthermore, it is essential to consider the use of green infrastructure and efficient building techniques. To reduce heat absorption and increase energy efficiency, building designs can incorporate elements like green roofs, urban forests, and reflective surfaces.

3.2.3. Concrete Structures Temperature Monitoring

To accurately measure the temperature of both the interior and external structure of the concrete [20], it is necessary to establish at least four monitoring sites on each testing axis. Position the measuring points within 50mm of the surface of the poured structure to ensure precise temperature measurement of the concrete surface. Place the measuring points at various depths along the outside, bottom, and middle of the poured structure, with a spacing of less than 600mm between the remaining measuring points. Arrange the measuring points within 50mm above the bottom of the poured structure to accurately measure the temperature of the bottom. To obtain accurate measurements of the temperature at the bottom of the pouring structure, it is necessary to position measurement points approximately 50mm above the bottom of the structure. The detection element is submerged at a depth of 1 meter for a duration of 24 hours to check for any abnormalities. If no issues arise, it can be used. The joints of the element are precisely regulated, and effective stabilization techniques are employed. The lead wires on the detection element can be centrally positioned to prevent damage to both the wires and the temperature measurement element during periods of vibration. Throughout the duration of the concrete construction, the temperature of the concrete structure and the surrounding environment is closely monitored, with temperature measurements taken at least four times daily. During temperature measurement, various data are meticulously recorded, and a temperature change graph is created using this information. This graph allows for a visual assessment of the temperature fluctuations in a specific area. If the temperature measurement results indicate abnormal issues in the temperature control data, a prompt alarm will be triggered. For instance, if the temperature difference between the interior and exterior exceeds 25 °C or if the internal temperature exceeds 65 °C, which are considered abnormal occurrences, immediate cooling measures must be taken by increasing the circulation of water.

3.2.4. Concrete structure maintenance

Addressing issues such as corrosion, chemical deterioration, and structural damage to effectively maintain concrete structures [21, 22, 23, 24, 25]. Monitoring steel bar corrosion in concrete structures is crucial for scheduling maintenance and replacements. The development of expert systems and advanced technologies like fuzzy logic and machine learning is key in diagnosing deterioration and implementing efficient maintenance strategies [26, 27]. Additionally, the use of smart sensors and innovative materials such as self-healing solutions and nanotechnology aids in detecting issues like seepage and enhancing maintenance practices [28]. Concrete structures are prone to various forms of deterioration, including cracking, shrinkage, and damage from environmental factors like chloride exposure [29, 30]. Proper maintenance strategies, including preventive treatments and strengthening measures, are crucial to mitigate these issues [31, 32]. It is essential to comprehensively evaluate the condition of concrete structures, considering factors like mechanical properties, damage assessment, and execution quality to determine the most effective maintenance approaches [33]In conclusion, the maintenance of concrete structures necessitates a multi-faceted approach that integrates monitoring technologies, expert systems, innovative materials, and comprehensive evaluation methods to ensure the durability and safety of infrastructure assets.

4. CONCLUSION

Horizontal and vertical motion measurements at the top of the supporting pile remains within allowable limits. However, the initial displacement during excavation displays a repetitive pattern with a relatively high frequency. An investigation is necessary to identify the cause of this repetitive pattern and assess its impact on the overall stability of the structure. Factors such as soil properties, excavation methods, and groundwater conditions should be considered in a thorough stability analysis to accurately evaluate potential risks and implement suitable mitigation measures. In architectural engineering construction, close monitoring and analysis of factors such as temperature and vapor concentration are vital for ensuring quality control of concrete structures. This guarantees that building materials function as anticipated in various environmental circumstances while preserving their structural stability. Carrying out thorough evaluations and examinations is crucial, taking into account factors such as temperature,

moisture movement, and weight-bearing capability to ensure the long-term durability and security of the building and its occupants, particularly in areas susceptible to earthquakes.

The study predicts the movement of linked particles across porous building materials with multiple layers, focusing on temperature and vapor concentration as key variables. It uses implicit temporal and finite differences to obtain numerical solutions, revealing the impact of moisture and temperature on specimens. The study also demonstrates how to compute the temperature incline constant using experimental methods. The predicted outcomes and actual values show a strong relationship, indicating that the current numerical technique can help identify fundamental material properties. Future research should integrate multi-dimensional heat and moisture flow in porous building materials into simulations to improve accuracy. A dynamic model that accurately anticipates and analyzes moisture-heat interactions and heat transmission is essential for improving porous material simulations.

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Investigation of the Change of Edirne City Centre Texture in Historical Periods by Space Syntax Method


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Abstract: *Urbans are spaces where human activities and lifestyles are formed and where structural, physical and social elements interact with each other. These spaces are complex and dynamic systems that reflect the historical, cultural, economic and political context of the city.They enable people to facilitate and sustain their housing ,work, educational, entertainment and social activities.They also include structural elements such as green zones, infrastructure and transportation systems. Urban morphology, on the other hand, examines the formation of the texture and components of urban space and the change of these components over time. The aim of this study is to reveal the accessibility and legibility of the street network of Edirne city center in different historical periods through the integration values of the street network in different historical periods with Space Syntax, which is a morphological analysis method, and simultaneously to reveal the space-use relationship in the context of the historical background of the city. In the context of the study, a historical background reading has been made in order to understand the changes in the urban fabric. Within the framework of the historical process from the foundation of the city to the present day, significant breaking points of the city have been identified. Maps from the years 1855, 1918, 1947, 1975 and 2023 has been analyzed and the change of urban space has been tried to be revealed in the analysis.*

Keywords*: Urban morphology, space syntax method, historical background, pedestrian movement.*

Tarihsel Dönemlerinde Edirne Kent Merkezi Dokusunun Değişiminin Mekân Dizimi Yöntemi ile Araştırılması

Özet: *Kent, insan etkinliklerinin ve yaşam biçimlerinin şekillendiği, yapısal, fiziksel ve sosyal unsurların etkileşim içinde olduğu mekanlardır. Bu mekanlar, insanların barınma, iş, eğitim, eğlence ve sosyal etkinlikleri gerçekleştirdikleri mekânların yanı sıra yeşil alanlar, altyapı, ulaşım sistemleri gibi yapısal unsurları da içermekle birlikte kentin tarihi, kültürel, ekonomik ve politik bağlamını yansıtan karmaşık ve dinamik sistemlerdir. Kent morfolojisi ise kentsel mekânın doku ve bileşenlerinin oluşumu ve bu bileşenlerin zaman içerisinde geçirdikleri değişimleri incelemektedir. Bu çalışmanın amacı, morfolojik bir analiz yöntemi olan Mekân Dizimi (Space Syntax) ile Edirne kent merkezinin farklı tarihi dönemlerdeki sokak ağının bütünleşme değerleri üzerinden erişilebilirlik ve okunabilirliğinin analiz edilmesi ve eş zamanlı olarak kentin tarihsel arka planı bağlamında kentsel mekân değişiminin sosyal yapı ve kullanım şekillerine olan ilişkisinin ortaya konulmasıdır. Çalışma kapsamında kentsel dokunun değişimini anlamak adına ilk olarak tarihsel arka plan okuması yapılarak kentin kuruluşundan günümüze kadar olan önemli kırılma noktaları belirlenmiştir. Sonuç olarak, kentin kırılma noktaları olarak belirlenen 1855, 1918, 1947, 1975 ve 2023 yıllarına ait haritalar üzerinden mekân dizimi analizleri yapılmış olup mekânsal yapının tarihsel süreç içerisindeki değişimi yaya hareketleri ve mekân-kullanım ilişkisi bağlamında ortaya koyulmaya çalışılmıştır.*

Anahtar Kelimeler: *Kent morfolojisi, mekân dizimi, tarihsel arka plan, yaya hareketleri*

1. INTRODUCTION

The urban textures we live in are a spatial area where people produce social relations, interact with each other, and where daily life is maintained at socio-spatial scales. Cities, like a living organism, are in constant change and transformation. The formation of the texture and components of urban space, the changes of these components over time and the study of the relationships that define their configurations have been the subject of urban morphology. In analysing the complex structure of the urban form, in addition to its physical formation, social and social phenomena should also be examined in the context of historicity. The historical background of a city and the reflections of social, socio-economic, cultural and political factors can be read through the morphological structure of the urban form. Understanding and making sense of space, examining the components that make up the space and revealing these issues with data has been an important research area where various studies have been carried out since the formation of cities and a subject that has been addressed within the framework of different disciplines. Historical city centres, which are generally the oldest, historical and cultural significance of a city, carry the traces of various cultures and periods by providing information about the architectural structures, street textures, monuments and other historical features of the city.

Edirne, located in the Thrace region in northwestern Turkey, is situated on the Ergene basin. Edirne, neighbouring Greece to the west and Bulgaria to the north, is a border city and has had a strategic importance throughout history due to its geographical location. Located at the junction of the trade routes between East and West, the city has become an important trade centre due to this feature. The geographical location of the city has made it open to the interaction of different cultures, as well as providing the city with a rich historical and cultural accumulation. The city centre, which has an important place with its historical and commercial areas, shopping streets, important public buildings and touristic places, is a lively and dynamic centre as it has important architectural works belonging to the Ottoman period such as Selimiye Mosque, Edirne Clock Tower, Üç Şerefeli Mosque, Edirne Bedesteni as well as lively streets such as Saraçlar Street where cafes, restaurants and shopping places are concentrated.Edirne city centre, which has a history dating back to ancient times, has witnessed many wars and physical changes in the historical process due to its strategic location by hosting many civilisations. How the effects of these changes have changed the urban form constitutes the main backbone and starting point of the article. The analyses made with the Space Syntax method, which is an important morphological method in understanding these stages of change, guide the way.

2. METHOD

The historical development of the Edirne city center and the underlying reasons for these historical turning points constitute the two-stage systematic structure of the article. In examining the spatial development of the city, which dates back to antiquity, the progression of the city from its foundation to the Roman era, the Byzantine period from AD 395, the Ottoman conquest in 1361, and subsequent Ottoman and Republic eras, have been delineated based on historical maps obtained from archival sources and relevant books and articles. In the second stage of the study, maps from the years 1855, 1918, 1947, 1975, and 2023 have been utilized to serve as a basis for space syntax analyses. Through these analyses, the study attempts to elucidate the development axes and dynamics of the Edirne city center, as well as the urban development directions and physical changes affecting pedestrian mobility, which in turn influence urban dynamics and economic parameters.

Space Syntax, which is the main analysis of the study, is a method developed in 1970 by Bill Hillier and Julienne Hanson to analyse spatial relations at various scales and to investigate the relationship between space and society [1]. According to Kropf, the theoretical basis of the space syntax method, which aims to understand the spatial structure of settlements through a series of analytical methods, is the analysis of the relationship between spatial structure and the general function of human movement [2]. Hillier and Hanson (1984) define space syntax as a method that analyses the built environment and the relationship between space and human movements. Space syntax, which deals with the built environment from the perspective of the inhabitants and designers, is an important basis for

understanding the past and present structure and presenting various inferences in the design studies to be carried out [3]. Space syntax analyses the spatial relations of settlements based on their physical characteristics. Since it is difficult to express complex spatial relationships, it is necessary to use abstract models or maps that represent the spatial system. The street system is the most important element of a city that enables people to meet each other and move from one place to another. Urban areas such as streets, avenues, roads, boulevards, paths, pavements, bridges and stairs, other than squares, shape a grid or network, or in other words, a potential movement pattern. In this context, urban space can be represented as linear elements. In this context, the Space Syntax method works with the concepts of "convexity" and "axiality". (Figure 1).

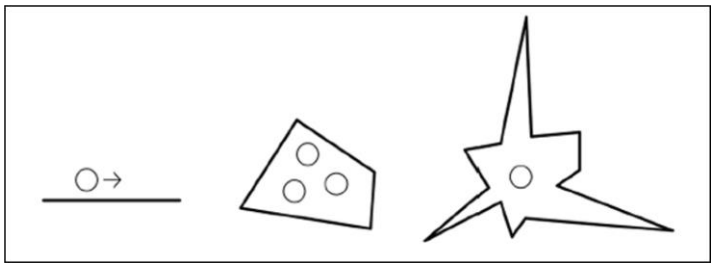


Figure 1. (from left to right) representation of the way people usually move along a line; convex area where users see each other and interactions take place; the range of visibility, which has a different shape depending on the location of the observer (izovist) [4]

Hillier (1988) defines convex space as "*a space in which all points (locations) within that space can be connected with others without going beyond the boundaries of the space*" [5]. When creating convex maps, depending on the form of the settlement, spaces outside the buildings or spaces that determine the boundaries of the buildings are defined. These spaces, which usually overlap with roads, can be gradually identified and analysed through classifications such as size/smallness, width/narrowness [3]. Axial maps consisting of axial lines, used as a method in this study, represent the longest visibility distance in the context of movement within a convex area. In other words, axial lines represent the way people move linearly on a road network. Axial lines are drawn according to the longest viewing distance of a moving person looking in different directions from his/her current position. For this reason, axial maps, which are also described as visibility axes, show movement paths and direction changes by representing the longest and shortest sight lines [3]. People always walk in a straight line instead of a curved line in order to minimise the distance. Therefore, axial lines representing a person's movement behaviour simplify the complex urban environment and connect people's perception of space and movement behaviour [6]. (Figure 2)

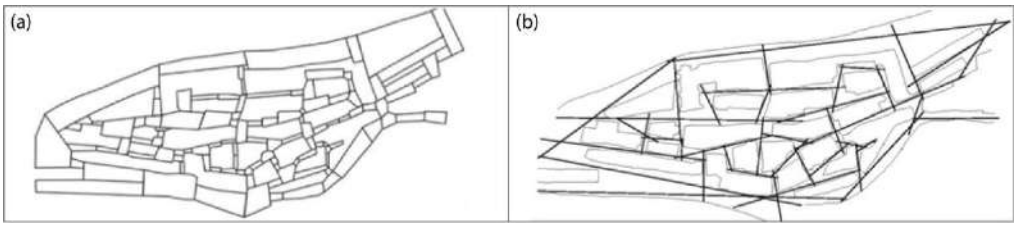


Figure 3. (a) Convex Map (b) Axial Map [7]

An axial map analyses spatial configuration through three important concepts: connectivity, integration (global and local) and intelligibility. In axial maps, all axial lines are connected to each other and are valued according to the number of axes they are connected to. Connectivity shows the degree of connection of each street with the streets that directly intersect each other. In this direction, the value of a street with many connections is high, while the value of streets with few connections is low. Highly connected axes can also be defined as the routes that people choose to move between urban areas [8]. At the same time, the higher the connectivity of an axial line within the urban system, the higher the number and variety of shops and shopping centres on the axis.

In the space syntax method, the integration value is a criterion that defines the depth of a space to all other spaces in the system. In this way, the areas in the system can be ranked from the most integrated to the most segregated. Since the integration distribution reveals the movement pattern in urban areas, the mobility of an area can be analysed in advance.Integration analyses are divided into two categories: global and local; Global integration describes how a street relates to all other streets in a given spatial system. The fewer the direction changes from a street to reach other points in the system, the higher the global integration value of the street. In this context, the length of the axial line and its connection with other lines increase the integration value in direct proportion [8]. Most of the urban neighbourhoods and suburbs in today's urban settlements have their own shopping areas. For this reason, local integration analyses are used since local city centres are not sufficiently emphasised in global integration analyses. In the analyses, integration values are expressed in a colour scale from blue to red. Red axial lines mean the most integrated axes, i.e. the axes with the most movement, while blue axial lines mean the most segregated axes, i.e. the axes with the least movement. Correlations between global and local integration values reveal the comprehensibility of the urban system (Figure 4).

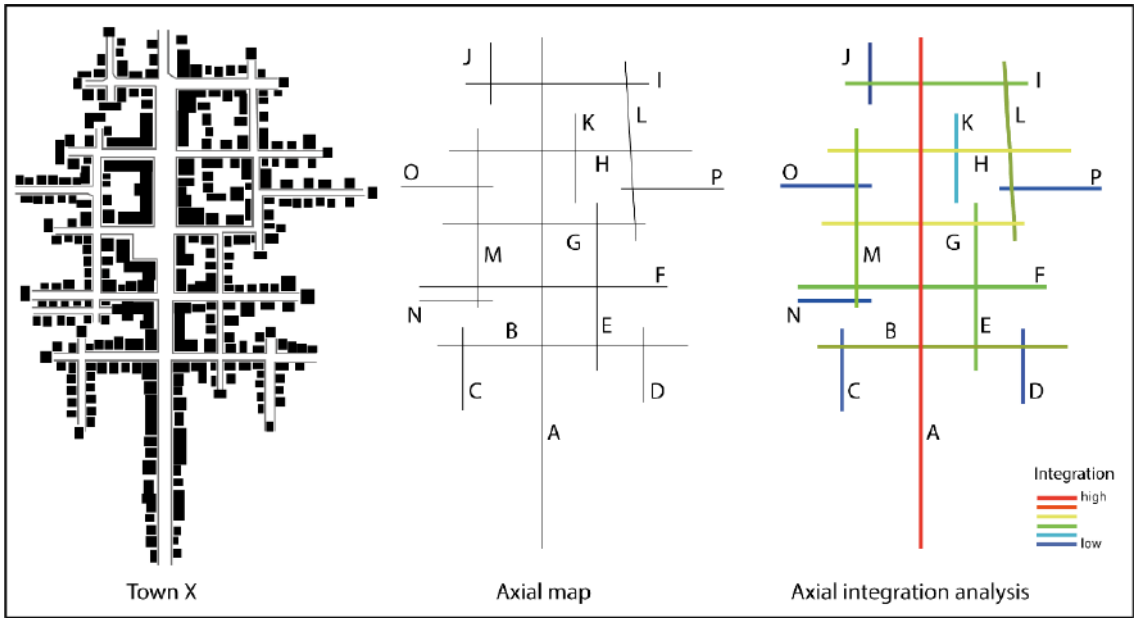


Figure 5. Axial map of settlement X and axial integration analysis [8]

Another analysis in the space syntax method is segment analysis. Thanks to axial maps, potential movement in urban spaces can be estimated. However, axial maps are insufficient both in determining semi-continuous lines and in expressing topological differences in the third dimension such as height. In order to overcome this deficiency, segment maps are developed based on analysing the intersection/junction points of the streets in the urban system according to the connection angle. With segment analysis, accessibility can be measured according to different metric distances and segment relationships of streets are reconstructed as the radius changes. Depending on the study, the distance can be analysed from 400 m, which refers to pedestrian movement, to 2000 m and above, where peripheral roads are seen. Choice analysis represents the shortest routes chosen by pedestrians and reveals the movement potential and thus urban routes [9]. The higher the applied metric radius, the more clearly the ring roads and motorway network will be read [3].

