

REPUBLIC OF TÜRKİYE
YILDIZ TECHNICAL UNIVERSITY
GRADUATE SCHOOL OF SCIENCE AND ENGINEERING

**CHALLENGES OF DEVELOPING SUSTAINABLE
NEIGHBORHOOD**



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MASTER OF SCIENCE THESIS

Department of Civil Engineering

Civil Engineering English Program

Supervisor

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Aleksandra PANCHENKO



Dedicated to my father

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Aleksandra PANCHENKO

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LIST OF ABBREVIATIONS

CEC	Commission of the European Communities
CIE	Commission Internationale De L'eclairage (International Commission on Illumination)
OECD	Organization for Economic Co-operation and Development
SDG	Sustainable Development Goal
SUT	Sustainable Urban Transformation
TOKI	Toplu Konut İdaresi Başkanlığı (Housing Development Administration of the Republic of Türkiye)

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Challenges of Developing Sustainable Neighborhood

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Master of Science Thesis

Supervisor: Prof. Dr. Zeynep IŞIK

Despite that cities are being built for people and by people, by 2024 there are no straightforward legit guidelines that would prescribe the steps of developing a sustainable neighborhood. Numerous neighborhoods, districts, and cities cannot provide safe and clean environments with healthy social interaction, fulfill the demand for health, child, and educational facilities, guarantee the right for adequate equal housing, and attract the public for economic prosperity and development. This study aims to propose a framework with which the practitioners can determine the necessity of the neighborhood for Sustainable Urban Transformation (SUT), hence influencing the development of sustainable neighborhoods, cities, and communities. In the study, Design Science Research Methodology (DSRM) was followed to create a framework. Preferred urban model tangible characteristics together with the main measurable indicators of the neighborhood have been combined into a framework. It has been categorized by social, economic, and environmental sectors and refers to Sustainable Development Goals (SDGs). The framework was reviewed by experts, which resulted in a gap in the research. Further application of the framework to the existing central neighborhood in Istanbul determined the necessity of sustainable urban transformation. Based on existing

positive local and nationwide urban practices possible solutions have been offered for sustainable regeneration and further development.

Keywords: Sustainable urban transformation, sustainable development goals, urban fabric, neighborhood, urban regeneration, human scale, compact city.



Sürdürülebilir Mahalle Geliştirmenin Zorlukları

Aleksandra PANCHENKO

İnşaat Mühendisliği Anabilim Dalı

Yüksek Lisans Tezi

Danışman: Prof. Dr. Zeynep IŞIK

Şehirlerin insanlar tarafından ve insanlar için inşa edildiği bir gerçek olmasına rağmen, 2024 yılına kadar sürdürülebilir bir mahalle geliştirmenin adımlarını belirleyen doğrudan yasal yönergeler bulunmamaktadır. Birçok mahalle, bölge ve şehir, sağlıklı sosyal etkileşimle temiz ve güvenli bir ortam sağlayamamakta, sağlık, çocuk ve eğitim olanaklarına yönelik talepleri karşılayamamakta, yeterli eşit konut hakkını garanti edememekte ve ekonomik refah ve kalkınma için halkı çekememektedir. Bu çalışma, uygulayıcıların Sürdürülebilir Kent Dönüşümü (SKD) için mahallenin gerekliliğini belirleyebilecekleri bir çerçeve önermeyi amaçlamaktadır; dolayısıyla sürdürülebilir mahallelerin, şehirlerin ve toplulukların gelişimini etkilemektedir. Çalışmada, Tasarım Bilimi Araştırma Metodolojisi (TBAM) kullanılarak bir çerçeve oluşturuldu. Tercih edilen kentsel model somut özellikleri, mahallenin ana ölçülebilir göstergeleriyle birleştirildi. Bu çerçeve, sosyal, ekonomik ve çevresel sektörlere göre kategorize edilmiş olup Sürdürülebilir Kalkınma Hedefleri'ne (SKH'ler) atıfta bulunmaktadır. Çerçeve, uzmanlar tarafından gözden geçirildi ve bu çalışmada bir boşluk oluşturdu. İstanbul'daki mevcut merkezi mahalleye çerçevenin uygulanması, sürdürülebilir kentsel dönüşümün gerekliliğini belirledi. Mevcut yerel ve ulusal kentsel uygulamalara dayanarak, sürdürülebilir yeniden yapılanma ve daha fazla gelişme için olası çözümler önerilmiştir.

Anahtar Kelimeler: Sürdürülebilir kentsel dönüşüm, sürdürülebilir kalkınma hedefleri, kentsel dokuya, mahalle, kentsel yeniden yapılanma, insan ölçeği, sıkışık şehir.



YILDIZ TEKNİK ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ

1

INTRODUCTION

The current urban population worldwide surpassed the rural population for the first time in recorded history and nowadays over half of the world's total population resides in urban areas. It resulted with the rapid growth and transformation of the territories, posing significant challenges for sustainability. Infrastructure strain, social disparities, economic instability, cultural erosion, environmental degradation, overcrowding of some territories, while other undergoing the urban sprawl. SUT emerges as a critical concept in addressing these challenges.

1.1 Sustainable Urban Transformation

The idea of sustainability concerning a city pertains to the urban area and its surrounding region's capacity to maintain desired levels of quality of life for the community. This should be achieved without limiting the choices available to both current and future generations, while also avoiding negative effects within and beyond the urban boundary [1]. Literature sources provide numerous theories and concepts on overall features a sustainable city should adopt: city development against the urban sprawl, integrated transportation, incorporating the green infrastructure, promoting the use of renewable energy, sustainable water and waste management, social equity and inclusion, participatory governance, cultural preservation and economic resilience. Also, numerous studies dedicated to the investigation of particular cases with a distinctive local range of urban problems are available. However, still there is no existing example of the sustainably transformed city that could serve as a set of rules and regulations for other struggling urban areas. Undoubtedly, the daunting task of transforming an entire city into a sustainable urban environment is a monumental challenge. Especially, when it concerns to Istanbul due to its size, complexity, and historical significance. However, the profound longing to live in sustainable environment and the conviction that it is a crucial element shaping human well-being induced for the current study. The aim of this study to investigate if there is a conceptual framework, model, guideline, or set of principles that can be utilized for

determining the dysfunctionality of any separate urban area, a neighborhood within the city. Which possible advantages the decentralized approach can offer. Which key features can serve as signs indicating the need for sustainable transformation in an urban area. Can these features be quantified, and is there statistical data available to illustrate changes over time and under different conditions. Are there established standards to define deviations in this context. What are the valid foundations for introducing enhancements in urban areas. Which contemporary urban models are relevant for sustainable regeneration. Have tools already been implemented in dysfunctional urban areas, and if so, are there positive or negative outcomes. Is there a comprehensive solution addressing multiple urban challenges. Exploring these facets can enhance the quality of people's lives and transform the surrounding environment into one that is secure, inclusive, and prosperous.

As cities themselves form a complex organization, same manner SUT is a multi-component equation with unknowns represented by objectives, legitimate ground, possible urban shape and concepts. SUT involves defining clear indicators and characteristic of designated urban area, referring to solid foundation of legitimacy and support from government authorities, urban planners, businesses, community organizations, and residents. The transformation process entails envisioning and planning for the desired future urban form and structure that align with sustainability principles and objectives. SUT requires careful consideration of all its components and their interaction to effectively address urban challenges and create a more resilient, inclusive, and sustainable environment.

1.2 Sustainable Urban Transformation Objectives

Overall literature resources refer to the subject of the Sustainable Urban Transformation process as a theoretical matter, but the crucial point to end up with a solution is to refer to some values taken as norms that would indicate any deviations hence problematic fields. The key phrase that can describe all mentioned above is lighted up in a doctoral thesis work of Yan Yang, dedicated to the problem of urban regeneration: “You can’t manage what you cannot measure” [1].

Yang [1] highlights six key driving forces and nine indicators correlating with the sustainable urban transformation process. Six key driving forces: population, governance, policy, wealth (economic growth), technology and lifestyle. Nine

indicators can be divided into three categories; (i) Indicators describing human well-being define the socio-economic structure of cities (personal disposable income, life expectancy at birth, student-teacher ratio), (ii) Built environment establishes the backdrop for human endeavors, spanning from individual dwellings and neighborhoods to expansive civic landscapes, encompassing transportation systems, public areas, and various infrastructures. Construction, management, and use of these man-made environments and their connection to social activities (residential floor area per capita, public green area per capita, car ownership per 1000 persons), and (iii) Natural environment, such as air, water as well as energy, juxtaposed with the built environment, encompassing spaces and elements significantly shaped by human influence (electricity consumption per capita, water consumption per capita, air pollutants).

SUT can be explained through the framework that should be based on the interrelations of the driving forces and indicators and represent economic, social, and environmental dimensions. Changes in these dimensions can objectively evaluate the process of SUT and call for changes in the framework if numbers require so.

1.3 Sustainable Development Goals

The SDGs also referred to as the Global Goals, were endorsed by the United Nations in 2015 as a broad call to action to safeguard the planet and promote happiness, peace, and prosperity for all individuals.

Seventeen SDGs define targets under social, economic, and environmental categories. Designated SDGs that correlate with SUT objectives represent the example of a legitimate staging ground for the development and application of SUT.

(i) SDG 1 “No Poverty” aims to ensure equal rights to economic resources for all, with a particular emphasis on vulnerable public categories; to achieve access to basic services, land ownership, control over property, inheritance, natural resources, and new sustainable technologies. SDG 1 states to "End poverty in all its forms everywhere" [2].

(ii) SDG 3 “Good Health and Well-being” intends to “Ensure healthy lives and promote well-being for all at all ages” [2]. Targets of SDG 3 aim to put an end to

the epidemics of water-borne and communicable diseases; cut the number of deaths and injuries resulting from road traffic accidents; substantially diminish the number of deaths and illnesses caused by hazardous chemicals, as well as air, water, and soil pollution and contamination; ensure access to high-quality essential health-care services.

(iii) SDG 10 “Reduced Inequality” concentrates on the gradual attainment and sustainability of income growth of the population, empowering and supporting the social, economic, and political inclusion of all individuals, irrespective of age, gender, disability, race, ethnicity, origin, religion, or economic status; promoting relevant laws, policies, and measures to attain increased equality, especially through fiscal, wage, and social protection policies. This goal states to “Reduce inequality within and among countries” [2].

(iv) SDG 11 “Sustainable Cities and Communities” pursues the aim of access to suitable, secure, and reasonably priced housing, along with essential services, while also upgrading substandard living conditions; access to secure, affordable, convenient, and sustainable transportation systems for everyone, focusing on improving road safety by expanding public transport with special attention to vulnerable populations; improvement of inclusive and sustainable urbanization, fostering participatory, integrated, and sustainable planning and management of human settlements; diminish the per capita environmental impact of cities, giving particular consideration to air quality and effective municipal waste management; universal access to safe, inclusive, public and green spaces, with a particular focus on vulnerable public categories; preservation and safeguarding the world's cultural and natural heritage. The slogan of the 11th Goal is "Make cities and human settlements inclusive, safe, resilient and sustainable" [2].