In the light of these methodical explanations, it is aimed to reveal the accessibility and legibility of the street network of Edirne city centre in the historical process through the integration values with the Space Syntax method. At the same time, in order to understand the causes of pedestrian movements and the land-use relationship, the historical background from the emergence of the city to the present day has been examined simultaneously and associated with the results of the analysis. In this way, strong or weak streets within the system will be read more clearly and the reasons will be explained.

3. SPATIAL CHANGE OF EDIRNE HISTORICAL CITY CENTRE AND ITS SURROUNDINGS

Edirne is located in northwestern Turkey on the highway line connecting Turkey to Europe and has a surface area of 6,279 km². The city is located on the plain where the rivers Meriç, Tunca and Arda meet and has 9 districts, namely Lalapaşa, Süleoğlu, Merkez, Havsa, Meriç, Uzunköprü, İpsala, Keşan and Enez. Neighbouring Greece and Bulgaria, the city is also a border city [10]. The study area is limited to the centre of Edirne, which has a surface area of approximately 955 km² and includes 21 neighbourhoods in total (Figure 6).

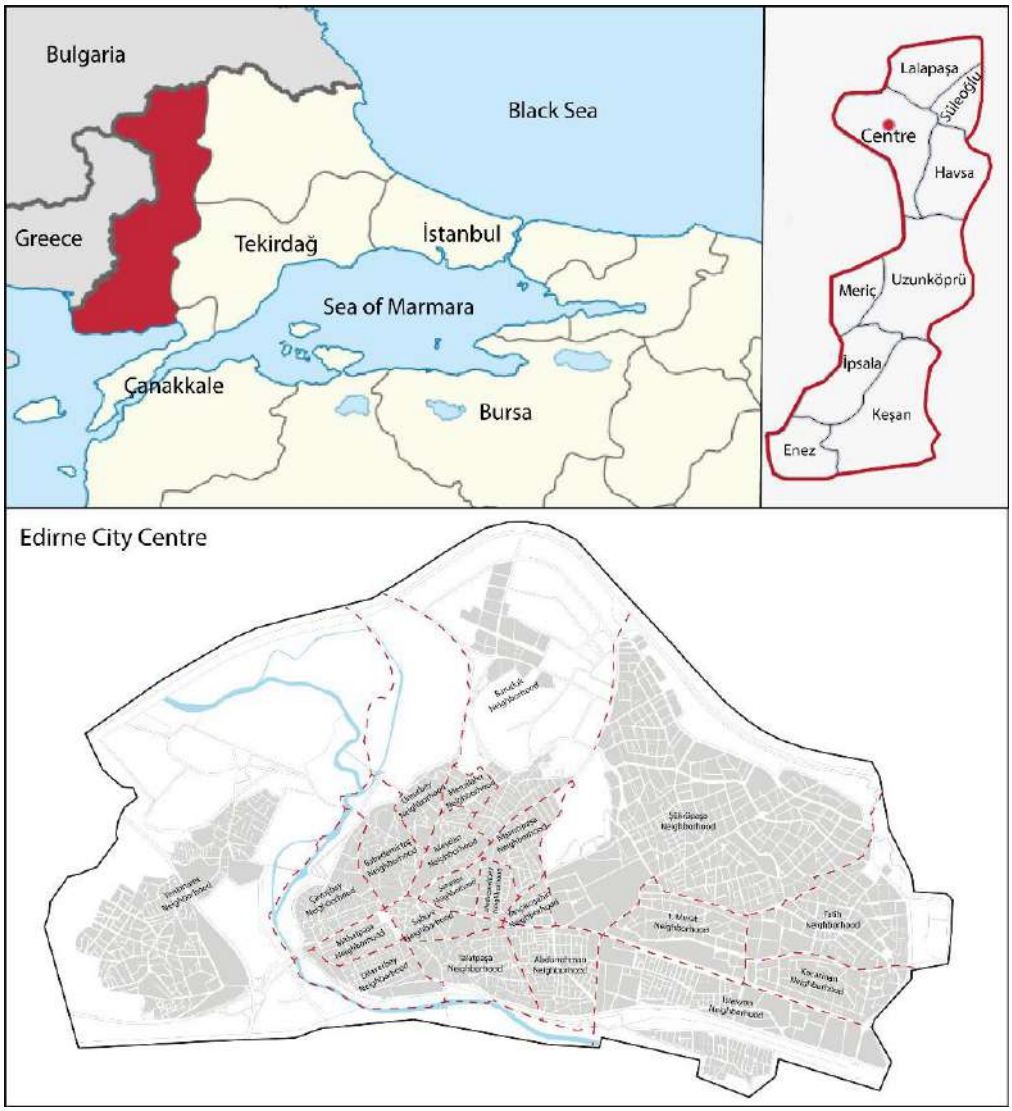


Figure 7. Location of Edirne on the top left, districts of Edirne on the top right and the city centre of Edirne, which is the study area, below

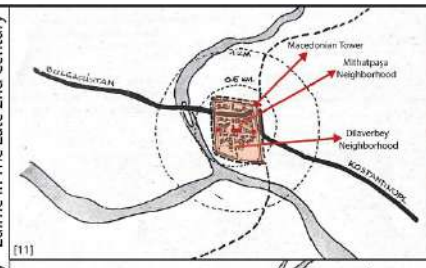
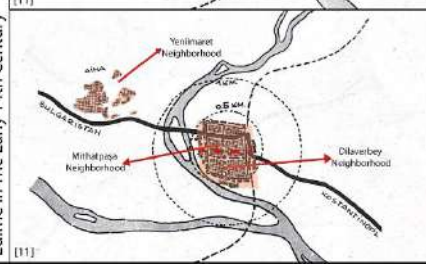
It is known that Edirne, which has a history dating back to the early ages, was founded in the 7th century BC by Thracian tribes, a branch of Turks migrating from Central Asia, under the name "Öski Damak (Old City)". However, according to various sources, the settlement of Öski Damak corresponds to the village of Üsküdar in Bulgaria rather than today's Edirne. For this reason, "Odrisya", founded by Odris, one of the largest Thracian tribes at the confluence of the Meriç and Tunca rivers, is accepted as the first settlement and market area established within the borders of Edirne [11]. After the death of Kotys, the king of Odrisya in the 4th century BC, the Thracians, who could not continue their existence for long, began to disperse and came under the sovereignty of various kingdoms [12].

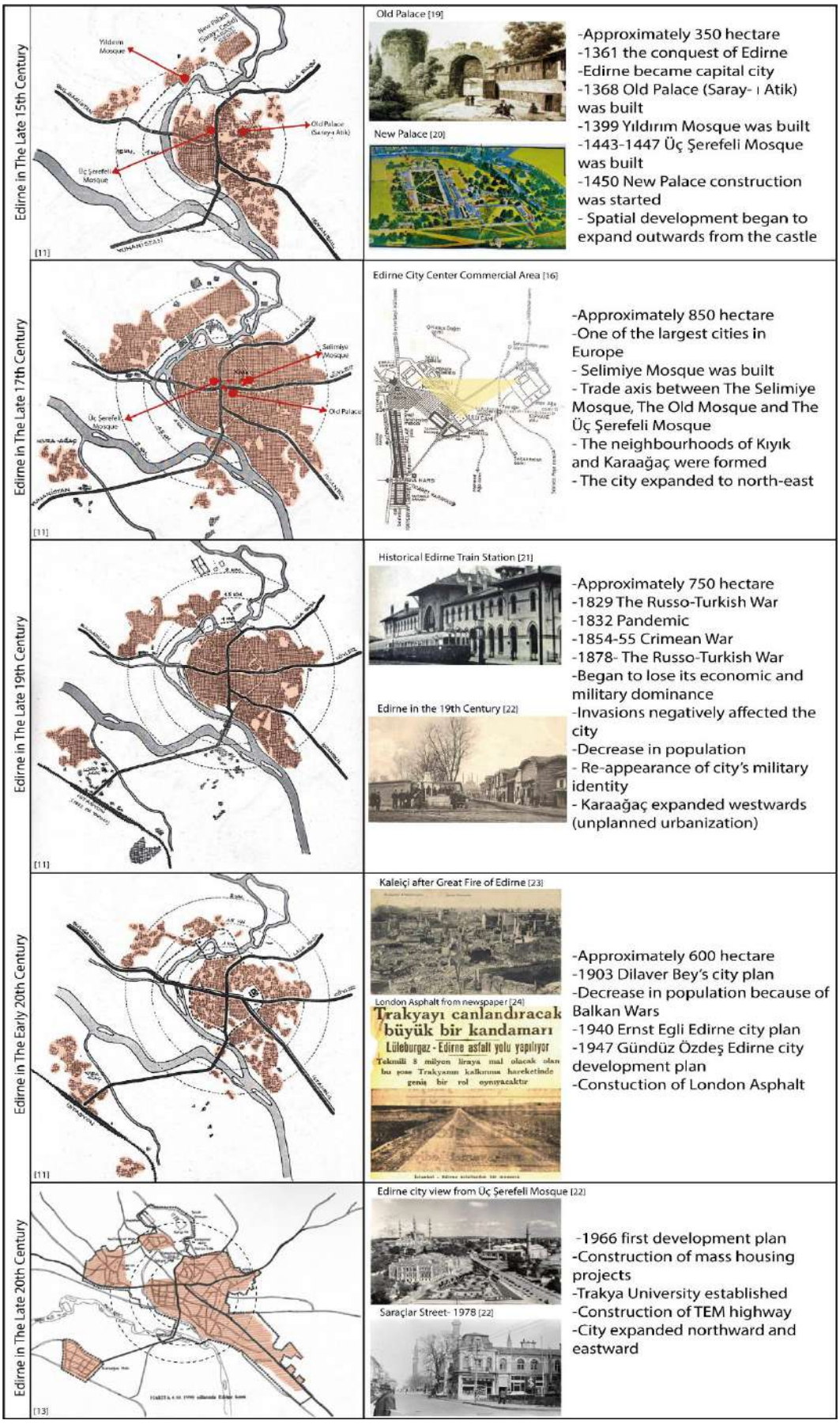
4. EDIRNE URBAN DEVELOPMENT AND SPACE SYNTAX ANALYSES

Edirne came under the sovereignty of Rome as a result of the Roman invasion in 46 AD. The formation of the city centre is observed during the Roman Emperor Hadrianus period between 117- 138 AD. Orestia, which was a town in its period, attracted the attention of Hadrian due to its strategic location and named the city Hadrianopolis, which means the city of Hadrian [13]. Hadrianopolis, which is located in a very favourable region in terms of trade, military and agriculture, experienced its brightest periods in the II. and III. Centuries AD [14]. The city, which was exposed to many wars as of the IVth century, was surrounded by walls by Hadrianus in the face of the wars. This walled settlement is the Kaleiçi district of Edirne, which today consists of two neighbourhoods, Mithatpaşa and Dilaverbey Quarter [13]. Hadrian built "Edirne Castle", in other words, a "Castrum" in order to protect the city against external forces. In this context, Edirne Castle was built entirely in accordance with the Roman Castrum plan [14].

Conquered in 1361 by the Ottomans, Edirne's spatial structure in the XIVth century is known to have had an area of approximately 100 hectares and to have consisted of the present-day Kaleiçi settlement and the town named Aina, which is located around the present-day Yeniimaret Neighbourhood [15]. The area where Üç Şerefeli Mosque is located today and its surroundings were used as the trade and market area of the city. Basically, the spatial structure of the city in the 14th century was characterised by a two-centred structure, namely inside the castle (administration/settlement centre) and outside the castle (Aina settlement-market area-trade centre) [16]. Since it is located on the historical Roman Road (Via Egnatia) extending from the Adriatic to Istanbul, it has been an important focal point for local and foreign merchants throughout history [13]. In terms of spatial development, the city did not show much development from the second century until this period, but it is known that there were spatial regressions from time to time during the urbanisation process as it was exposed to many wars, attacks and invasions due to its location. According to Özdeş's urban development maps, unlike the II century, the occupancy of the areas within the city walls increased (Table 1).

Table 1: Spatial development of the city since its foundation [16, 17, 18, 19, 20, 21, 22, 23, 24]

Edirne in The Late 2nd Century		Edirne Castle [17] 	-Approximately 50 hectare - The brightest era - Edirne Palace based on Roman Castrum plan - Double-centred structure (inside and outside the castle)
Edirne in The Early 14th Century		Edirne Macedonian Tower [18] 	-Approximately 100 hectare -Aina Town connected by a bridge to Kaleiçi


Edirne in The Late 15th Century
Yıldırım Mosque
Old Palace (Saray-ı Atik)
Üç Şerefeli Mosque
[11]
Old Palace [19]
New Palace [20]
-Approximately 350 hectare
-1361 the conquest of Edirne
-Edirne became capital city
-1368 Old Palace (Saray- ı Atik) was built
-1399 Yıldırım Mosque was built
-1443-1447 Üç Şerefeli Mosque was built
-1450 New Palace construction was started
- Spatial development began to expand outwards from the castle
Edirne in The Late 17th Century
Selimiye Mosque
Old Palace
Üç Şerefeli Mosque
[11]
Edirne City Center Commercial Area [16]
-Approximately 850 hectare
-One of the largest cities in Europe
- Selimiye Mosque was built
- Trade axis between The Selimiye Mosque, The Old Mosque and The Üç Şerefeli Mosque
- The neighbourhoods of Kıyık and Karaağaç were formed
- The city expanded to north-east
Edirne in The Late 19th Century
[11]
Historical Edirne Train Station [21]
Edirne in the 19th Century [22]
-Approximately 750 hectare
-1829 The Russo-Turkish War
-1832 Pandemic
-1854-55 Crimean War
-1878- The Russo-Turkish War
-Began to lose its economic and military dominance
-Invasions negatively affected the city
-Decrease in population
- Re-appearance of city's military identity
- Karaağaç expanded westwards (unplanned urbanization)
Edirne in The Early 20th Century
[11]
Kaleiçi after Great Fire of Edirne [23]
London Asphalt from newspaper [24]
Trakyayı canlandıracak büyük bir kandamarı
Lüleburgaz - Edirne asfalt yolu yapılıyor
-Approximately 600 hectare
-1903 Dilaver Bey's city plan
-Decrease in population because of Balkan Wars
-1940 Ernst Egli Edirne city plan
-1947 Gündüz Özdeş Edirne city development plan
-Constuction of London Asphalt
Edirne in The Late 20th Century
[13]
Edirne city view from Üç Şerefeli Mosque [22]
Saraçlar Street- 1978 [22]
-1966 first development plan
-Construction of mass housing projects
-Trakya University established
-Construction of TEM highway
-City expanded northward and eastward

After Murad I conquered the city, the city took the names "Edrenaboli" and "Edrene" instead of Hadrianopolis, and after the XVIIIth century, it started to be called "Edirne" [13]. After the conquest of the city, Murad I first converted two churches in Kaleiçi into mosques. These mosques are Halebi Mosque and Church Mosque. Due to the continuation of the Rumelia campaigns, the Akincılar Road, which is the axis connecting the city to the Balkans, has a special importance, so the town of Aina and its surroundings were built. In 1399, Yıldırım Mosque and Yıldırım Kulliye were built and a neighbourhood was established in this area [15]. Moving the state centre from Bursa to Edirne made the city more important and contributed greatly to the spatial development of the city. In this direction, the Old Palace (Saray-ı Atik), the first palace of the period, was built in the area where Selimiye is located today. In 1385, as a result of the expansion of the conquests towards the Balkans with the capture of Sofia, the city was secured and central organisation started to form. The importance given to the city gradually increased with the period of Yıldırım Bayezid. With the Imaret system, new neighbourhoods, namely Seferşah, Ortaimaret and Şahmelek, were added to the city outside the castle and the town of Aina was included in Edirne. Edirne, which entered a rapid construction process with the reign of Murat II, was an important commercial city and government centre. During this period, many mosques, madrasahs and bridges were built in the city. Between the years 1443-1447, Murat II built many mosques, madrasahs and bridges in the city. Murat II had the Üç Şerefeli Mosque, one of the important landmarks of the city, built between 1443 - 1447. The construction of the second palace, Saray-ı Cedid-i Amire (New Palace), was also started during the reign of Murat II. Edirne, which reached a surface area of approximately 350 hectares in the XVth century, shows a great urban development when compared to the spatial structure of the XIVth century. As it became the capital of the Ottoman Empire, the importance given to the city gradually increased and the city expanded from Kaleiçi to Sarayiçi, Kirişhane and Darphane and the urban area reached 1.5 km in diameter [13]. The city, which developed by continuously building new structures, became one of the big cities in Europe in the XVIth and XVIIth centuries [25].