1.4 Compact City Concept

The definition of a "compact city" always goes in parallel with the definition of "sustainable development". Appeared as a possible sustainable urban form to solve specific problems mentioned above, it surely has similar intentions: "reducing the amount of travel and shortening commute time; decreasing car dependency; lowering per capita rates of energy use; limiting the consumption of building and infrastructure materials; mitigating pollution; maintaining the diversity for choice

among workplaces, service facilities, and social contacts; and limiting the loss of green and natural areas" [3].

"Compact city" is a quite newish term and was mentioned in the 1970s, in Dantzig and Saaty's book (1973) [4]. In the late 1980s urban problematic agenda refreshed this term and connected it with the concept of sustainability and urban form. The idea of looking back to the model of compact historical cities, such as Amsterdam, inspired visions of revitalized urbanity and ideas about the importance of high life quality.

In 1990 the Commission of the European Communities (CEC) issued a Green Paper on the Urban Environment where the compact city model was promoted as the most environmentally sustainable urban planning approach. [5].

In 2012 the OECD (Organization for Economic Co-operation and Development) presented compact city policies [6] that included directions for the disruption of urban sprawl, supporting public transport development, and stimulating the evolution of mixed-use neighborhoods. Twenty-seven countries received a list of similar policies, but whether can they be implemented in practice remains a question mark.

It is important to understand that lessons from the implementation of "compact city" policies should be learned from the cities around the world. As well as that "there cannot be a set of rigid strategic guidelines that should be strictly followed and implemented anywhere around the world to achieve sustainable urban forms. Sustainability depends on several intertwined factors that should fit the local context". [3]

At some level even being the same urban form, some cities cannot be compared by scale or social, cultural, political, and historical parameters. However, such relative proportions as density and diversity of urban areas provide the ability for comparison.

The concept of the Compact City depicts a system of mixed-use districts with a quality urban design where people live and work in the same place. Hence, shortened distances give people a choice regarding types of transportation systems to use and encourage developing the habit of sustainable modes. The compact

configuration of districts improves social and communal relations and results in the growth and development of local businesses [6].

"The compact city is spatially contained, environmentally sound, efficient for public transport, socially beneficial, and economically viable" [3].

Following are the core dimensions of compact city urban form: adequate space for streets, efficient street network, high density, mixed land uses, social mix, limited land use specialization, attractive, quality, and energy-efficient design of dwellings, sustainable transport, and accessibility [3].

1.5 Human Scale in Urban Design

The compact city model can be contemplated as a much younger and more ecologically oriented form of the "Human Scale" concept. Urbanism refers to the design and planning of urban spaces that are tailored to human dimensions, fostering a sense of community, promoting pedestrian-friendly spaces, and enhancing the overall quality of life.

Most of the urbanists and architects that attached a value to "Human Scale", refer to measurements or "scales" starting from the human height and width.

One of the bright examples of those who emphasized on the importance of human size, was Le Corbusier, the French architect. In the 1950s he developed an anthropometric scale of proportions - The Modulor [7], that represents a solution for harmonious standardization of mass production and a reference tool in designing new buildings (**Figure 1.1**). It is also known that he conveyed his endorsement for the centuries-old research initiated by Vitruvius, Da Vinci, and Leon Battista Alberti. They were trying to find the mathematical correlation between human proportions and the natural world.

Sert is another architect who sensed the correlation between the human scale subject and the works of Da Vinci (**Figure 1.2**). "Sert was juxtaposing Leonardo Da Vinci's famous geometrical approximation of Vitruvius man with an abstract scheme that represented neighborhood units organized hierarchically around a community center, much like cells in the organism[...]. Although thus grounding his proposals in an artistic canon, Sert was by no means concerned with aesthetic proportions. His image served as evidence for a convergence of individual needs

and those of the body social. Adding “organic” imagery to economical, physiological, and sociological arguments, Sert suggested that a certain spatial model was ideally, even naturally suited to an efficient and socially integrated existence. Space, according to Sert, had to be adapted to the rhythms and physical radii of everyday family life—the family being the basic cell of the social organism” [8].

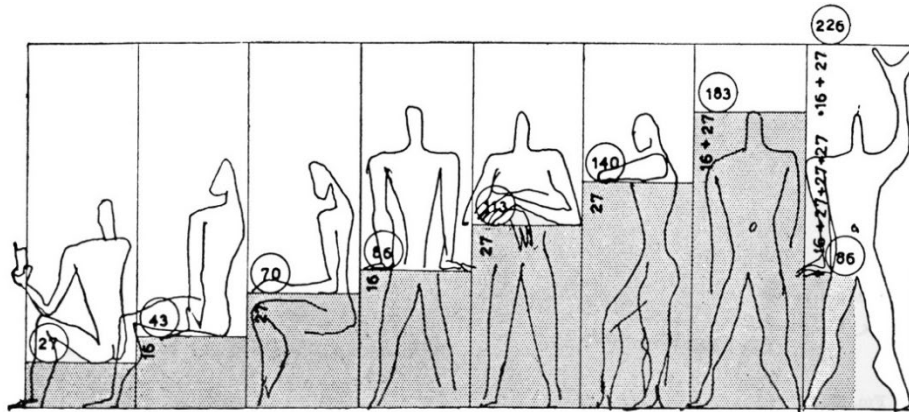


Figure 1. 1 Modulator scale [7]