The classical urban form of Edirne in physical terms started to be formed as of the XVIth century. From the XVIth century onwards, Edirne ceased to be a military base and started to become a settlement used by the sultans for recreation purposes. The location of Selimiye Mosque, which was built on Sarıbayır, the highest hill of Edirne during the reign of Suleiman the Magnificent, influenced the zoning plans to be made in the republican period and caused the mosque to become an important focal point. At the same time, the main streets and roads planned during the republican period were also shaped according to the location of the mosque [13]. With the construction of Selimiye Mosque, a triangular commercial axis started to form between Eski Mosque, Üç Şerefeli Mosque and Selimiye Mosque, and the city started to expand towards the northeast direction as of the 17th century [26]. Towards the end of the 17th century, with the establishment of Kıyık and Karaağaç neighbourhoods, the city continued to grow by reaching an area of approximately 850 hectares. Structures such as Kanuni Sultan Bridge, Ali Pasha Bazaar, Rüstem Pasha Inn, Two Gate Inn, Sokullu Mehmet Pasha Palace were also built in this period [13].

As the Ottoman Empire gradually lost power in the XIXth century, wars and occupations started to affect Edirne negatively. Edirne was occupied by the French army in 1854-1855 during the Crimean War. "Osmont Map", known as the oldest plan of the city, was prepared by Osmont, an engineer serving in the French army. On the plan, the development of the city was analysed by dividing the city into two parts as Kaleiçi and outside of Kaleiçi. The plan, which gives information about the walls in Kaleiçi, also shows the street texture of Kaleiçi settlement and the locations of some monuments [26], (Figure 5).

Figure 8. 1855 The Osmont Map [27]

The map titled "Plan d'Andrinople" was made in the same year as the Osmont Map [27]. Due to being the oldest and most legible map of the city, this plan has been utilized as a base for interpretation in space syntax analyses (Figure 6).

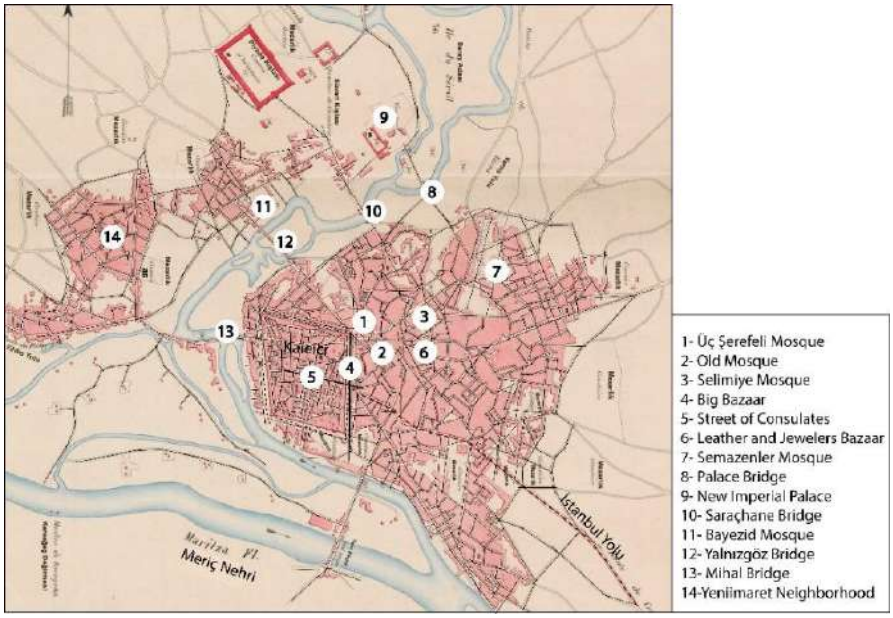


Figure 9. 1855 "Plan d'Andrinople" with important streets and landmarks [27]

On the 1855 map, the locations of significant historical landmarks such as the Üç Şerefeli Mosque, Old Mosque, and Selimiye Mosque are evident. The Tunca and Meriç Rivers serve as natural boundaries, shaping the spatial development of the city. The spatial expansion of the city generally encompasses the Kaleiçi and northeastern surroundings, as well as the Yeniimaret and Yeni Saray areas in the west.

According to the space syntax analyses of the 1855 Edirne map, in local integration analyses, the most integrated axis is identified as Street 4, which houses the main market area, with a value of 3.716599. Another axis, indicated as number 5 on the map, which horizontally intersects the Kaleiçi settlement, emerges as the second most integrated street across the city, boasting the highest integration value. During that period, consulates were situated along this street. Both local and global integration analyses reveal Üç Şerefeli Mosque, Old Mosque, Selimiye Mosque, and their immediate vicinity as the most

integrated area of the city, forming its commercial center with bustling markets and bazaars. Additionally, Yeniimaret Neighborhood, the vicinity of Yeni Saray, and Semazenler Mosque area are observed as integrated zones within themselves. (Figure 7).

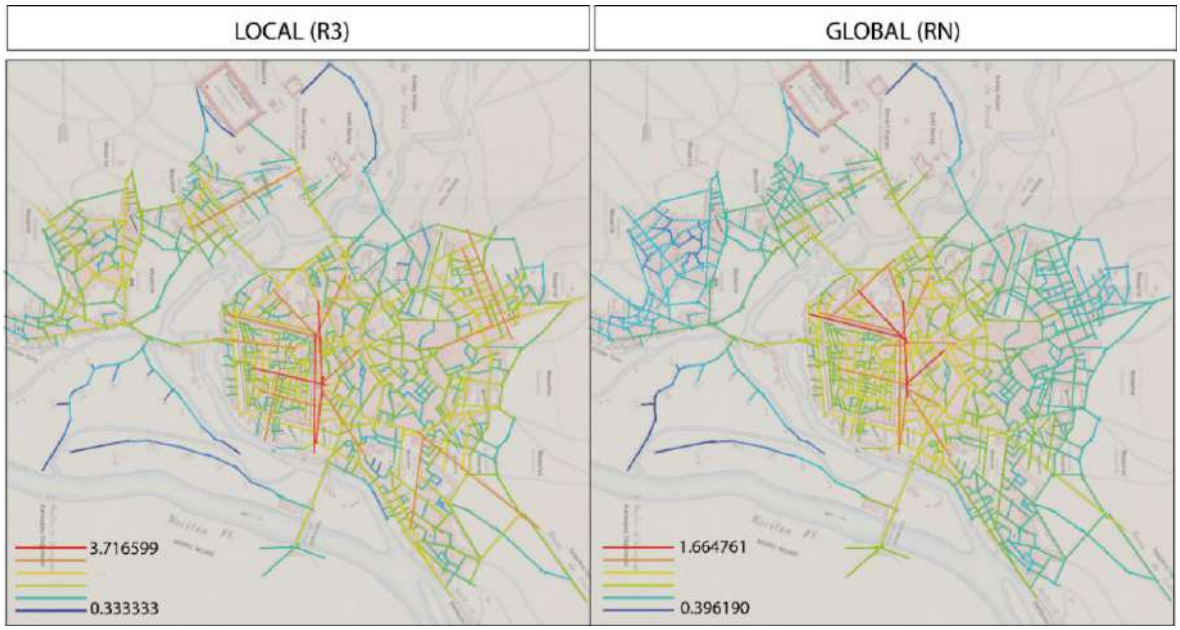


Figure 10. 1855 local integration analysis (left) and global integration analysis (right)

In 1878, Edirne was occupied for the second time by Russia. Following the wars, the city's military identity regained prominence, leading to the construction of military fortifications around the city perimeters starting from 1885. The fortifications built during this period, known as "tabyas," can be clearly observed on the map titled "Edirne City and its Environs," drawn by Mehmet Selami in 1884. On the map, apart from the city center, the significance of Edirne Palace, Karaağaç, the railway, and the station building, as well as the importance of the Meriç and Tunca Rivers influencing the city's development directions, are evident. Karaağaç, exhibiting irregular development towards the west, is characterized by settlements around Ortaköy Avenue. Ortaköy Avenue and Station Avenue emerge as two main axes in the Karaağaç settlement [26].

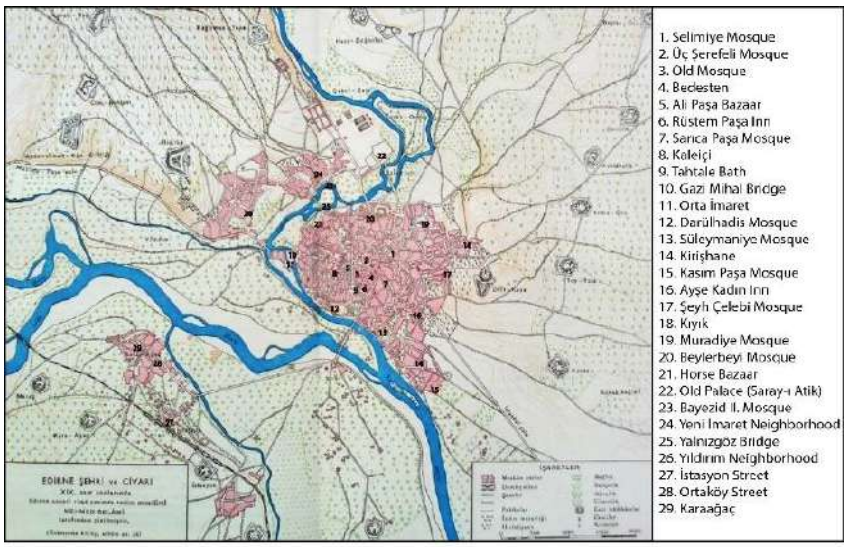


Figure 11. 1884 Mehmet Selami "Edirne City and its Neighbourhood" [27]

In 1903, a major fire broke out in the city, resulting in almost the entire neighborhoods located in Kaleiçi being burnt down. Dilaver Bey, who was the Mayor of Edirne at the time, commissioned French experts

to prepare a grid plan and perpendicular streets for Kaleiçi under the "Fire Site Plan and Building Regulation (Ebniye Kanunu)". Shortly after the preparation of Dilaver Bey's plan, the city entered a period of social decline with the outbreak of the Balkan Wars. The Balkan Wars led to a significant decrease in the city's population [26], (Figure 9).

Figure 12. 1903 Kaleiçi Dilaverbey plan (left), 1918 Edirne population distribution (right) [27]

After the war, the city contracted to approximately 750 hectares, with settlements decreasing primarily in neighborhoods such as Yıldırım Mahallesi, Sarayiçi, and Kirişhane Mevkii. However, no significant changes are observed in Kaleiçi and its surroundings [13].

As the 20th century unfolded, the impact of wars began to manifest in the city. The Balkan Wars, in particular, led to a significant decrease in the city's population, making the 1918 Edirne map crucial in this context [26]. Additionally, the Dilaver Bey plan, devised after the fire in Kaleiçi, is first observed on the 1918 map. Therefore, another map utilized in space syntax analyses is the 1918 Edirne map (Figure 10).

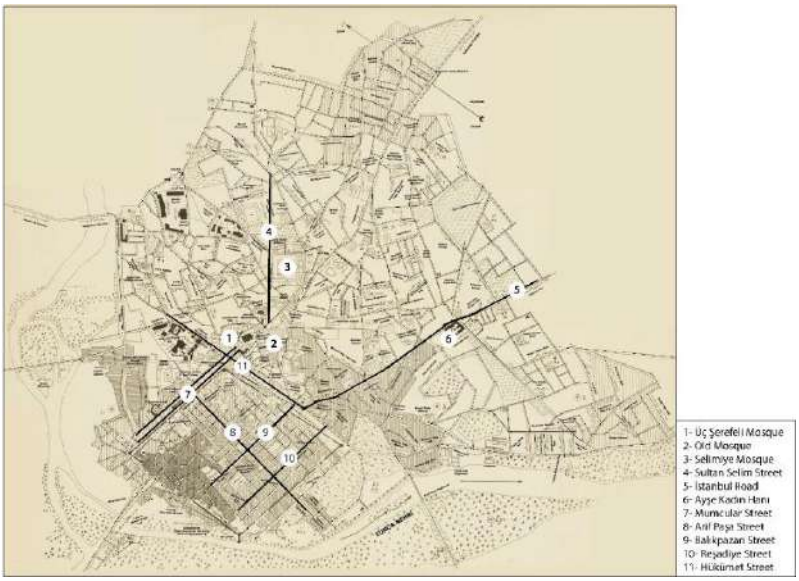


Figure 13. 1918 map with important streets and landmarks [27]

In the 1918 map drawn towards the end of World War I, the grid plan of the Kaleiçi area is clearly discernible. The area that is darker shaded in Kaleiçi indicates traces of the fire. From the markings on the map, it can be inferred that Greeks reside in sparsely shaded areas, Armenians in horizontally shaded areas, Jews in densely and vertically shaded areas, and Muslims in unshaded areas. Although the Muslim population is minimal, it is known that there are Jewish and Armenian settlements throughout the city (Figure 10).

When examining the space syntax analyses of 1918, unlike 1855, it is observed that the Kaleiçi area appears more integrated in local analyses, indicating higher accessibility and pedestrian mobility. The most significant reason for this change stems from the grid-based Dilaver Bey plan implemented in the Kaleiçi area. Horizontally, Balıkpazarı and Reşadiye Streets, and vertically, Arif Paşa Street, are among the most integrated streets in Kaleiçi. Throughout the map, in terms of local integration analysis, the axis descending from Ayşe Kadın Hanı, with a value of 3.389751, and having the highest visibility, emerges as the most integrated street. Sultan Selim Street is another highly integrated street, characterized by numerous han (inns), markets, and bazaars. In global integration analysis, the streets most integrated are Hükümet Street in the city center, the axis between Üç Şerefeli Mosque and Old Mosque, and Mumcular Street. Integration values decrease towards the peripheries (Figure 11).

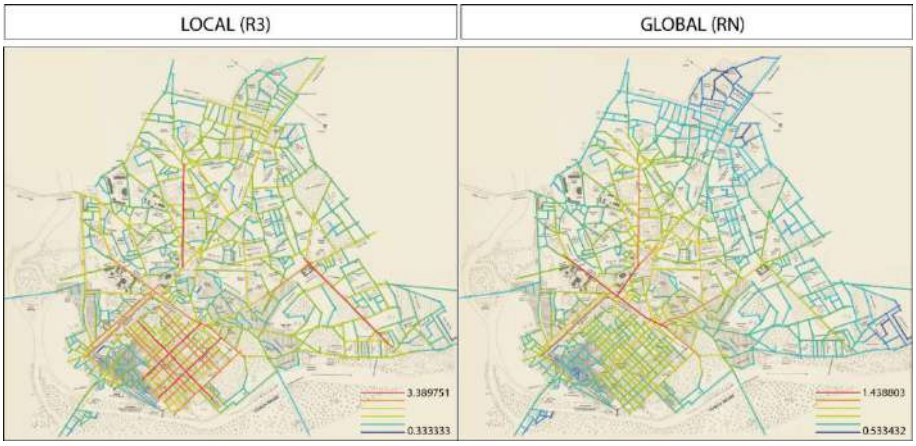


Figure 14. 1918 local integration value (left) and global integration analyses (right)

By the time the Republic period was reached, urbanization decisions were made, prompting the invitation of Prof. Ernst Egli to prepare the city's urban plans. Planning studies commenced in 1937, with consideration given to the terrain structure. The plan emphasized the joint evaluation of main roads and historical landmarks. Egli, by retaining the Selimiye Mosque in the city center, created an axis passing through Kaleiçi and connected this axis to the Edirne-Istanbul road. The Edirne-Istanbul road was widened, and as per this planning, existing structures were expropriated and demolished [11], (Figure 12).Another significant decision in Egli's plan was to design a peripheral road parallel to the Tunca River to provide direct transportation along the east and west axes. The road coming from Karaağaç Neighborhood splits into two branches, one passing under the Tunca River and the other crossing over the river with the help of a bridge, facilitating access to the city center [26].

Figure 15. 1940 Ernst Egli Edirne plan [27]

In the plan, while preserving the existing street pattern of Kaleiçi, some roads were widened, and main routes were established. The created main routes are discernible on the plan. Around the Old Mosque, historical heritage and existing plots were preserved, resulting in an amorphous structure. Egli, who also conducted planning on settlement areas, created a square with commercial and social spaces in front of the Üç Şerefeli Mosque and planned a stadium surrounded by green areas to the south of the city. Overall, Egli demonstrated an approach aligned with the city's terrain structure, preserving existing road axes and evaluating areas divided by roads as plots without undergoing re-parcellation in some regions [26].

Gündüz Özdeş's study titled "Preparation Study for the Edirne Urban Plan" in 1951 provided a significant foundation for future urban planning. The construction of the road extending from Istanbul to London in 1938, known as the London Road, passing through the city center, represents one of the crucial turning points in spatial development. Gündüz Özdeş's 1947 Edirne Map, being the clearest depiction of the London Road, served as a basis for space syntax analyses (Figure 13).