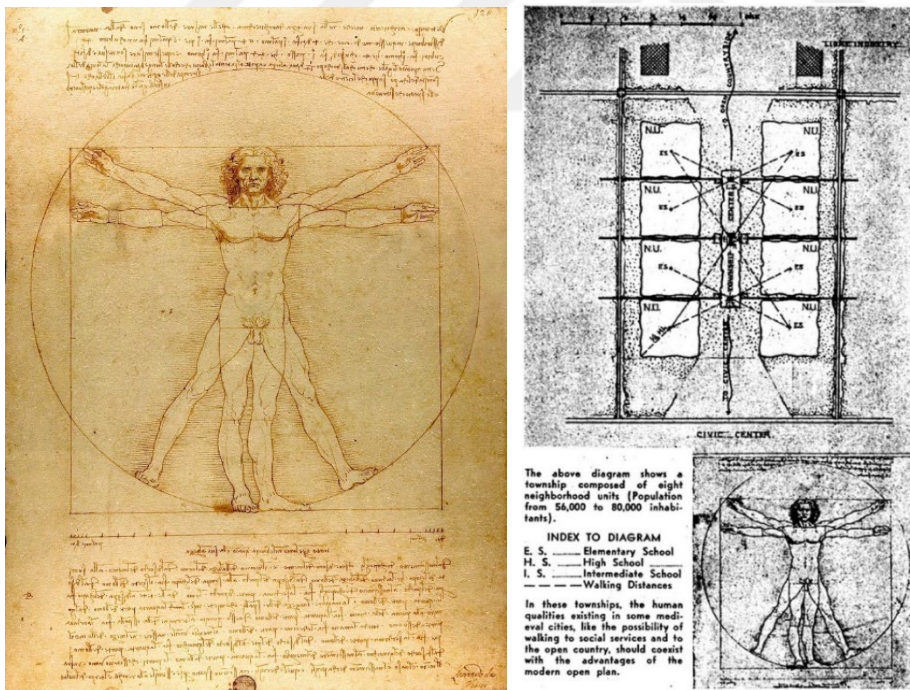


Figure 1. 2 Left: Vitruvius, Da Vinci [9]. Right: Hierarchically organized neighborhood units around a community center similar to the cells in the organism according to Sert [8]

Main indicators of the "human-scaled" environment: (i) Walkability (streets, sidewalks, and public spaces are designed based on two main scales according to Danish urban planner Jan Gehl [10]: 5km/h perspective and eye-level or "how far you can walk and how far you can look"), (ii) Mixed-use development (a mix of residential, commercial, and recreational spaces within a neighborhood that supports local businesses, that reduces the need for extensive travel and fosters a more interconnected and cohesive community), (iii) Urban density (human-scale urbanism doesn't necessarily mean low density, but it emphasizes an appropriate balance between vitality, urban energy and human comfort).

Kuchenbuch [8] refers to the "pedestrian quarter-hour" to be the "most important unit of measurement in urban planning" as an indicator of the close spheres of social bonding within a community, that was found by Umlauf in 1941. In 1944, Gutschow arrived at similar conclusions. He proposed the maximum area for a settlement as the distance between a tram stop and an apartment that could be comfortably traversed on foot within "10 minutes, or 800-900 meters".

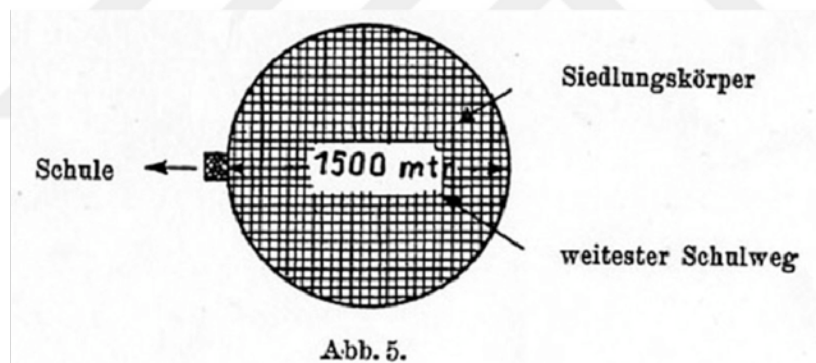


Figure 1.3 The longest acceptable distance to the school defines the diameter of the settlement [11]

(iv) Public spaces (parks, plazas, and squares design that encourage social interaction and community engagement, invite people to gather, relax, and strengthen the social fabric of the urban environment).

Such an organic structure as the modern city should facilitate community life and social contacts without in any way curtailing individual activities, as long as these do not constitute obstacles to the collective aspiration of the population as a whole [8].

(v) Architectural proportions (the scale of buildings and their relationship to the surrounding environment, visually appealing human-scale architecture that exists in harmony with the surrounding context, avoided overly massive dominant structures for a more intimate and comfortable urban atmosphere)

“The surroundings man creates for himself must have a human scale. When official buildings are of excess size, it is an expression of their importance and the impression they are supposed to make on a visitor in a one-time experience. But there is a contradiction between the gigantic scale of a huge apartment building and the tiny cell of a flat, which will not uplift its inhabitant, but rather bring him down to the size of a bee. A small house will attract a visitor because he’ll be able to fully take it in visually. A large house will make him step back so that he can view it in its entirety. For that reason, it repels” [12].

(vi) Street design (slower traffic and human-scale streets that provide pleasant and safe experiences for people with the help of street furniture, lighting, landscaping, and features that encourage social interaction).

Unfortunately nowadays very often many people can have "A feeling of some unfortunate mistake about the increasing distance between the city and people that live in it" [13]. Some cities are so unfriendly to their citizens that they represent an "Anti-city". Urban areas' condition is an indicator of the ambiance of humanity [13].

(vii) Cultural and historical context (urban spaces that respect and incorporate local cultural and historical identity, preserved historic structures that are integrated into the urban fabric, hence contributing to a sense of continuity and connection with the past), (viii) Accessibility (pedestrians, cyclists, and individuals of all ages and abilities are equal while accessing urban public spaces and facing the infrastructure).