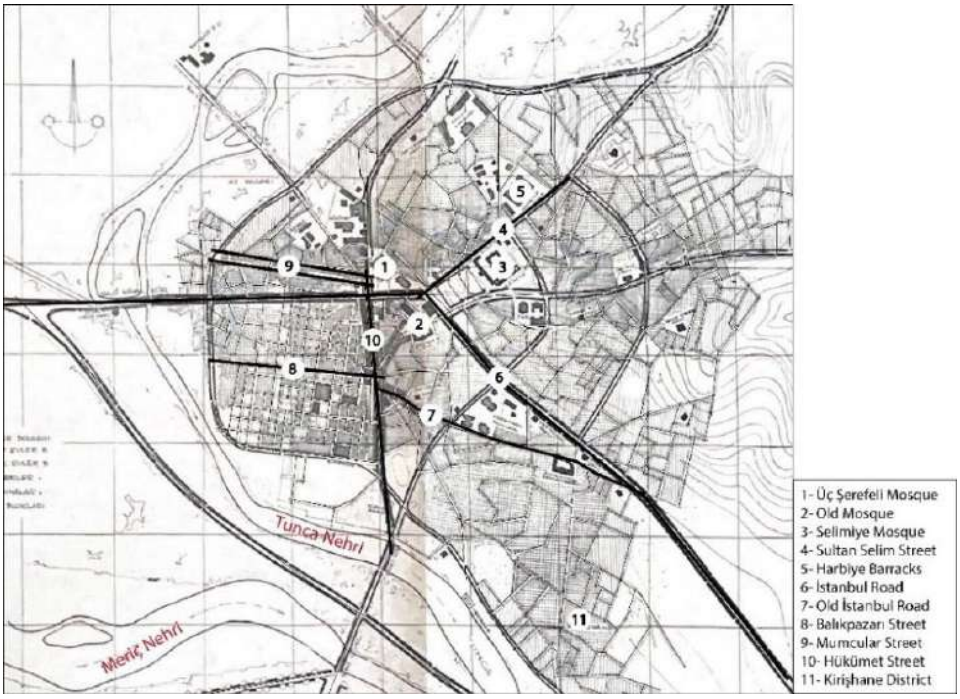


Figure 16. 1947 map with important streets and landmarks [11]

In the 1/8000 scale plan, the Istanbul-Bulgaria highway passes through the center of the city. Additionally, there is another road parallel to this highway that passes between the Tunca and Meriç rivers. In Özdeş's plan, the area between the Old Mosque and the Municipality Square is designated as the city core, from which five main axes radiate outwards. Historical buildings, official structures, and commercial buildings are indicated on the plan, while residential areas are depicted as dense, sparse, or with few housing units. Similar to Egli's plan, the road coming from Karaağaç splits into two branches, one leading to Kaleiçi and the other to the Selimiye Mosque. The rivers on the plan serve as boundaries, and the city's planning extends up to the rivers (Figure 13).

In the space syntax analyses of the Özdeş Plan, the London Road (Istanbul Road), Sultan Selim Street, and Hükümet Street (Saraçlar Street) are seen as forming the backbone of the city, constituting the most integrated streets in both local and global integration analyses. In the local integration analysis, the portion of the Istanbul Road above Kaleiçi has the highest integration value, with a value of 3.578552. In the global integration analysis, the entire Istanbul Road is clearly seen as fully integrated. With the construction of the new Istanbul road, the integration values of the axis descending from Kaleiçi and Ayşe Kadın Hanı have decreased compared to previous periods. The division of Kaleiçi settlement by the Istanbul Road and the separation of Mumcular Street from the Kaleiçi settlement have significantly reduced their integration values (Figure 14).

In the analyses of 1855 and 1918, it was observed that the further towards the city periphery, the integration value decreased. However, in the analyses of the Özdeş Plan, due to the newly added main roads, there is no significant decrease in integration values as one moves towards the periphery, indicating a higher level of integration with the city. The Kirişhane District and its surroundings emerge as the least integrated area in the system.

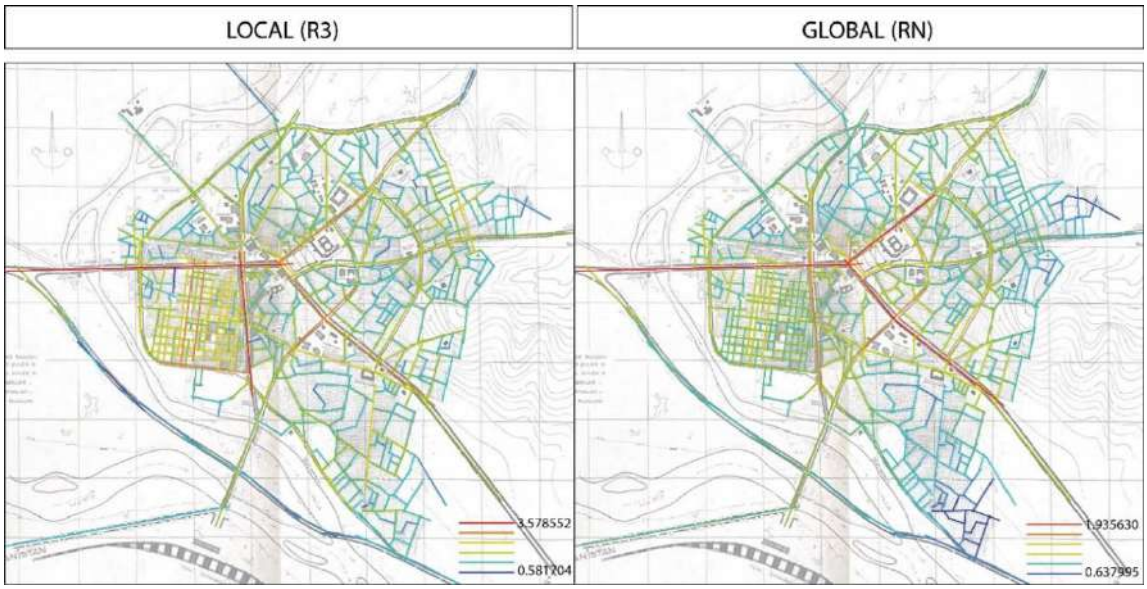


Figure 17. 1947 local integration analysis (left) and global integration analysis (right)

As of 1950, urban development activities accelerated, and demolitions began in line with Özdeş's recommendations and Egli's plan. The most significant development in the structuring of the urban space occurred in 1966 with the preparation of the urban plan. In this plan, parcels were combined and enlarged, mainly encompassing conservation area decisions. By the 1970s, due to the ongoing rapid urbanization process, multi-story buildings were constructed. According to the additional urban plan of 1975, the city expanded linearly along the London Road, planning new residential areas and an industrial zone to the east of the city [25]. Since the urban plans made during this period were not accessible, only the 1975 Edirne Map, which focused solely on the city center, was used as a basis for space syntax analyses (Figure 15).

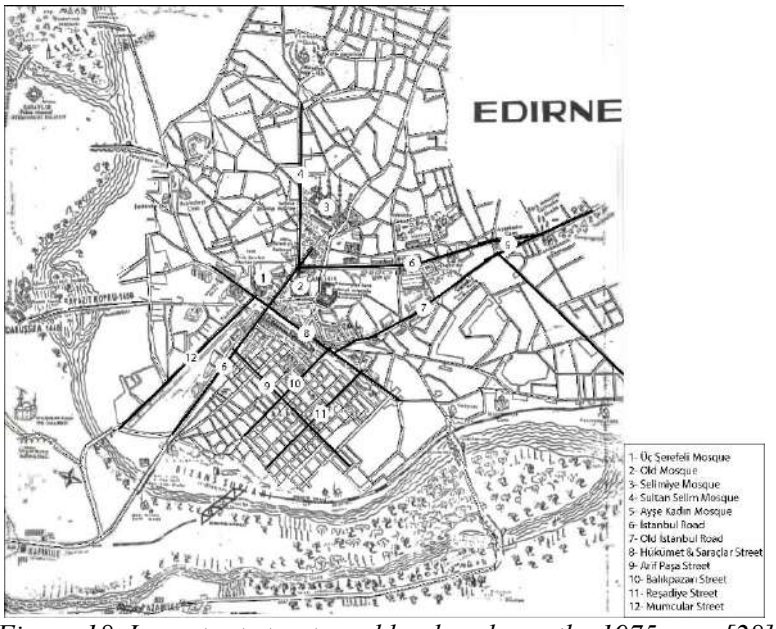


Figure 18. Important streets and landmarks on the 1975 map [28]

In the 1975 map, significant changes are not observed in the city center. It appears that the existing street layout and parcel structure of the city are preserved. During this period, there was a significant increase in demand for the Kaleiçi settlement, leading to a considerable rise in its value [26].

Similar to the analysis in the Özdeş Plan, in the 1975 Edirne map, Istanbul Road, SaraçlarStreet, and Sultan Selim Street are the most integrated streets. With an integration value of 3.246087, Saraçlar Street emerges as the most integrated street in the local integration analysis. Due to the organization of roads within the urban planning, the integration value of Kaleiçi has increased again. Arif Paşa, Balıkpazarı, and Reşadiye Streets are main roads with high integration values. With the expansion of the city to the east, the integration value of the axis descending from Ayşe Kadın Mosque, now known as Uzun Kaldırım Street, has also increased within the system (Figure 16).

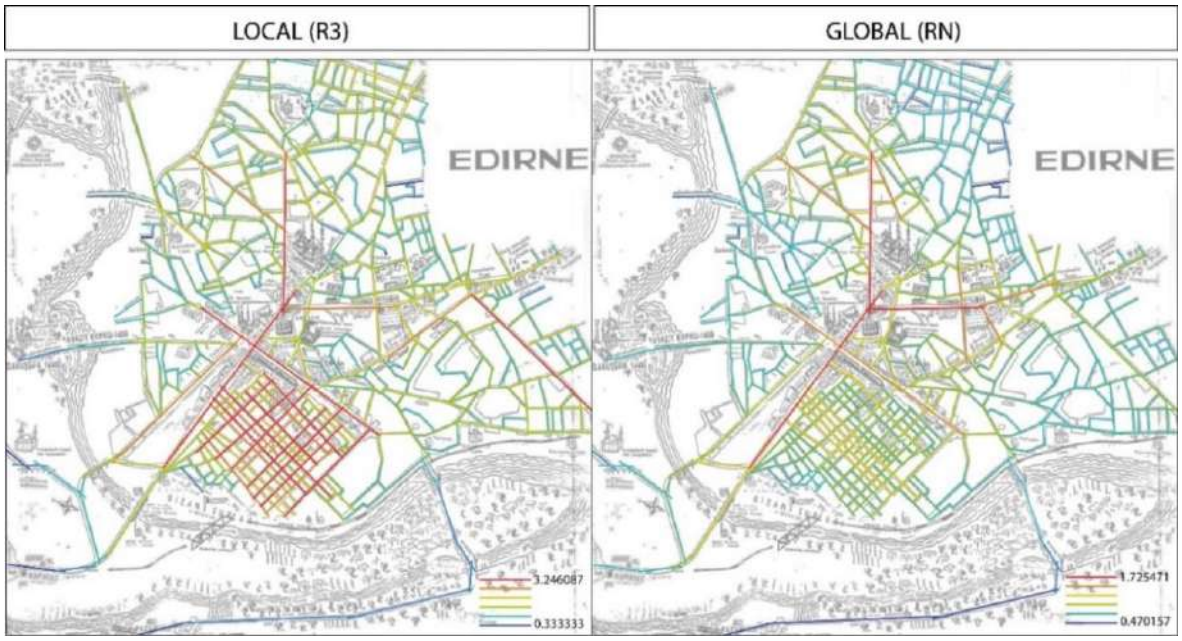


Figure 19. 1975 local integration analysis (left) and global integration analysis (right)

In the 1980s, the establishment of Trakya University marked a significant threshold in the eastern expansion of the city, with urban development continuing towards the Ayşekadın region on the Istanbul side. Concurrently, due to the increase in population and corresponding housing demand, the inadequacy of the 1966 urban plan led to the preparation of a new zoning plan spanning 20 years, initiated in 1984. Moreover, in the 1990s, the construction of the TEM highway in the northeast direction of the city redirected its development trajectory towards the north [25]. Simultaneously, the proliferation of cooperative initiatives amid neoliberal policies led to the construction of collective housing projects in the vicinity of I. Murat Mahallesi, henceforth referred to as Cooperative Houses. Despite the 1984 zoning plan being devised to span two decades, the emergence of significant urban voids within the city and the formation of new concentrations in the northern part prompted the necessity for a new zoning plan in 2003 [13].

Subsequently, a series of urban plans were implemented, including the 2005 revised urban plan, the 2007 conservation-oriented urban plan, and the 2015, 2016, and 2017 urban plans. Through these plans, the city expanded towards the TEM highway in the north and towards the Istanbul side in the east, ultimately taking its present form. In line with this, space syntax analyses were conducted using the 2023 urban plan to examine the city's existing urban fabric and the relationship between space and land use. The 2023 urban plan reveals the city's development towards the northeast along Atatürk Boulevard. Preserving the urban core to a large extent, the city has reached the present day, with the original settlement area of Kaleiçi and its boundaries discernible on the 2023 map (Figure 17).

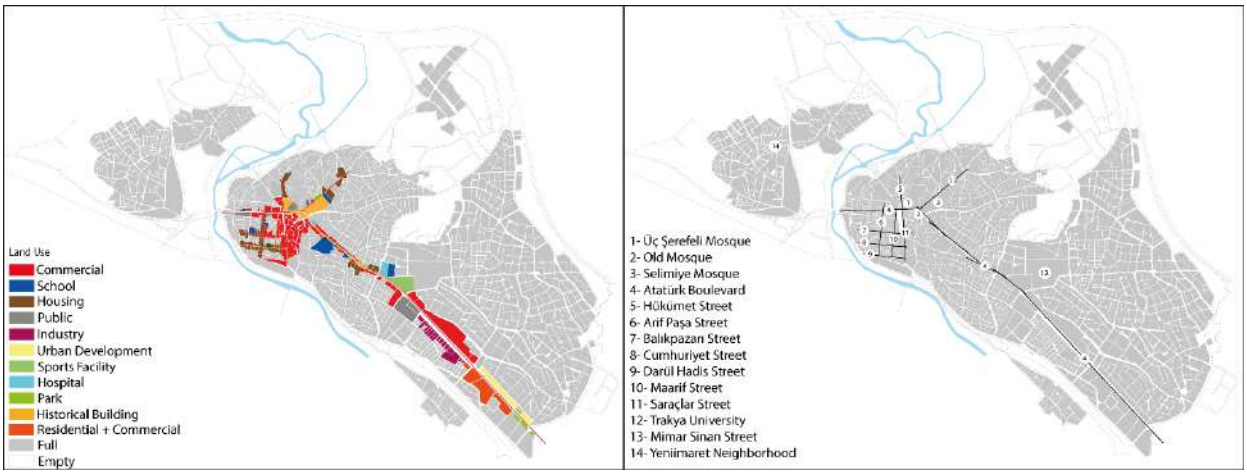


Figure20. Study area land use analysis (left), important streets and landmarks

Previous period maps indicate that Atatürk Boulevard, Saraçlar Street, Hükümet Street, Balıkpazarı Street, Arif Paşa Street, and Sultan Selim Street (nowadays known as Mimar Sinan Street) emerge as streets with high integration values in local integration analyses, consistent with earlier maps. These streets, dense with historical and religious structures, also serve as areas with a high concentration of commercial units such as inns, markets, passages, and shops. Saraçlar Street, which is closed to traffic today, hosts numerous dining and various shops, attracting tourists and serving as a hub for shopping, resulting in high pedestrian traffic throughout the day. The urban development areas spreading eastward with the construction of universities and shopping malls have proportionally increased the integration value of Atatürk Boulevard. In local integration analysis, Atatürk Boulevard stands out as the most integrated street with a value of 3.774766. Atatürk Boulevard, formerly known as the London Road, accommodates various facilities including universities, schools, hospitals, shopping centers, sports facilities, and historical buildings (Figure 18).

Figure 21. Local integration analysis for the year 2023 (on the left) and global integration analysis (on the right)

In the urban context, local integration analysis reveals the presence of integrated subgroups within the city. Conversely, the global integration analysis demonstrates a decrease in integration value as one moves away from the urban core. Notably, Yeniimaret Neighborhood, connected to the urban core via bridges spanning the Tunca River, exhibits a discernible trend of gradual detachment from the city over time. This observation underscores the dynamic nature of urban spatial configurations and the evolving patterns of connectivity within the urban fabric.

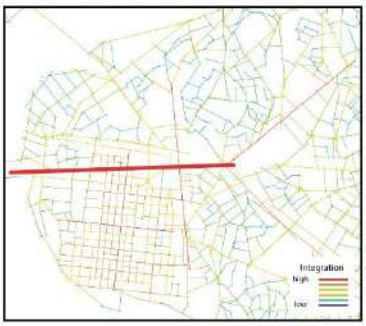
5. SYNTHESIS AND EVALUATION

This study delves into an examination of the spatial evolution of Edirne's urban center across distinct historical epochs juxtaposed with its contemporary spatial configuration. The research endeavors to discern how the urban landscape has transformed over time and elucidate the resultant implications on pedestrian dynamics, drawing upon a comparative analysis of space syntax. Through meticulous space syntax analyses conducted on maps dating back to 1855, 1918, 1947, 1975, and 2023, the study unveils the interplay of local and global integration, the intricacies of urban connectivity, and the shifting spatial dynamics across different epochs. Moreover, these space syntax analyses unveil insights not only into the evolutionary trajectory of urban spaces but also underscore the dual significance of street networks, locally and globally, within the urban fabric.

According to the results of space syntax analysis, Istanbul Avenue (Atatürk Boulevard), Balıkpazarı, Arif Paşa, Reşadiye Streets, Hükümet Street, Saraçlar, and Mimar Sinan Avenue have been identified as streets and avenues with consistently high integration values across all historical periods. Moreover, significant historical junctures have played a pivotal role in shaping the spatial development of the city. In this regard, notable events such as the reconstruction of the Kaleiçi settlement according to a grid system following a fire, the establishment of Istanbul Avenue traversing the city center in 1938, and the subsequent urban development along this thoroughfare stand out as crucial turning points influencing the city's spatial evolution.

Table 2. Comparison of streets with high integration values by years [22, 29, 30, 31]

İstanbul Road- Atatürk Boulevard



Year	Integration Value (R3)
1947	3.578552
1975	3.148910
2023	3.774766

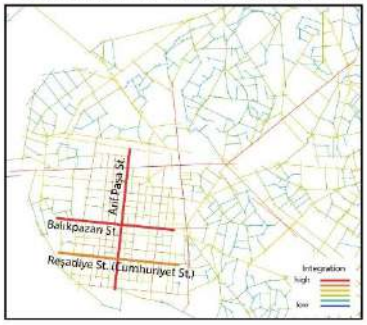
Atatürk Boulevard in 1950's [22]

Atatürk Boulevard in 1970's [22].