SUT FRAMEWORK DEVELOPMENT

While conducting a literature review, it emerged that there is a lack of straightforward guidelines or frameworks for the separate urban areas within the city with dysfunctional features, that would contain a recognition procedure by determining the trouble points and the level of dysfunctionality or deprivation, based on preferable urban model for transformation. Difficulties in statistics research determined poor analysis and disclosure levels that step in the way of scientific studies, aiming to influence on development of sustainable cities and communities. Drawing on Istanbul's example, it was observed that city neighborhoods reflect different combinations of social, economic, and environmental characteristics, that support the idea of developing the framework by adopting the decentralized approach. The condition of neighborhoods may vary from positive values in the economic sector, while social and environmental characteristics decline (e.g. Nişantaşı, Etiler), to environmentally and socially viable, but economically unfortunate (e.g. Kanlıca). Therefore, the aim of the study is to develop a framework in order to determine the necessity of the neighborhood for SUT in detachment from the average city statistics and characteristics. The developed framework is set to be implemented in a specific neighborhood example in Istanbul to showcase the indicators that have deteriorated in their present state. Additionally, potential instruments for achieving sustainable transformation and development will be presented.

2.1 Research Methodology

In this study, Design Science Research Methodology (DSRM) has been implemented to develop the SUT framework (**Figure 2.1**). The problem definition, obtained solution objectives for developing the framework, its demonstration by example, expert evaluation, that highlighted the research gap, and communication are provided below in this chapter.