Atatürk Boulevard-2024

Atatürk Boulevard-2024

Balıkpazarı, Arif Paşa ve Reşadiye Street



Integration Value (R3)			
Year	Arif Paşa St.	Balıkpazarı St.	Cumhuriyet St.
1918	3.134604	3.216419	3.269388
1947	3.039613	2.905531	2.975544
1975	3.244182	3.197612	3.134593
2023	3.476684	3.493534	3.327415

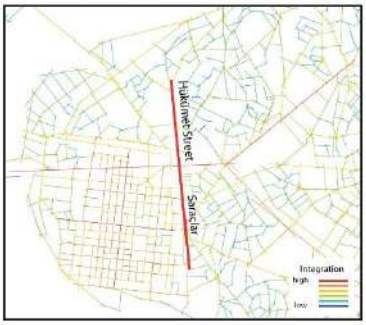
Old Pictures of Kaleiçi Streets [29]

Arifpaşa Street-2024

Balıkpazarı Street-2024

Cumhuriyet Street-2024

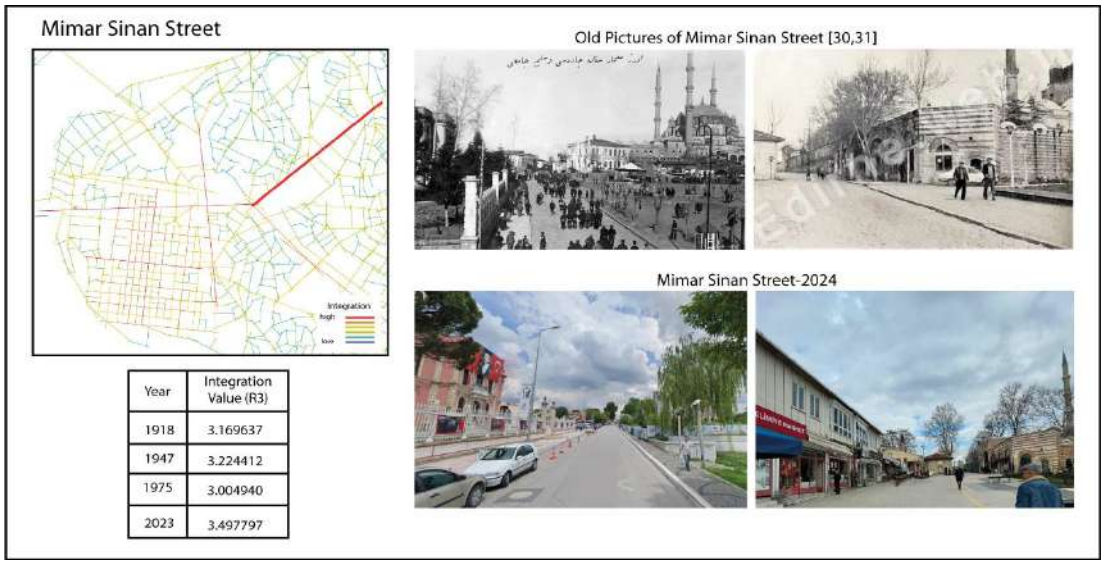
Hükümet Street- Saraçlar Street



Year	Integration Value (R3)
1855	3.716599
1918	3.066817
1947	3.297008
1975	3.246087
2023	3.649786

Old Pictures of Saraçlar Street [22, 29]

Saraçlar Street-2024



Year	Integration Value (R3)
1918	3.169637
1947	3.224412
1975	3.004940
2023	3.497797

The research outcomes underscore the enduring coherence of the road network surrounding the urban nucleus of Kaleiçi and its proximate environs across successive historical epochs, thereby elucidating the considerable degree of integration inherent within the urban core. Conversely, the emergence of novel urban development zones and associated road networks in the city's northeastern quadrant during the 20th century has failed to achieve complete assimilation with the central urban nexus. The spatial transformation of Edirne's city center throughout historical epochs serves as a testament to the evolution of the city's socio-economic framework and cultural identity. The perpetuity of main thoroughfares and streets, elucidated by the analytical findings, mirrors the city's enduring essence across temporal phases. These arterial routes, focal points of intense commercial activities, exert a significant influence in sculpting the urban economic landscape, societal interactions, and pedestrian dynamics. However, pivotal moments that punctuate the city's spatial development impact not only its physical infrastructure but also intricately interwoven social and economic dynamics. For instance, the post-fire reconstruction of Kaleiçi engendered not merely physical reconfiguration but also precipitated a reconstitution of settlement patterns and pedestrian movement.

The study, while examining the spatial evolution of the city throughout its historical trajectory, holds an instructive value for future planning and design decisions through the utilization of space syntax methodology. The main arteries identified as the most integrated streets through space syntax analyses, due to their role in shaping the urban memory and backbone by accommodating numerous historical, religious structures, and various commercial units over time, constitute crucial urban dynamics to be considered in forthcoming urban design and planning endeavors. In this context, space syntax, as a morphological analysis method, not only plays a significant role in elucidating spatial structures and relationships and comprehending pedestrian movements but also contributes to the formulation of strategies for the city's future development. It stands as a pivotal morphological analysis method in deciphering the developmental dynamics of urban spaces and shaping planning and design decisions geared towards the future.

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The Effects of the Restructuring Route: The Example of Maksem Street


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Abstract: *Cities are primarily composed of road systems and urban fabric. Analyzing the urban form and its connections can be achieved by reading the routes, which are the main component of the road system. By interpreting the relationships between the parts, it is possible to understand the processual evolution of the whole and the reasons behind the current form, which is the final state of evolution. Many European cities have restructuring routes that show the effects of the transition to modernity. These routes are integrated into the existing fabric at the end of the building process. This study aims to examine the effects of Maksem Street, which was opened during the modernization period in Bursa, on the urban fabric as an example of a restructuring route. Urban analysis necessitates a diachronic and comparative approach to identify the conditions before and after the route in this work. To achieve this, we have used historical maps, including the 1862 Suphi Bey and 1921 maps, as well as base map and cadastral map. The data obtained from this analysis were evaluated using the urban morphology method, focusing on changes in the road system, subdivisional order, and urban fabric.*

Keywords: *Restructuring route, urban morphology, Maksem street*

Maksem Caddesi' nin Yeniden Yapılandırıcı Bir Rota Olarak İncelenmesi

Özet: *Kentleri meydana getiren en önemli ögeler yol sistemleri ve dokulardır. Yol sisteminin temel bileşeni olan rotaları okumak, kent formunu tüm bağlantılarıyla birlikte incelemenin önemli bir yoludur. Böylece parçalar arasındaki ilişkileri yorumlayarak bütünün süreçsel evrimi ve evrimin son durumu olan mevcut biçimin arkasında yatan nedenler anlaşılabilir. Birçok Avrupa kentinde moderniteye geçişin etkileriyle yeniden yapılandırıcı rotaları görmek mümkündür. Bu rotalar, inşa sürecinin sonunda dokuya müdahale eder ve kendi mantıklarını mevcut dokuların bir parçası haline getirir. Bu çalışma yeniden yapılandırıcı rota örneği olarak Bursa'da modernleşme sürecinde açılan Maksem Caddesinin kentsel doku üzerindeki etkilerini ortaya koymaya çalışacaktır. Kentsel çözümleme rota öncesi ve sonrası durumları tespit edebilmek için diyakronik ve karşılaştırmalı bir okumayı gerektirmektedir. Bunu gerçekleştirmek için tarihi haritalar-1862 Suphi Bey haritası ve 1921 haritaları- ve günümüz halihazır ve kadastro haritaları kullanılmıştır. Okuma sonucu elde edilen veriler kent morfolojisi yöntemi kullanılarak sırasıyla yol sistemi, parselasyon düzeni ve bina dokusundaki değişimler üzerinden değerlendirilmiştir.*

Anahtar kelimeler: *Yeniden yapılandırıcı rota, kent morfolojisi, Maksem caddesi*

1. INTRODUCTION

To understand the city as a living organism, it is necessary to explain its transformations over time at different scales, from individual buildings to the regional level. These elements form hierarchies on the urban level at various times. Cities consist of road systems and urban fabrics, with buildings being the smallest parts of fabrics. Road systems are structured hierarchically, with routes at different scales and also, reading the route is a crucial method for examining the urban form and its connections. By interpreting the connections between the parts, it is possible to understand the processual evolution of the whole and the reasons behind the current form, which represents the final state of evolution.

Changes in the urban environment can result from alterations to routes or urban fabrics. Road layout modifications can occur specifically at the level of matrix routes. The need to connect existing poles with new ones can result in the creation of urban restructuring routes. These new ones tend to overlap with pre-existing patterns but alter their structure and hierarchy. These are the new potential matrix routes, characterized by more modern typologies and a higher settlement approach, and the resulting new connection spaces [1].

During the Ottoman period, the urban fabric of Bursa developed outside the Hisar region. Towards the end of the nineteenth century, it became the main focal point of modernization movements. The organization of new routes was a manifestation of the ambassadorial travels to Europe on the spatial level. These routes became the main development axes of the city and acted as restructuring routes within the city, causing the re-adaptation and changes of the existing fabric. Mecidiye Street, Saray Street and Hamidiye Street which were opened with the interventions of the governors in the late 19th century, are just a few of them [2]. Mecidiye Street, together with the Maksem section, forms an important urban route traversing the city from north to south. It intersects with other recently opened roads at certain points and is an important restructuring route within the city's road network.

The study focuses on the morphological structure of the Maksem section of Mecidiye Caddesi as a restructuring route. The street was later divided into three parts: Maksem, Ulucami, and Fevzi Çakmak Street. The study examines its adaptations to pre-existing urban fabrics and the new hierarchies it reveals typomorphologically. Typomorphological analysis involves analyzing a city or part of it based on its road system, subdivisional order and urban fabric. Although this analysis focuses on the road system, it will also reveal the impact of the new route on the urban fabric in terms of subdivisional order. This has important implications for architecture, as new criteria for building forms emerge, indirectly affecting their design. Spatial change can be identified diachronically and comparatively through the use of historical maps, which highlight the histo-geographical context of sites, buildings, and spaces. This study will utilize historical maps and photographs, with two particular historical maps being of importance for spatial readings. Suphi Bey and his team prepared the Map of Bursa dated 1862 to determine the situation before the restructuring route. The Map of Bursa dated 1921 was used to determine the situation after the restructuring route.

2. URBAN DEVELOPMENT OF BURSA

Historians state that the first settlements in Bursa date back to 4000 BC, but there is limited information about prehistoric periods. The first written records mention the Bithynians who settled in this region around 700 BC [3]. Bursa was founded by the Bithynians on a hill in the 2nd century BC and was surrounded by city walls. Throughout its 2200-year history, it has been the center of many civilizations. However, there is limited information available on the pre-Ottoman period of Bursa. The name of Prusias evolved into Prusa and eventually became Bursa over time [4]. Prior to the Ottoman conquest in 1326, the only settlement area was Hisar. It was during the prolonged siege of Bursa that quarters (mahalle) were established for the first time. Baykal [5] states that when the Turks took over Bursa in 1326, the city only consisted of the Hisar and had a population of two thousand houses and seven quarters. During the reign of Orhan Gazi in Bursa, a new urbanization model was implemented for the first time in 1339. A complex comprising a mosque, medrese, imaret, bathhouse, and bedesten was built outside the existing city walls. Residential areas were created around this complex to increase the

Muslim population in the city. The urbanization of Bursa during the Ottoman period was determined by the housing areas that developed organically around the complexes built by the five sultans different parts of the city. These, together with smaller ones built by members of the dynasty and administrators, served as the centers and focal points of settlement units known as quarters [4].Like other Ottoman cities, Bursa suffered from great fires that destroyed large parts of the city. However, after each fire, the city was rebuilt without altering its physical characteristics, preserving the same street and fabric. Despite the addition of new quarters in the 19th and mid-20th centuries due to intensive migration and industrial development, the city was able to maintain its historic appearance until 1950 [4].

3. RECONSTRUCTION MOVEMENTS IN BURSA

The proclamation of Tanzimat was significant not only administratively but also in terms of the changes it brought about in physical space. This period, also known as Ottoman modernization, had an impact on Bursa and the physical structure of the city was transformed. The urban fabric of Bursa, which was previously shaped according to pedestrian transport, was altered by the avenues that were opened in the second half of the 19th century [6]. Ahmet Vefik Pasha, who was the ambassador to Paris at the time and witnessed Haussman's zoning interventions, initiated similar changes in Bursa. He made significant efforts to connect the traditional quarters, which were previously independent and had cul-de-sacs. The earthquake of 1855, which destroyed two thirds of the city, facilitated Vefik Pasha's initiatives [7]. Vefik Pasha did not create a new city center as in Istanbul, but he developed a new center that made it easier to reach the old one by using the concept of restructuring routes as the main tool to achieve his goal of creating an ideal city with both modern and Ottoman characteristics [8].

During his governorship from 1891-1897, Ahmet Münir Pasha organized Maksem Street and completed the roads around Ulucami, which had been left unfinished by Ahmet Vefik Pasha. The transport axes Fevzi Çakmak - Santral Garaj connection, Cumhuriyet Street, which are important and heavily used today, were opened during the period of governor Mümtaz Pasha (1903-1906) as part of zoning operations [9]. According to municipal documents, Hamidiye Street, now known as Cumhuriyet Street, was completed in 1913. The construction of Maksem Street, which forms the southern part of Mecidiye Street, was completed in 1909 [10].The routes that were opened in the north-south and east-west directions, intersecting each other, aimed to connect Bursa to the Mudanya railway and highway. This change altered the traditional urban fabric that previously ended in cul-de-sacs, making urban transportation easier and providing easy transitions between quarters and streets [11]. Reconstructing interventions in the late 19th and early 20th century resulted in the reorganization of the commercial center. This area, which had spread over a large range in the second half of the 16th century, became bounded by Atatürk Street to the south, İnönü Street to the east, Cumhuriyet Street to the north, and Cemal Nadir Street to the west. The change in the transport system strengthened the area's position within the city, but resulted in the demolition of many historic buildings [6].

"In the process of reconstruction the city, the methods of urban planning introduced by European engineers who trained Ottoman students in military schools were applied. Suphi Bey, one of these engineering students, drew the first cadastral plan of the city in 1858 and had it printed in 1862. Vefik Pasha used this plan for the reconstruction of Bursa" [8].

4. URBAN MORPHOLOGY AND URBAN ROUTES

Urban morphology is the study of the city and its components according to subsequent transformations. Moudon states that urban morphologists not only analyze the evolution of city form but also consequences of the social and economic forces behind it. Cities as organisms that are transformed over time have different elements such as buildings, gardens, streets, and parks for investigating [12]. The act of reading the existing urban fabric is one of the most important components of the design phase. This is always critical, because for a designer status is never neutral: It is a relationship between subject and object; it therefore involves an interpretation, a critique, which is a typical act of design. This method is based on the conviction that any contemporary urban intervention should be a 'critical continuation' of the existing built environment. 'Continuation' because it implies reading the form of what is already

there (a place, a building, a fabric) [13]. Urban analyzing is, in fact, a process of understanding the phenomena described in the constructed reality. It implies the reconstruction and explanation of the different forms that the organism takes over time: the study of the universality of its character and the comparison with similar organisms; in general, to understand it as a set of relatively autonomous elements, linked by relations of necessity and contributing to the same outcome [14].

In the study of urban morphology, the process is to understand the diachronic and synchronic topic mutations of urban fabrics at different scales, i.e. the design of successive stages of transformation that explain the present reality and lead future changes. In order to do this, it is useful to first distinguish some of the relationships that link these components, to recognize the binaries of opposing and complementary concepts: routes/poles; basic building/special building. It is therefore necessary to try to understand what is the general structure of fabrics in their reproducible character; this is also a way of establishing hierarchies and scales, of recognizing typologies and exceptions, that is, of design. In fact, the city is a dynamic organism that finds its ability to develop and survive over time through the constant transformation of its structures. Urban morphology is based on three fundamental concepts that characterize human settlements as: pole, route and fabric [1].

4.1. Urban Pole

An 'urban node' is a singular point at the intersection of two continuities [15]. In particular, an urban node is formed at the intersection of two routes. Each interconnected component of a building, such as an urban structure, creates a node with varying degrees of harmony and scale. A 'pole' is an 'enriching' of the term node; in general, it is determined by the presence of more continuities, although starting from a point. It should also be noted that the distinction between node and pole depends on the scale of the reading. The pole indicates the place of convergence or origin of routes, leading to a gradual specialization of the fabric [14]. The city is a system in which all life tends to polarize and changes shape over time according to this tendency [16]. It is the hierarchy of polarization that gives the city its vitality.

4.2. Urban Fabric

The city is an organism composed of fabrics. An urban fabric is the sum of temporally determined features that distinguish the formation of groups of buildings. An urban fabric is therefore characterized by a recognizable, repeatable and identifiable rule that can be recognized, reproduced and defined simultaneously in a series of groupings according to different cultural spaces and diachronically in successive stages of the transformation process of the groups [14]. This rule allows each building and space to find its own identity and measure of its urban role according to its position in the fabric, but this measure can change over time [1]. It is important to analyze the logics underlying the formation of the urban fabric diachronically and specific aspects that we need to look at, because they are the outlines of the transformation of a city; they are a direct expression of urban society and understanding and knowing how to approach them, where possible, can make the difference between the success or failure of urban interventions [1].

4.3. Routes

A route is derived from the old French “rute”, from Latin “rupta”, and is a regular path artificially created by consolidating a spontaneous route or by building it according to a plan. This is fundamental to understanding the hierarchy of space along a route, according to its proximity to a pole or node. Reading a route means interpreting the relationships between the parts, their order and function: it is a way of studying the architectural form in a morphological sense as a visible part of the whole, thus allowing us to design in continuity with the inherited city [14].

Terms such as "suburb" and "district", common in the Middle Ages, show us precisely that it was not the building but the constructed road that was the origin of the formation of urban fabrics. What distinguishes the concept of "road" from the general concept of "route" is precisely the construction of its edges, which, however varied, makes the former an "urban route" in all its possible manifestations.

Although it is the structure that turns the road into a route, in some cases the route can also be formed within an existing fabric through destructive actions. In the first case, the process is spontaneous, while in the second it is the result of a decision [1].

In general, it is possible to identify some "basic" typologies of routes that can be found in any spontaneously formed urban fabric, from the medieval city to the present day [1]. According to Strappa [14], four main types of routes can be found in built reality, schematically corresponding to the stages of development and transformation of urban formations:

1. *Matrix Route:* This is the oldest route that existed before the construction. The buildings on these routes are therefore the first witnesses and components of the structuring process of the area. It is formed spontaneously, according to experience, without any planning intention or decision. The parcels formed by the routes are less regular than those that will be formed in the following period [14].

2. *Building Routes:* These are the routes that occur chronologically after the matrix route. They are created for the tendency of building blocks to use the rear parts within the plot instead of continuing a linear expansion for economic and functional reasons. It is the second stage of the process of the area. They are usually perpendicular to the matrix route [14].

3. *Connection Routes:* These are the connecting roads that link the building routes. The formation of connecting routes, which complete the perimeter of a series of plots, gives rise to the "urban blocks", one of the most stable organisms that constitutes the geometric beginning of the construction of the nineteenth-century European city [14].

4. *Restructuring route:* Restructuring routes are 'traumatic' routes that intervene at the end of the construction process in 'mature' fabrics, where new poles are created that generate new connectivity needs. These routes are crucial for understanding the transition to modernity in many European cities. They lead to irregular plots, often trapezoidal or triangular in shape. As a result, new types of buildings develop that are 'unusual' due to the shape of the plots [14]. In fact, these are new matrix routes, usually characterized by more specialized typologies and higher residential yields [1].

Throughout history, restructuring routes have had a significant impact on urban fabrics. A very clear example of the modern fabric is Haussmann's Paris. Plots are trapezoidal or rectangular, as in the case of Rue Voltaire in Paris, and as a result building types have developed innovatively, often as simultaneous variants of basic types resulting from the orthogonal grid (Figure 1).

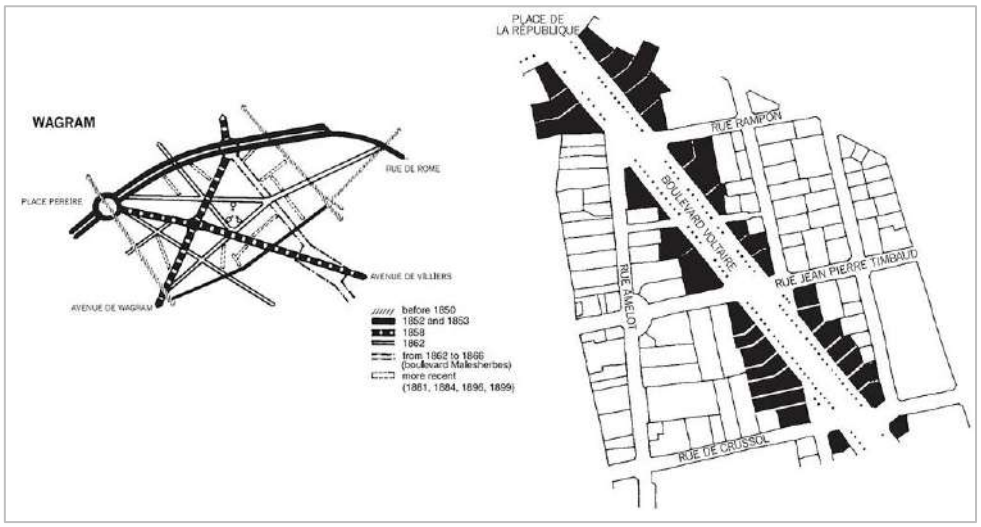

Figure 1. Restructuring routes in Voltaire Boulevard and Wagram Area [17]

In Italy, until the Second World War, the restructuring routes followed important urban streets such as Corso Vittorio Emanuele II, Via Nazionale, Viale Trastevere, Corso Rinascimento, Via dei Fori Imperiali and Via della Conciliazione, which also determined the current shape of the city [14].

In particular, the restructuring route of Viale Trastevere in Rome is a clear example of the traumatic transition to modernity in the Roman fabric. It is part of a single route that also includes Via Arenula, which connects the two poles of Largo Argentina and Trastevere Station via the Garibaldi Bridge. For the most part, the route is oriented very differently from the existing fabric, creating irregular plots where multi-family houses are built as simultaneous variants of carrier types. A case study is the Naples Rettifilo (Corso Umberto I) in Naples, polarized by the central station and the old market square, where the existing regular fabric is cut diagonally across the new route with the task of renewing the degraded city center [14].

5. MAKSEM STREET AS A RESTRUCTURING ROUTE

Maksem Street as a restructuring route that has a strong place in the morphology of the city of Bursa, is one of the three important streets of a basic route that has been fragmented over time. These are Maksem Street from Maksem Mosque to Grand Mosque (Ulu Cami), Ulu Cami Street from Grand Mosque to Şehreküstü Square and Fevzi Çakmak Street from Şehreküstü Square to the Bursa City Square (Kent Meydanı). The study will focus on Maksem Street where the traces of the restructuring route can be clearly seen.

5.1. Maksem District

This is one of the oldest districts in Bursa and it is located between Karaağaç, İbrahimpaşa and İvazpaşa. Maksem got its name because it is the place where the springs of Uludağ are divided and distributed to the city with more than forty pipes [18]. Street runs through the center of the district (Figure 2). There is also a Maksem Mosque, which is still known by the same name is one of the most important nodes of the restructuring route [19].

Figure 2. The part of Mecidiye Street (Maksem) opened in 1906 [20]

Today, the changes that have been made to the streets, especially the widening of the roads, have changed the dimensions of the streets. With the reorganization of Atatürk Street, we can see that some of the plots and consequently the buildings at the intersection of Maksem Street and Atatürk Street have been removed. In the photograph showing the Tiled Fountain west of Bursa Grand Mosque and the entrance to Maksem Street, both buildings on either side of the street are now missing (Figure 3).

Figure 3. Tiled Fountain (Çinili Çeşme) and Maksem Street entrance (2024)

Spatial changes over time have also affected the road layout. It can be seen that the width of Maksem Street is not constant along the road, but varies according to the different directions and dimensions of the paving. While the left part of the street is reserved for parking cars on the way to Maksem, the traffic flows from Grand Mosque (Ulu Cami) towards Maksem Mosque on the right side. The street also has a variety of functions. We can see that the ground floor is more often used for this purpose. In general, the continuity of commercial uses such as market, bakery, stationery, etc. continues along the street on the ground floor, although it is interrupted from time to time.

The three-dimensional structure of the street is also heterogeneous. It has been observed that the mass movements on the facades of the buildings belonging to different periods along the street are not balanced with each other (Figure 4). This situation is not only the result of the traditional-modern dichotomy, but also exists in the new buildings themselves. Undoubtedly, this situation is also due to the zoning rules that have changed over time. Some buildings preserve the traces of the traditional fabric from ground level.

Figure 4. Imbalance in mass movements (2024)

The different types of corner plots, created as a result of the intersection of the nineteenth-century street network and Maksem Street, have been filled in due to the valuable frontages, revealing different types of buildings. On the other hand, the places where the road widens the most through the pavement along the street are the two starting points of the street. These nodes have partly polar characteristics. While the starting point on the Maksem Mosque side is dominated by the mosque itself, it is supported by commercial and residential functions around it. This also increases human mobility. The entrance to the route at the node with Atatürk Street is again supported by the Grand Mosque and commercial functions. At certain points, the route provides valuable views of the urban landscape with the monuments of the Grand Mosque (Ulu Cami) and the Maksem Mosque.

6. TYPOMORPHOLOGICAL ANALYSIS OF MAKSEM STREET

The area altered by Maksem Street, which is studied as a restructuring route, consists of residential districts south of the city's commercial center. Three main elements are recognizable in the urban fabric of Bursa in 1862 (Figure 5): the topography, the organic street network and the cul-de-sacs The organic street network of the city, consisting of wards built as traditional two or three-storey houses in gardens around or centered on places of worship, is a result of the topography. While the topography influenced the shape of the streets, the streets also influenced the shape of the building blocks and the organization of the plots within the network. This is a general feature of Ottoman cities. Due to the asymmetric nature of the topography, the land on which each building is located is not composed of rectangular equal plots [21]. Therefore, this asymmetry leads to different settlement alternatives within the plot.

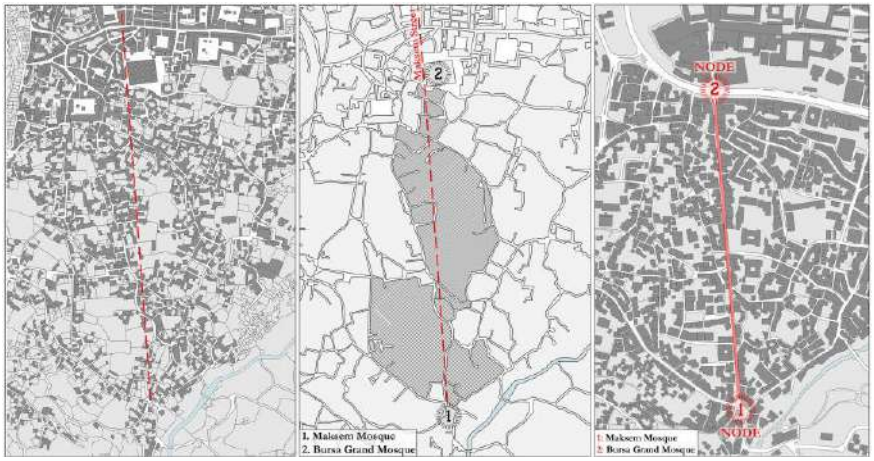

Figure 5. Urban fabric, roads network and affected urban blocks on 1862 and 2023 maps

The Ottoman urban fabric described in general terms above is also evident in the area which has an organic structure based on hierarchy of cul-de-sacs and topography. It can be observed that the route of Maksem Street changes at eleven urban blocks (Figure 5). Since the 1862 map of Bursa does not contain information on the numbering of the urban blocks, the current block numbers were used in this study (Figure 6). The changes caused by the restructuring route are analyzed diachronically and comparatively on the basis of eleven urban blocks.

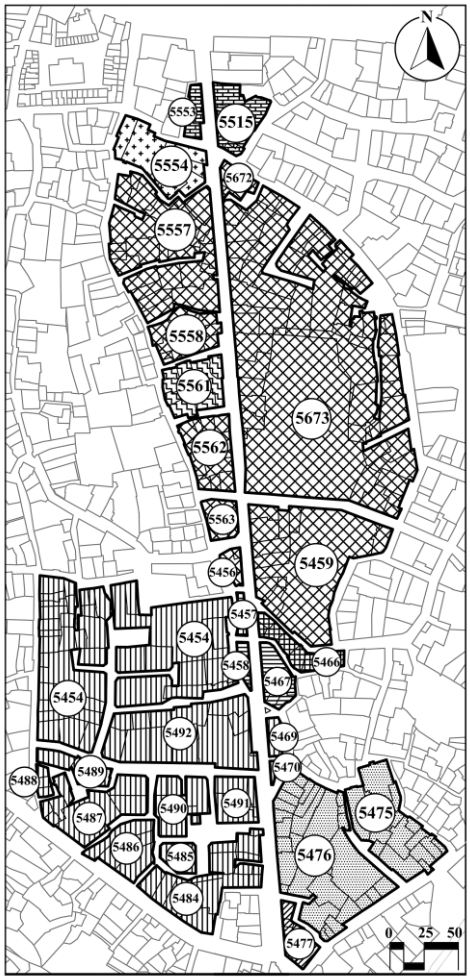

Figure 6. Numbers of urban blocks changed on today's cadastral map

6.1. Changes in Road Network and Urban Blocks

As a restructuring route, Maksem Street, which has caused significant spatial changes in the urban fabric, can be analyzed with some concepts. Accordingly, the new route has produced some urban blocks in the traditional fabric to become smaller. Such as, urban block 5477 has been reduced in size due to the effect of Maksem Street. Similarly, urban blocks 5475-76 and some parts of 5561 and 5515 had same situation (Figure 7).

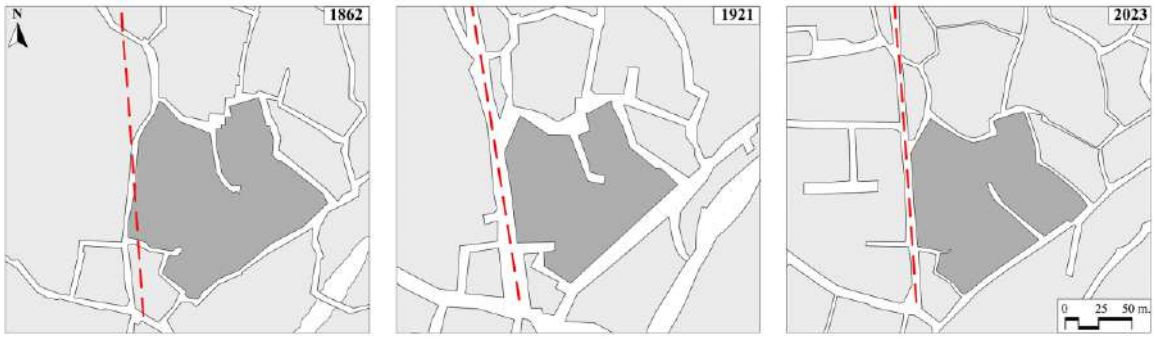

Figure 7. The status of the urban blocks numbered 5475-76 on the maps of 1862, 1921, 2023

Urban block 5477, on the other hand, enlarged with the change of the road running through it to the south-east. Biggest part of the urban blocks 5457-66 was merged with other blocks after 1921 (Figure 8).

Figure 8. The status of the urban blocks numbered 5457-66 on the maps of 1862, 1921, 2023

The physical change where the effect of the route is most visible is the fragmentation of the urban blocks. The urban blocks numbered 5455-92 were created with the effect of the route. These blocks were first divided into two parts of different sizes by the effect of Maksem Street, and then divided into sub-parts by the effect of zoning. The two cul-de-sacs shown on the 1862 map were extended after 1921. The 1921 boundaries are largely similar according to the current boundaries. It can be seen that most of the urban blocks numbered 5457-66, which had been split in two by the effect of the road, were merged with another block after 1921. The blocks numbered 5553-5515, which had previously had an integral structure, were first fragmented by the effect of the street and then enlarged by merging with the surrounding small urban blocks. It can be observed that the urban blocks numbered (5456, 59)- (5557, 58, 62, 63)- (5672, 73) had a holistic structure in the 1862 Suphi Bey map, but they were divided into 3 parts with the effect of Maksem Street, but due to the changes in the road system, they increased to six in 1921 and to eight today (Figure 9). This fragmentation was caused by the continuation of cul-de-sacs. The 1862 map shows that the cul-de-sac was continued by dividing Maksem Street to come across another street.

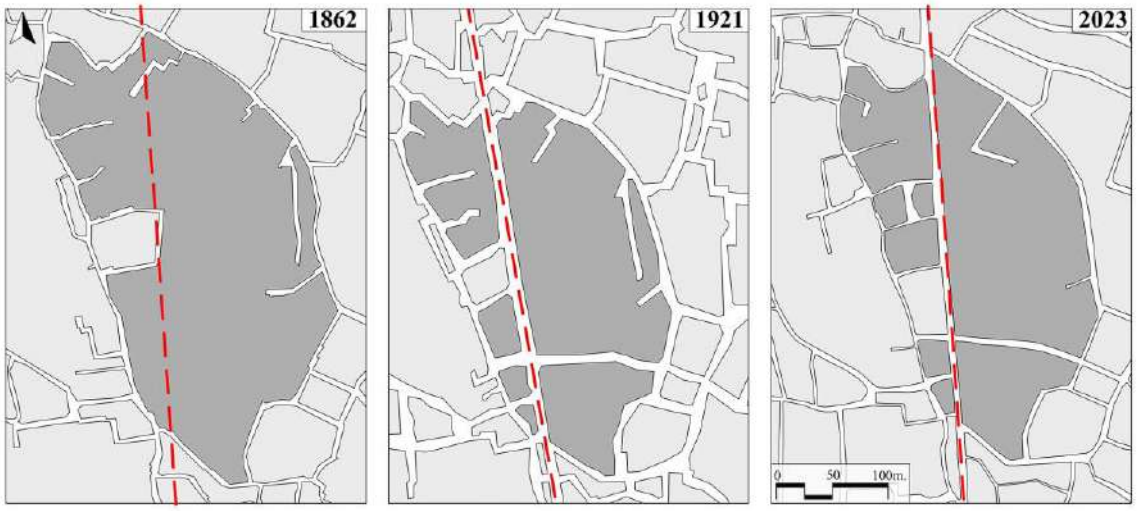

Figure 9. The status of urban blocks numbered (5456, 59)- (5557, 58, 62, 63)- (5672,73) on the maps of 1862, 1921, 2023

6.2. Changes in Subdivisional Order

Although the subdivisional order underwent sharp changes in some places, new sizes and shapes emerged due to actions such as amalgamations and divisions, as is the case today. For instance, the current urban blocks numbered (5454,55,84-88,89-92) partially preserve the traces of 1862 in the order, as shown in the 1862 map. However, some plots have been divided and others have grown by integration (Figure 10).