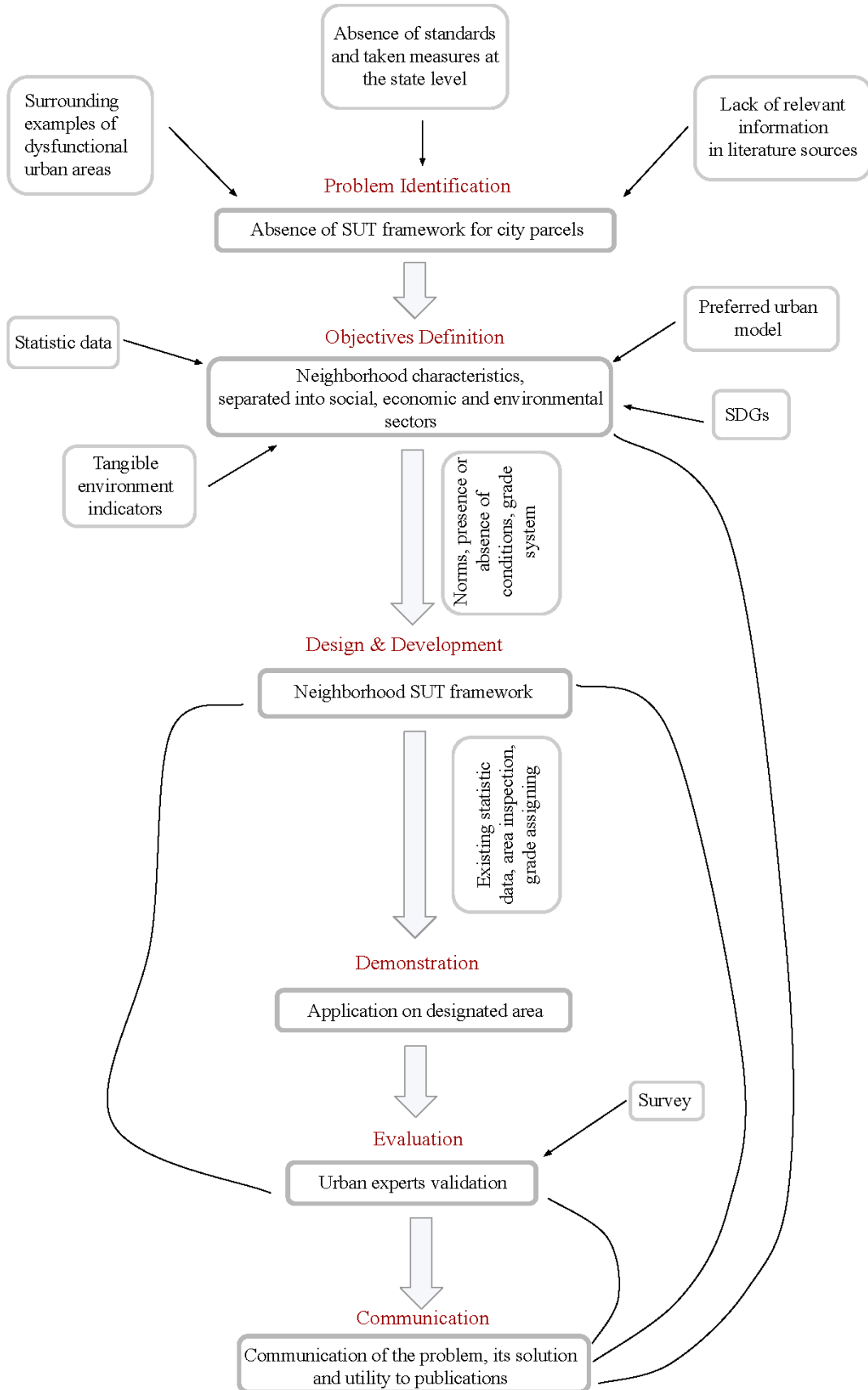


Figure 2. 1 SUT framework DSRM

2.2 Problem Definition

A literature review is replete with separate valuable approaches, methods, and concepts relative to the development of sustainable cities. The concept of the sustainable city has arisen as a political response to the deterioration experienced in urban environments throughout the 20th century. The UN's sustainable city program defines a sustainable city as one capable of preserving natural resources while simultaneously achieving economic, physical, and social advancement, all while mitigating environmental risks that could compromise such progress. Consequently, the key pillars of sustainability encompass economic, social, and environmental dimensions. The diverse array of definitions surrounding sustainability underscores its intricate nature and the challenge it poses as a goal. Thus, it becomes imperative to establish clear definitions for sustainability in general and urban sustainability in particular. "Sustainable urban development" pertains to the strategies and processes driving advancements in sustainability within urban areas [14]. According to Abbas M. Hassan et al., the sustainable city is positioned as an intermediary phase between sustainability and sustainable development. Consequently, the term "The city of transition into sustainability" appears more logical and practical than "The sustainable city" [15]. Tony Dominski introduced three stages necessary for transitioning to a sustainable city, termed the "3 Rs": Reduce, Reuse, and Recycle, which inherently imply an ecological objective. Dominski asserted that attaining a sustainable city is a long-term endeavor that spans across multiple generations [16]. It's widely acknowledged that different regions vary in physical attributes, climate, economic resources, ecological makeup, as well as the desires and needs of their inhabitants. Consequently, there isn't a singular definition of a sustainable city, posing a challenge to its creation. For instance, in China, Shanghai is recognized as the top economic city among all Chinese cities, yet it still falls short of sustainability due to imbalances in socio-ecological development [17]. Therefore, achieving sustainability necessitates addressing the three dimensions of economy, environment, and society.

The most prevalent initiatives toward achieving sustainable cities include the emergence of the recently prominent "ubiquitous eco-city" and "zero-carbon eco-city," alongside the more traditional "compact city," which has a lengthy history.

While the "free eco-city" and the "u-eco-city" are considered cutting-edge models, they are hindered by various limitations, particularly concerning economic and societal aspects such as a lack of social cohesion and equity, decreased employment rates, and economic challenges, making them less applicable in developing countries. Meanwhile, the concept of the compact city demonstrates a notable alignment with the pillars of sustainability, with the only drawback being the potential for insufficient green spaces and increased traffic if the urban model is improperly applied and managed [15].

Urban sustainability is inherently tied to specific locations, meaning that strategies cannot be universally applied or replicated as a fixed prototype from one place to another. Additionally, it's crucial to prevent the transfer of problems from one location to another. For example, Inner Mongolia in China boasts a rich natural environment and cultural heritage. Still, it is also home to coal mines that have a detrimental impact on Mongolia due to the burning of coal and its conversion into electricity [18].

Taking into account all the uncertainties and numerous approaches to defining a sustainable city, a decentralized approach of regeneration of the sustainable neighborhoods or their sustainable development appears as a more realistic and applicable way to achieve a sustainable city as a whole.

The lack of a complex and straightforward framework for SUT of cities and the broad gap related to the methods of determining the necessity and describing the process of SUT for neighborhoods and districts particularly encouraged to engage in this study.

Offered by Yang Yan [1], such indicators as (i) Added value per capita and year, (ii) Tax revenue per capita and year and (iii) water consumption in households per capita per day represent the average numbers among all city parcels and cannot reflect the current condition of the neighborhood. Statistic data regarding meeting the demand for childcare, educational, medical, and sports facilities cannot be evaluated due to the lack of national or nationwide norms, in the event that such statistics are published. Therefore, together with indicators, determined in literature sources and applicable to the neighborhoods uncoupled from the city, and drawing

on a preferred urban model for SUT and its characteristics, alternative indicators should be developed to form a SUT framework for city parcels.

2.3 Design and Development: SUT Framework Objectives

Figure 2.2 represents the developed framework. Derived neighborhood indicators have been categorized into three main sectors for evaluation of the neighborhood condition. (i) Environmental indicators include air quality, noise, and illumination levels, which acquire critical significance in the case of housing exposition towards highways. Being one of the primary potential advantages of urban parcels, water expanse quality imposes conditions for overall environment appearance and public attraction. Urban patterns, heritage preservation, housing conditions and waste management utmost reflect applied sustainable principles in the matter of consistency. (ii) The social sector is formed with indicators, that usually display substantial differences between separate city neighborhoods. Level of overall safety within the determined area, modal split in transportation and infrastructure comfort degree, active recreation, and green areas fulfillment for the public. (iii) Economic indicators of the neighborhood reflect public attraction and prosperity, which mainly depend on existing dominants within the city parcel and their management. Same time the framework shows the relation between indicators and SDGs, corresponding SUT. To obtain results using the framework, the grade system has been set. Depending on obtained statistical data and the presence or absence of stated conditions, consents were assigned a value of "1", while denials were given a value of "0". In the context of the necessity of neighborhoods for sustainable urban transformation, it was proposed to set a threshold at 30% of the total possible sum or above, which corresponds to 6 points out of 19 and above. It was assumed that 30% of declined neighborhood characteristics could be considered as occasional deviations in case of their spread through all three sectors. Same time, should all the declined indicators belong to one of the sectors, it would result in concentrated work on the rehabilitation of this particular sector. In case the neighborhood contains less than 70% of its indicators within the norms, it requires the complex process of analysis, selection, and application of tools for sustainable transformation.