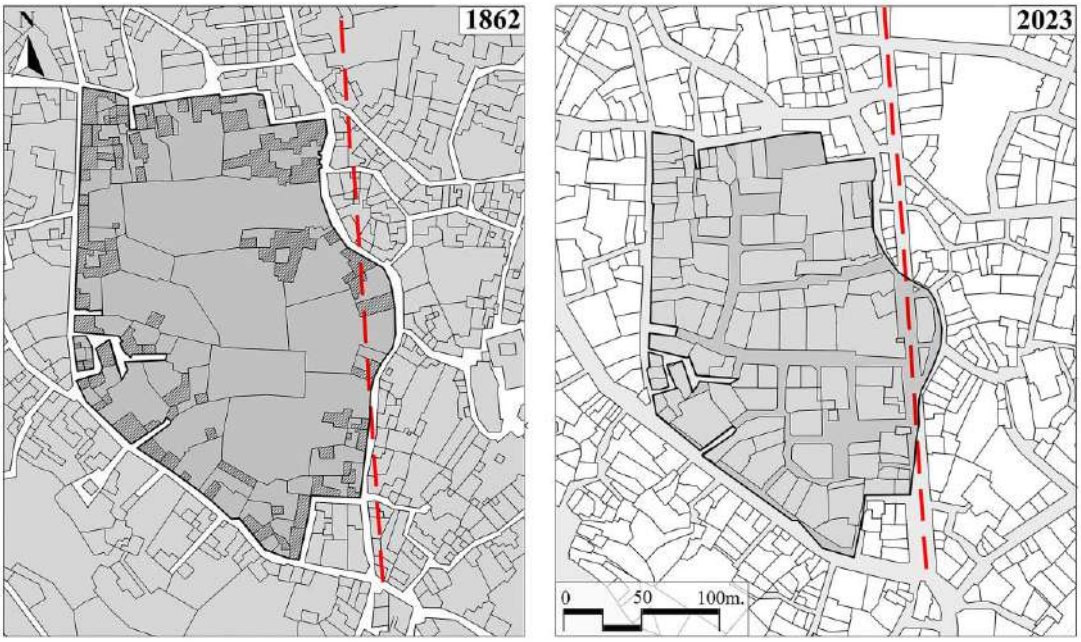

Figure 10. The status of the subdivisional order in urban blocks numbered 5454,55,84,85,86,87,88,89,90,91,92 on the maps of 1862 and 2023

It can be observed that the plots bordering Maksem Street in the building blocks 5475-76, 5458-67 and 5457-66 have become smaller, while the others have not undergone any serious change. In the plots of urban blocks 5475-76, it can also be observed that the construction on the street has increased due to the continuation of the cul-de-sac in the urban block. Therefore, new and larger plots have been created that did not exist in 1862 (Figure 11).

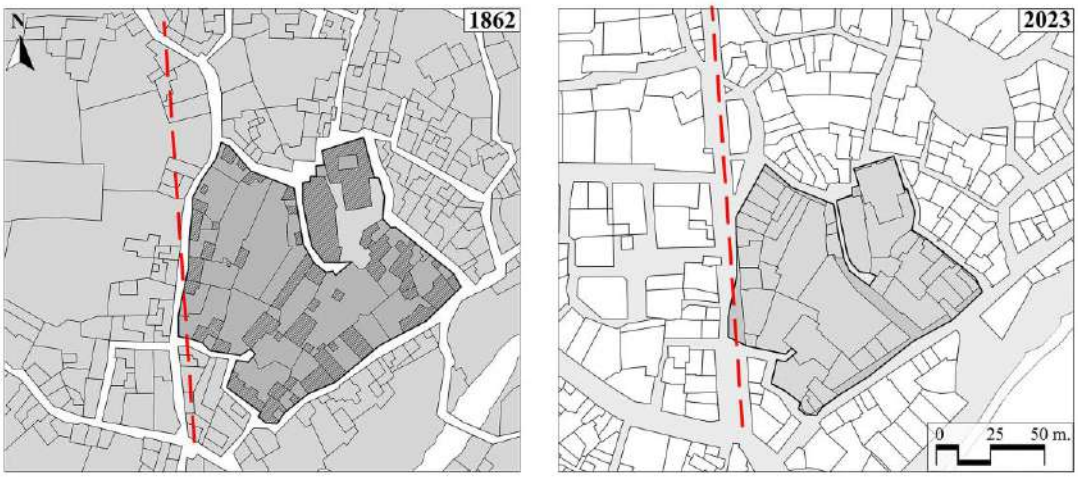

Figure 11. The status of the subdivisional order in urban blocks 5475-76 on the maps of 1862, 2023

It can be seen that the plots in the urban blocks numbered 5457-66 have caused the formation of asymmetrical structures over time. Urban blocks (5456, 59)- (5557, 58, 62, 63)- (5672, 73) have experienced more changes in the subdivisional order than other urban blocks. The reason for this situation is the size of the urban block and the road network that has developed within it. While the plot sizes are generally divided into small pieces, the parcels with two school areas within the blocks have grown by merging. Although subdivisional order of block 5561 has changed, it is assumed that this situation has nothing to do with Maksem Street. According to 1862 order of the block numbered 5554 is similar to the present one, and only the plots bordering on the street have been divided. The layout of this area has not changed due to the historic buildings on the north-eastern boundary of the urban block. Concerning the subdivisional order of block 5553 and part of block 5515, it can be seen that the plots

inside the block, where the mosque and the mausoleum are located, have not changed, while the plots bordering the road have been divided into smaller pieces. In a large part of block numbered 5515, the subdivisional order has changed completely.

6.3. Change in Building Fabric

Asymmetrical plots resulting from the topography have led to the development of building types that differ from those present in 1862. When analyzing the change in building fabric over time on block 5477, it becomes apparent that the building density has increased. In urban blocks 5475-76 and 5458-67, it is observed that the building fabric is concentrated on the street frontage and the buildings fill the plots for maximum utilization. In blocks no. 5457-66, there has been no change except for the dwindling of the relevant plots and change in their shapes as a result of the implementation of Maksem Street. It is seen that asymmetric plots cause the formation of asymmetric structures. When the building fabric of the blocks numbered (5456, 59)- (5557, 58, 62, 63)- (5672, 73) is analyzed, it is seen that the density increases on the periphery of the block. The presence of two school areas within the boundaries of the block has been the factor that reduces the density in the area (Figure 12).

Figure 12. The status of the urban fabric in the urban blocks (5456, 59)- (5557, 58, 62, 63)- (5672, 73) on the 1862, 2023 maps

It is seen that the building fabric of urban block no. 5561 is similar to that of 1862. When the building fabric of urban block 5554 is examined, the building density has not changed to a great extent, but the building volumes have increased. The reason for the lack of an increase in building density as in the other blocks is the vacant land which is currently under transformation. In urban block 5553 and part of block 5515, it is seen that the building dimensions have grown to the extent permitted by the plot dimensions.

7. CONCLUSION

Restructuring routes can be integrated into the urban fabric for various reasons. Transport issues are crucial for the city's functionality. At times, urban fabric may require surgical intervention to address health concerns such as ensuring adequate sunlight and reducing environmental pollution. The reorganization of commerce in neighborhoods may necessitate rerouting. As previously stated, restructuring routes can serve as an organizing mechanism within the urban landscape by connecting particular urban spaces, such as squares, linking urban centers, and revitalizing pedestrian pathways.

As demonstrated by Western examples, restructuring routes may result in irregular plots. In our study area, Maksem Street has caused a similar situation. In 1862, it not only fragmented the urban blocks but also altered the orthogonal subdivisional structure in many plots, resulting in the emergence of ones with varying geometric structures.

Special architectural solutions may be required for new plot structures that are emerging in demolished areas. These buildings may have unusual geometrical forms, such as trapezoids and triangles, which are frequently encountered along Maksem Street. The fragmentation of irregular urban blocks by the route has made this possible.

In some cases, the routes for restructuring may exceed the available street widths in urban areas. Boulevards are a prime example of this. This situation is also applicable to Maksem Street, as it has a wider structure than the surrounding area. The buildings surrounding the street space also have a higher morphology accordingly. The expansion of the street has made the street space attractive for commercial as well as residential functions.

The study conducts an urban analysis on various levels, with a focus on the restructuring route as the central element of the urban fabric. It demonstrates that examining the constituent elements that shape the urban landscape, such as the street system, subdivisional structure, and urban fabric, can provide a crucial foundation for the physical structure of urban space. At this point, interventions in the urban fabric can introduce a new logic to the space, regulating and transforming it. This is exemplified by Maksem Street.

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Facade Layout Review Through Examples on Bitlis Traditional Houses

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Abstract: *Houses, which are examples of civil architecture that constitute the traditional architectural texture that forms many old Anatolian cities that have survived to the present day, but whose numbers are gradually decreasing, are a synthesis of human life, social, cultural, functional and aesthetic experiences. Increasing accurate information about our housing culture produced using traditional materials and techniques is very important in terms of documenting the local housing that constitutes the world heritage, as well as the value it provides in establishing the connection of our present life values with the past and enlightening the future generations of our country on this issue. In this regard, Anatolia has a diversity and richness that cannot be ignored. Local housing architecture in Anatolia varies depending on factors such as geographical features, climate, topography, use of local materials and traditional lifestyle. Architectural techniques and details traditionally passed down through generations show the local people's commitment to their roots, tradition and local identity. Houses are of great value as a set of spaces that reflect the lifestyles, values and traditions of the people in that region. The information on the architectural features of the local housing examples in Bitlis Province, one of the Eastern Anatolian provinces, which is the subject of this article, is presented in order to contribute to the research on Anatolian Local Civil Architecture. Recognizing the local housing architecture as much as it is researched, protecting and keeping it alive as much as it is recognized, will be instrumental in transferring the culture we have to the future.*

Keywords: *Vernacular architecture, traditional housing, stone house, façade layout, Bitlis*

Bitlis Yöresel Konutlarında Örnekler Üzerinden Cephe Düzeni İncelemesi

Özet: *Günümüze ulaşmış birçok eski Anadolu kentini meydana getiren, ancak sayıları giderek azalan geleneksel mimari dokuyu oluşturan sivil mimarlık örnekleri olan konutlar, insan yaşamının, sosyal, kültürel, işlevsel ve estetik deneyimlerinin birer sentezidir. Bu konuda Anadolu'muz göz ardı edilemeyecek bir çeşitliliğe ve zenginliğe sahiptir. Anadolu'da yöresel konut mimarisi, coğrafi özellikle, iklim, topografya, yerel malzeme kullanımı ve geleneksel yaşam tarzı gibi faktörlere bağlı olarak farklılıklar gösterir. Geleneksel olarak kuşaklar boyunca aktarılan mimari teknikler ve detaylar, yerel halkın köklerine, geleneğine ve yerel kimliğine olan bağlılığını gösterir. Konutlar, o bölgedeki insanların yaşam tarzlarını, değerlerini ve geleneklerini yansıtan mekân bütünü olarak büyük değer taşır. Bu yazıya konu olan Doğu Anadolu illerinden Bitlis İli içindeki yöresel konut örneklerinin mimari özelliklerine ait bilgiler, Anadolu Yöresel Sivil Mimarisi üzerine yapılan araştırmalara katkıda bulunmak amacıyla sunulmuştur. Yöresel konut mimarisinin araştırıldığı oranda tanınması, tanındığı oranda korunması ve yaşatılması, sahip olunan kültürün geleceğe doğru aktarılmasına vesile olacaktır.*

Anahtar kelimeler: *Yöresel mimari, geleneksel konut, taş ev, cephe düzeni, Bitlis*

1. INTRODUCTION

The visual image that cities leave in our memory is directly related to the architectural identity of the city integrated with its natural beauties. Urban identity is formed by the harmony of the natural environmental data of the city and the economic, sociological and cultural components of the society living in that region. However, deterioration, change, degeneration in the urban fabric, loss of architectural authenticity, loss of identity and mediocrity. In order to prevent this, factors such as historical environment and traditional texture, cultural and natural heritage, social and economic structure, property status, technical infrastructure, building and street texture, transportation system, and the organization of social reinforcement areas should be evaluated as a whole in the preparation of conservation zoning plans. In 1989, the Diyarbakır Cultural and Natural Heritage Conservation Board decided to register 280 buildings in Bitlis under the scope of urban conservation site with the decision number 317 [1]. Although the Bitlis Conservation Plan, prepared by urban planner M. Remzi Sönmez, was approved by the Ministry of Culture on 5.12.1998 with Law No. 2179 and entered into force, it could not be implemented due to the terrorism and lack of public security in those years [2].

When natural disasters such as floods and earthquakes in the vicinity of the region in recent years were added to the lack of implementation, initiatives such as durable construction - qualified construction - healthy urbanization were seen as a way out by local administrations, and transformation projects have started to be implemented in many regions of our country.

Although it is known that the geographical and human characteristics of a city and its socio-cultural structure form the architecture specific to that city, almost all of the houses built by the state through "urban renewal, urban development and transformation projects" in many provinces such as Bitlis, Kars, Gaziantep, Trabzon, Bayburt, Adana, Diyarbakır, Bursa, Agrı, Edirne, Malatya, Istanbul, Izmir, Erzincan, Denizli, Erzurum, Ankara reflect a very similar architecture. While the permanent living spaces to be built in cities are planned to meet today's comfort conditions, the necessity of starting from examples reflecting local architectural features and using local building materials has been overlooked in the projects prepared in this context. Within the scope of this study, it is aimed to convey and once again emphasize the architectural features in the facade layouts of traditional houses in the center of Bitlis and to draw attention to the issue.

2. HISTORY OF SETTLEMENT

Obsidian samples found in Nemrut and Suphan Mountains within the borders of Bitlis province show that the history of the region dates back to the Neolithic period. Traces of civilizations dating back to 3000 BC, Mitanni, Urartu, Roman, Sassanid, Byzantine, Byzantine, Muslim Arabs, Seljuk period traces in Bitlis and its immediate surroundings show that the region was considered as a settlement by different civilizations [3]. Although the origin of the name of Bitlis used today is not known for certain, according to historical sources, the Assyrians called it Bit-Liz, Persians and Greeks Bad-Lis or Bad-Lais, Byzantines Bal-Lais-on, Babaleison or Baleş, Arabs Bad-Lis, Armenians Pageş or Pagişi [4]. The region, which was under the rule of Turkmen raids, Ahlatşahs, Artuqids and Ayyubids in the XIth century, and the Great Seljuks, Ilkhanids, Karakoyunlu, Akkoyunlu and Safavid states in the XIIth century, came under the Ottoman Empire in the middle of the XVIth century [5]. Occupied by Armenian gangs during World War I, the city was liberated in 1916 and became a province in 1935.

The historical urban fabric of Bitlis consists of the historical castle built by Badlis, one of the commanders of Alexander the Great period, and the 56-meter high walls surrounding it, religious buildings, bazaar, bedesten, baths, madrasahs, inns, bridges, tombs, cumbets and many local housing examples built with smooth cut stone.
The beautiful houses of Bitlis have even been the subject of travelogues. In the 17th century, Evliya Çelebi wrote about Bitlis in his travel book, "... there are a total of 5 thousand beautiful houses in the city of Bitlis on the hills, and all of them are well-built houses covered with amber-scented earth. But some of them are houses leaning against each other. For they are generally beautiful houses built on high airy ground..." [6]. Among the information Lieutenant Colonel J. Shiel gave about Bitlis, which he

visited during his trip to the east in 1836: "...the city of Bitlis has a very remarkable appearance. The houses are made of red stone cut into square blocks and there is a general two-story construction with windows on the street..." [7].

3. NATURAL AND GEOGRAPHICAL FEATURES

Neighboring the provinces of Batman, Mus, Van and Siirt, about three-quarters of Bitlis' land is mountainous and the settlement is located between steep mountains. It is close to the Upper Euphrates part of the Eastern Anatolia Region. It is very easy to reach Lake Van, Mount Nemrut and Mount Suphan from the city center. The climate in Bitlis is very harsh, winters are cold, snow usually falls heavily and remains unmelted for a long time. Therefore, the settlement formed in the form of terracing on steep topography throughout the city is the most important feature that emerges as an architectural identity.

Mustakbaba neighborhood, Zeydan neighborhood, Atatürk neighborhood and Inönü neighborhood, which were formed in Bitlis Kale and its immediate surroundings in the center of Bitlis, have the feature of embanked settlement sitting on the steepest slopes in the region [8]. In the placement of Bitlis houses in this region on the topography, it is noticeable that an architecture that respects the privacy of the neighbor, does not interrupt his sun and view, protects the nature and intertwines with it [9]. For this reason, storeyed structures have emerged depending on the steepness of the slopes descending from the hills towards the Bitlis Stream.

4. BITLIS LOCAL HOUSING ARCHITECTURE

Bitlis local stone houses are located on the slopes descending from the hills surrounding the center of Bitlis towards the Bitlis stream. The houses, which sit on sets in terracing order, have one, two or three floors depending on the steepness of the slope. Almost all of the houses built with smooth cut stone have straight facades. The houses are covered with a flat earth roof. When the stone housing examples examined in the urban conservation area of Mustakbaba, Zeydan, Atatürk and Inönü neighborhoods, which are the subject of the research, are viewed from a distance, the cubic architecture with green vegetation between them exhibits a unique settlement texture [10]. Single-storey, two or three-storey stone houses located perpendicular to the slope offer a very neat architectural integrity. Depending on the topography, the houses have back or side gardens. Houses located parallel to the slope usually form a row side by side, creating a street silhouette.

The alleyways and streets are also shaped according to the slope. The roads parallel to the slope are wider, but the roads perpendicular to the slope are very narrow and stepped. The steep streets are generally shaped with many and wide steps. Since it is difficult to reach the houses by climbing a large number of steps, some corners of the stairs are twisted and turned [11]. It is quite difficult to climb up and down these steps in Bitlis. For this reason, even today donkeys are used to carry loads and goods [12]. The heights and widths of the steps are sized so that donkeys can easily climb them. It has been observed that donkeys, with the load on their saddles, can climb those steps even more easily than humans.

5. FAÇADE LAYOUT DETERMINATIONS ON EXAMPLES OF TRADITIONAL HOUSES IN BITLIS

The number of single-storey houses in the region is small, mostly two or three-storey houses. The exterior facades of the stone houses that make up the fabric of the neighborhood are generally flat, with no projections. There are no bay windows, closed overhangs or balconies. The basic building material of Bitlis houses is stone on the exterior and intermediate floors with wooden beams in the interior. Yellow-brown-red colored stones obtained from the quarries in the region were shaped in the form of cut stone and used in the buildings.

The most important decorations are the row windows facing the street. These architectural elements, which mostly form a series of twin or triplet windows, are the most important elements depicting the

façade. The most common window sizes in the houses in the region are 90x135 - 95x175 cm. The windows are usually double-hung wooden windows and many of the ones close to the street have iron bars. Rosebud motifs seen on the window arches are among the decorative elements applied on the facade. Almost all of the exterior walls from outside are unplastered. The thickness of the exterior walls varies between 85-100 cm. The reason why the wall thicknesses are so high is insulation due to the fact that it is a very cold climate zone, as well as providing rigidity in the structure in terms of the carrier system. It is seen that the interior wall thicknesses are thinner than the exterior walls. The interior walls, which are usually 30 cm thick, are mostly plastered.

Among the houses that make up the architecture of the region are the houses of the leading aghas of the region. Agha houses are mostly planned on the basis of Haremlik-Selamlık (separately houses for women and men). Since such examples sit on a large and wide area on the land, they have created a typology where more than one building comes together. Below are examples of dwellings consisting of both single and multiple structures. Through the examples, determinations were made regarding the façade layout of local houses.

5.1. Example 1: block 499, parcel 2

The house built with smooth cut stone technique in the Zeydan neighborhood, block 499, parcel 2, has two floors due to the slope of the land (Figure 1). The ground floor of the house is defined as the basement and is used as an animal shelter. The basement is entered through a single-leaf wooden door. There is a rosebud motif ornament in the center of the stone lintel on the entrance door (Figure 1). The entrance to the main floor, which is used by the rightful owner of the house, is provided from the upper level, from the south facade. It can be clearly seen that there is a distinction in the workmanship between the ground floor and the main floor. While the basement floor was built with more sloppy rows of cut stone, the upper floor was built with more qualified and elaborate cut stone. The floor separation of the building is provided with wooden beams. On the north façade facing the courtyard of the building, there are triplet windows connected by arches. There is a flattened and protruding stone arch above the windows. The window arch in the center of this triple window arrangement is decorated with floral motifs (Figure 1). The wooden joinery of the windows is original and there is an iron grid in front of each of them.

Figure 1. Zeydan neighbourhood, block 499 parcel 2, triple window row on the 1st floor façade (source: author, 2013)

5.2. Example 2: block 454, parcel 12

The house on block 454, parcel 12 in Mustakbaba neighbourhood was built using smooth cut stone technique and has two floors (Figure 2). There are storage and cellar spaces on the ground floor and rooms on the upper floor. Since the façade of the building forms the silhouette of the street, it was built with a very qualified and elaborate cut stone technique. On the ground floor, there is an arched entrance door entered through a single-leaf door and a light window above it. There is also a winter room on the ground floor and the windows of this room are arched twin windows. The first floor of the dwelling has a series of three windows. There are flattened and protruding stone arches above the windows. Since the

arched windows are planned adjacent to each other, they form a series. The wooden joinery of the windows are original, painted with white oil paint and each has an iron grid in front of it. Where the roof cover meets the façade, a profiled stone molding draws a distinct line.

Figure 2. Mustakbaba neighbourhood, block 454 parcel 12, double window on the ground floor, double triple window row on the 1st floor façade (source: author, 2013)

5.3. Example 3: block 498, parcel 5, 6

The building, which is one of the most beautiful examples of traditional Bitlis residential architecture, was built in masonry using cut stone (Figure 3). It sits on a rather large area. Due to the slope in the topography, it appears to have three floors from the facade facing the street, while it has a single floor from the rear facade. The distinction between the first and second floors of the building is marked with a decorated floor molding. The main entrance door of the building is located on the south facade facing the street. The door is located in a pointed arched niche. The door, which also has a flat arch at the top, is double winged and wooden. The facade is characterized by rectangular windows. There is an iron grid in front of all the windows. Almost all of the garden walls of the building have been demolished. The façade of the building is also damaged, and some stones have fallen. The building has a flat roof but part of it has collapsed.

Figure 3. Zeydan neighbourhood, block 498 parcel 5, 6, rectangular double window row on the 1st floor façade (source: author, 2013)

5.4. Example 4: block 456, parcel 1

The building constructed with smooth cut stone is one of the three-storey houses in the region. The floor separations of the dwelling are provided with wooden beams that protrude a little bit. There are two entrance doors on the south façade. One of them leads to the upper floors of the building while the other one leads to the storage and service area on the ground floor. Both entrance doors do not have original wings. The rectangular windows of the immovable have wooden joinery and iron grids. There are small rectangular windows above the doors on the ground floor. On the first floor there are two twin windows with flat lintels (Figure 4). The second floor has one triplet and one twin rectangular windows with flat

lintels. There are stone jambs around the upper floor windows. The building was constructed with smooth cut stone and covered with a flat earth drop.

Figure 4. Zeydan neighbourhood, block 456 parcel 1, double & triple windows on the façade (source: author, 2013)

5.5. Example 5: block 499, parcel 7

The rectangular dwelling has three floors and a flat roof. A wooden beam is seen at the separation of the ground floor and the first floor and is perceived as a horizontal dividing element on the facade. There are independent cellar and storage rooms on the ground floor. The entrance doors of these spaces are single-leaf narrow doors. There are also ventilation windows above two of these doors. These windows have no joinery, only iron bars. The windows on the facades of the building built with smooth cut stone have a rectangular form. There are three twin windows with flat lintels on the first floor (Figure 5). All windows have iron grilles. The building is covered with a flat earth drop.

Figure 5. Zeydan neighbourhood, block 499 parcel 7, double window row on the 1st floor façade (source: author, 2013)

5.6. Example 6: block 496, parcel 3

The L-shaped dwelling on the parcel has two floors and a flat roof. The floor separation of the two-storey immovable is provided with wooden beams. The ground floor entrance is from the east facade of the dwelling. There is a winter room on the ground floor apart from the cellar and storage room. There are rectangular windows above and on both sides of the door on the ground floor. The openings between the cut stones on the ground floor have reached a dangerous level. There are seven rectangular windows on the first-floor façade. If the window arrangement is followed, the room layout plans at the back can be understood. Behind the double window in the center of the façade is the sofa space. There are rooms

on both sides of the sofa. The room on the left has a double window and the room on the right has a triple window array (Figure 6). The triplet window joinery has been renewed. There is an iron railing in front of all windows. The building, which has partial cracking and deterioration on the walls, is covered with a flat earth drop.

Figure 6. Zeydan neighbourhood, block 496 parcel 3, double & triple window row on the 1st floor façade (source: author, 2013)

5.7. Example 7: block 162, parcel 6

The building with a rectangular plan has two floors and a flat roof. The floor separation of the two-storeyed dwelling is provided with wooden beams and can be easily seen from the facade. The ground floor is entered from the east façade through a rectangular door. There is a rather large window above the door, which is not joinery. There is an iron railing on the ground floor window. There is a rectangular double window on the first-floor façade (Figure 7). The windows have wooden joinery and iron grilles in front of them. The immovable is covered with a flat earth drop. The wall of the building built with smooth cut stone adjacent to the neighboring building has cracks. Water enters from the roof and spills are seen in places. It was observed that the roof and some interior walls were supported from inside with wooden posts to prevent collapse. The partition used as an arched hearth inside was filled and closed. Since the building is in danger of collapse, urgent measures should be taken.

When the row of houses towards the end of the street is examined, a similar façade layout is observed. The ground floor of the dwelling in the center of Figure 7 again has a single-leaf entrance door and a small horizontal rectangular window above it. The windows on the first floor are also rectangular and have iron bars.

The dwelling on the far left of Figure 7 is also two-storeyed and covered with a flat roof. The ground floor has an arched double window arrangement next to the entrance door. The first-floor windows are twin and rectangular windows. The two-storey stone dwellings formed in an adjacent arrangement form the silhouette and architectural identity of the street.

Figure 7. Inonu neighbourhood, block 162 parcel 6 (building on the far right) and neighboring buildings next to it (source: author, 2013)

5.8. Example 8: block 495, parcel 1

The two-storey house has elaborate stone masonry. Built with smooth cut stone, the dwelling also has a wooden beam determining the floor separation (Figure 8). The entrance is through a single-leaf door on the south façade. There is a window of different sizes on each side of the door. Behind the small window is the cellar. Behind the other window on the ground floor is the winter room. There are 2 rooms on the first floor of the house. The windows of the rooms form a double arrangement on the facade. The wooden joinery of the windows are original and there is an iron grid in front of each of them. The house is covered with a flat roof and there is a profiled stone molding at the roof level.

Figure 8. Zeydan neighbourhood, block 495 parcel 1 (source: author, 2013)

5.9. Example 9: block 138, parcel 3

The house on block 138, parcel 3 is planned as a haremlik-salamlık (separately houses for women and men) and the entrances of the sections are separate and far away from each other (Figure 9). The harem (for women) part of the building, which is accessed through four separate doors, is the size of a house on its own with its rooms, a living room and service units. In this example, which is a combination of several buildings, no building interrupts the field of view of the others since the large and small buildings are placed in accordance with the topography. Since there are smaller windows depending on the functions on the ground floor, there is no regular window row. However, in the first-floor façade layout, there are rows of windows depending on the proper room layouts. The rectangular windows add a distinct order to the building (Figure 9). The harem section is entered through a wooden door in the north through a narrow courtyard with a stone paved floor. There is a sofa with a hearth at the entrance and there are two rooms opening to the west. There is an intermediate space to the north-west of the hall and a single room and bath sections opening to it. At the southwest end of the hall, there are two more rooms divided by a cupboard. It is understood from the rich decorations, carved wooden cabinets and ceiling decorations that the room entered through the door on the south façade was planned as the head room of the house. The other room next to the head room is simpler and smaller in size. The building is covered with a flat earth roof.

Figure 9. Inonu neighbourhood, block 138 parcel 3, double window row on the 1st floor façade (source: left figure Bitlis Municipality archive, 1985 while right figure author, 2013)

5.10. Example 10: block 140, parcel 3

The building examined in Inonu neighborhood, block 140, parcel 3 has a square plan, two storeys and a flat earth roof (Figure 10). There are rectangular windows on the ground floor of the street façade depending on the functions in the rear. The interior consists of an iwan (local name: akıt), cellar and storerooms on the ground floor. The smallest window in the corner is quite small depending on the function behind it (cellar) and has no joinery. To the east of the building is a garden surrounded by high walls. The garden is entered through a door with a flat arched door; one wing of the entrance door is present while the other is missing. The stones of the garden entrance have the same characteristics as the stone architecture of the house and the rest of the garden wall is a smooth cut stone masonry wall. However, since most of the garden wall was demolished, it was rebuilt with fragmentary stones for security purposes. The entrance to the dwelling is from the east façade, through the door in the courtyard. The first floor is reached by a wooden straight-arm staircase. There are 3 rooms on the first floor. There are eight rectangular windows on the street (south) façade of the first floor. The triplet window arrangement is planned in an arch pediment. The rooms where these windows open are more special. The window frames are wooden and have vertical sashes. The sashes are divided into squares with slats. There are iron railings outside the windows. The floor separation of the two-storey building is provided with wooden beams and can be seen from the facade. The building is covered with a flat roof. There is a profiled molding that visually separates the roof from the facade.

Figure 10. Inonu neighbourhood, block 140 parcel 3 traditional house with adjacent garden (source: author, 2013)

EVALUATION

Some of the dwellings in the neighborhoods examined could be entered, while others were demolished, so no measurements could be made and only the relationships between the spaces could be examined. It is seen that the local houses generally have a simple plan and have service spaces such as woodsheds, stables, kitchens on the ground floor and sofas and rooms on the upper floors. Even if there is a garden or courtyard, it is observed that it is kept small due to the harsh climate and has units such as warehouse, latrine or outbuilding. In houses with large programs, it is observed that wet areas such as baths and toilets are part of the house and are usually resolved by protruding outward from the ground floor in cylindrical form. However, such examples were not included in this study and it was deemed appropriate to analyze them in a separate category.

In the two- or three-story houses in the region, there is a common area on the ground floor called “akıt (as local name)”, which evokes the function of a sofa. The sofas on the ground floor are generally rectangular in size, with stone walls and floors. The ceiling is covered with a vault, also made of stone. Stables, cellars and other storage spaces of the house open onto the ground floor. The entrances of the buildings from the ground floor usually open to this common room. It is the coolest part of the house. Above the entrance door, there is usually a window opening without joinery for ventilation and lighting.

There are also wooden stairs leading from the ground floor to the upper floor. In some examples, there is a winter room (examples 6, 7, 8) on the ground floor in addition to spaces such as sofa, cellar, storage room. There are rooms on the upper floor. The windows of the rooms are arranged in a row, creating very regular silhouettes with an architectural identity.

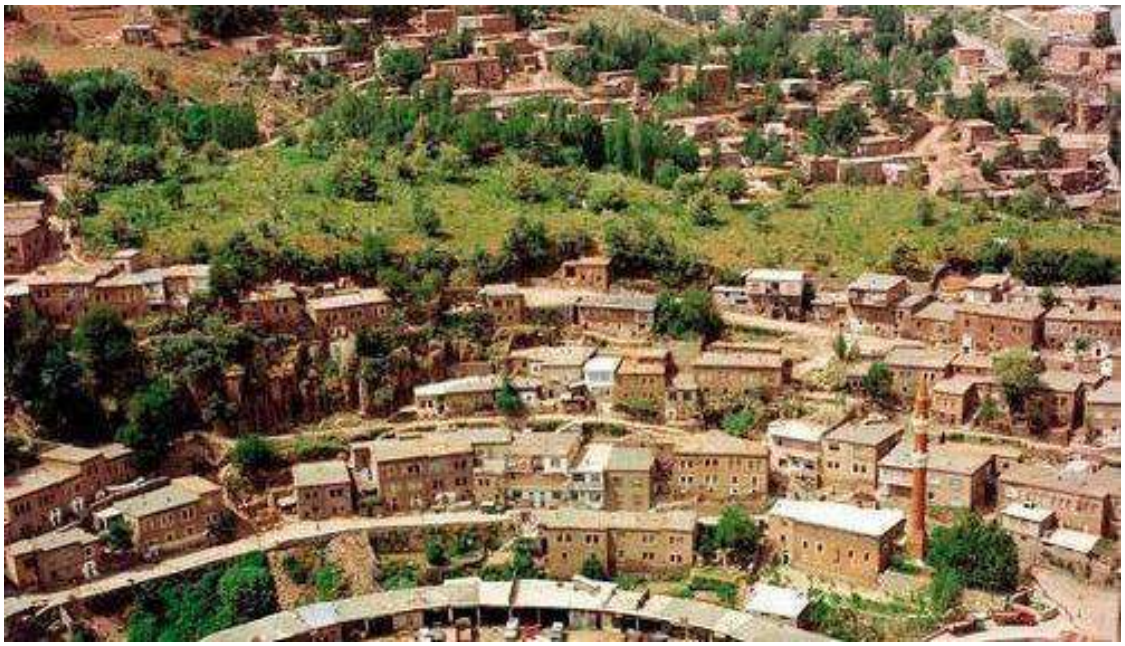

Figure 11. Traditional Bitlis houses that sit on the slope of the topography and create architectural identity integrity (source: author, 2013)

CONCLUSION

It is noteworthy that the local architectural identities of ancient cities in Turkey have been lost in the last century due to many reasons. Changes in the social profile, rapid migration from villages to cities, unplanned urbanization, social, economic and political factors cause rapid change and transformation of the local architectural identity that has been formed over centuries in that region. With the rapid change of cities over time, it is seen that they move away from their unique architectural identities and that every city is becoming more and more similar to each other. One of the most important parts of the city, which is the memory object of the city and reflects the identity elements of the city belonging to a period, is the residential architecture. Traditional houses are the most important element that carries the traces of the past, reflects the history and cultural heritage of a city, preserves the deep-rooted past and cultural identity of the city and ensures its transfer to future generations. The architectural styles and styles that emerge with such houses reflect the cultural richness of a city by bearing the traces of local traditions, handicrafts and construction techniques.

Local houses shape the identity of a city and reflect its history, cultural heritage and the identity of its local community. Preserving and restoring these houses helps to preserve the identity of the city and pass it on to future generations. It creates a lasting image of the city in the memory of those who live in the region, as well as visitors for a certain period of time. Local housing examples in Anatolia have many aesthetically unique architectural details. The ornamentation and decorative elements adorning the facades and the handcrafted motifs make them different from other examples. The local housing examples create a visually different atmosphere in the streets and neighborhoods of the city and present a character unique to the identity of the city. The image formed in the whole street also contributes to the touristic attraction of the city. Tourism activities contribute to the economy of the region and help the development of local businesses.

Conservation policies should be developed and disseminated for houses with local architectural features without losing their identity at the urban scale. The power of preserving collective urban memory in conservation policies is linked to supporting the urban dwellers both culturally and socio-economically. Long-term planning is the key to ensuring that families who take ownership of their own homes stay in the area longer and that young family members take ownership of their own living space and city.

The modern comfort conditions of today's life, the desire for individual life apart from the family, distance to central business areas and social reinforcement areas, etc. cause the loss of the culture of life in Bitlis, as in other regions, and thus the rapid disappearance of Bitlis civil architecture examples. In Bitlis, which harbors many riches, inventory studies that cover the whole province and will serve different studies should be carried out. Surveying and documentation studies for historical monuments throughout the region should be completed, and large-scale planning and conservation-implementation moves should be made to protect the cultural and architectural texture.

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