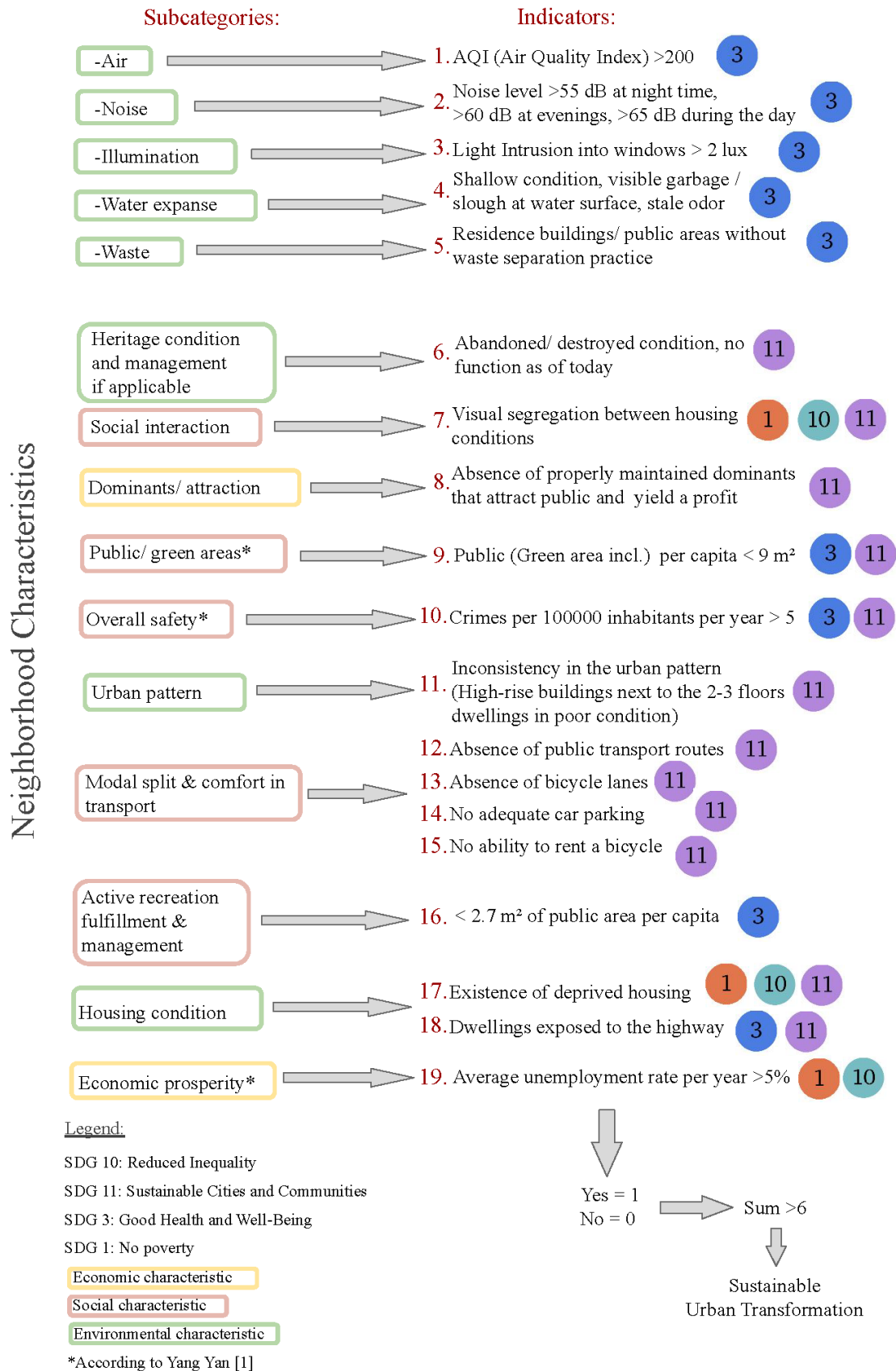
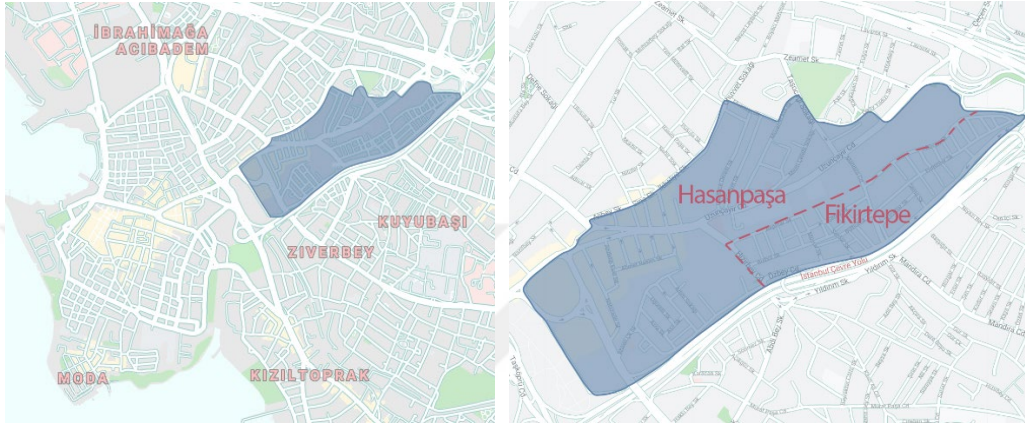


Figure 2. 2 SUT framework

2.4 Demonstration

The SUT framework has been applied to the determined area in Istanbul represented in **Map 2.1**. A portion of it falls within the boundaries of the Fikirtepe neighborhood, with the majority situated in the Hasanpaşa neighborhood. To enhance convenience, the study exclusively employs the name "Hasanpaşa" to refer to the designated study area.



Map 2. 1 Designated area

Hasanpaşa, situated near the crowded streets of Kadıköy and Moda, is a historically dense neighborhood. Despite its notable location, Hasanpaşa falls short of showcasing a vibrant social life that could attract residents and investors to contribute to its development. The neighborhood's abundant transport options, numerous social amenities, government institutions, educational facilities, and historical landmarks raise questions about why it remains neglected, sporadically deserted, disorganized, and neglected in the present day.

2.4.1 Hasanpaşa District History

In the 17th century, Hasanpaşa and Acıbadem surroundings were under the ownership of Osman Ağa, they were expropriated by Murad IV in 1630, and then at the beginning of the 19th century, they came into possession of Selim III.

The name "Hasanpaşa" comes from Hasan Hüsnü Pasha from Bozcaada, who served as the Minister of the Navy during the reign of Abdülhamid II. In 1889 Hasan Hüsnü Pasha built Hasanpaşa Mosque (**Figure 2.3**) in the neighborhood instead of the burned-out old mosque. In the 1930s during the process of giving names to

neighborhoods and districts, it was decided to give the neighborhood the mosque's name.

Hasanpaşa Gashanesi, one of the oldest industrial facilities of the Anatolian Side, was established in this neighborhood in 1892 to meet the gas needs of the Anatolian side of Istanbul. Today, this structure survives as one of the early examples of the Ottoman industrial heritage; The building became an art and culture center with the name Museum Gazhane and same time a great example of the industrial area regeneration works.



Figure 2. 3 Hasanpaşa Mosque [18].

The construction of houses and mansions on the banks of Kurbağalidere started at the beginning of the 20th century. The population of the neighborhood increased in the 1960s and 1970s when the heaviest migration from Anatolia to Istanbul was experienced. In 2022 population of the Hasanpaşa neighborhood reached 16 564 persons [19].

2.4.2 Hasanpaşa Infrastructure

Hasanpaşa's location and potential are remarkable with rich transport accessibility, plenty of social establishments, governmental institutions, educational facilities, and historical heritage objects.

Transportation in Hasanpaşa is mainly presented with public transit systems. Following are the transport possibilities around the neighborhood: Söğütlüçeşme Marmaray and Metrobus stations, Fikirtepe and Uzunçayır Metrobus stations, Ünalán and Acıbadem metro stations, busses routes that end up in İETT (Istanbul Electric Tramway and Tunnel Directorate) Hasanpaşa Garage. Private car users can reach the neighborhood by the İstanbul circular road and use services of İSPARK Söğütlüçeşme Metrobus open parking or İSPARK Salı Pazarı underground parking. Due to the absence of rental bicycle hubs and bicycle lanes integrated into the road network, designated areas do not provide an opportunity for bicycle utilization.

Social infrastructure includes Yeni Kapalı Salı Pazarı (Kadıköy Tarihi Salı Pazarı) public market, Holiday Inn İstanbul - Kadıköy Hotel, G-Han Hotel, Mini Suite Hotel, Kadıköy Park Suites Hotel.

Governmental services are presented with Uzunçayır Kadıköy marriage license bureau, İstanbul Asian Side Probation Directory, Kadıköy Administration, and Kadıköy Employment Office.

Numerous educational facilities are located within the borders of Hasanpaşa: Okan University and campus, Kadıköy KEY College, Kadıköy Final Private High School, Kadıköy İmam Hatip Mid School, Ali Dayı Master Student Dormitory, Boğaziçi Dormitories, Cem Ege Private Master Student Men's Dormitory, Odan Kadıköy Student Girls' Dormitory.

Being the central neighborhood, Hasanpaşa contains examples of the historical heritage: Kaptan Hasan Paşa Mosque, Söğütlüçeşme Hamam (Abidin Bey Hamam), Hasanpaşa Gazhanesi (Müze Gazhane) Museum, Karikatür Evi Cartoon House, Dr. Ali Rıza Gültekin Mansion (Kadıköşk), Driver İbrahim Heritage House, Nurettin heritage shop, Mahir Çayan's mother Heritage House.

2.4.3 Neighborhood Characteristics According to the SUT Framework

The SUT framework combines tangible and measurable neighborhood characteristics that are classified into three main categories: environmental, social, and economic. Tangible urban characteristics refer to the physical and visible aspects of an urban area. These are the features that cannot be quantified through statistics and numerical data. Measurable characteristics are represented with statistical data or obtained results based on conducted measurements.

2.4.3.1 Tangible Characteristics

Tangible characteristics constitute a component of SUT that consistently varies from one neighborhood to another, from district to district, and embodies the distinct identity, functionality, and aesthetics of a city. This particular set of features cannot be entirely enhanced through the adoption of universally applied national standards. The tangible characteristics of neighborhoods align with the concept of decentralized SUT development, as articulated at the neighborhood level within the urban hierarchy.

- **Abandoned Historical Heritage**

The sustainable urban fabric of central neighborhoods in existing cities cannot be present without historical heritage. The condition of heritage examples partially reflects the overall neighborhood state, national respect the history, governmental attention to the public bond with the past, and sense of belonging. Following are the examples of heritage abandonment in the Hasanpaşa neighborhood that form a part of the SUT framework.

(i) Coachman Ibrahim House, also known as Arabacı İbrahim evi, stands as a two-and-a-half-floor wooden residence situated at the intersection of Ahmet Rasim Street and Ali Ruhi Street. İbrahim Efendi, the head of the family, migrated from Romania in the 1930s and worked as a coachman. Following in his father's footsteps, his son, Remzi, initially pursued the same profession but later shifted to employment at Otosan Factory upon its establishment. Presently, the house stands in a state of partial deterioration.

(ii) Nurettin's Grocery Store, known as Nurettin'in dükkânı, comprises two wooden houses constructed towards the close of the 19th century along Kurbağalidere Street. Although it still stands today, the structure has unfortunately experienced a

degree of neglect. The ground floor of the right three-story building, constructed with bricks, remains in use and currently houses a sewing workshop.



Figure 2. 4 Left: Coachman Ibrahim's house. Right: Nurettin Grocery Store [18]

(iii) The House of Mahir Çayan's Mother (Mahir Çayan'ın Anne Evi) holds historical significance as the dwelling of Mahir Çayan, a prominent Turkish Marxist-Leninist militant and the founder of the Turkish People's Liberation Party-Front. Situated by a garden and a creek, the rear side of the house provides a scenic view. During the early 1970s, Mahir Çayan's mother resided in this house. Due to suspicions that Çayan might visit, law enforcement took measures to monitor the street by establishing coffee houses and keeping a close watch on the area

(iv) Ali Ekber's Coffeehouse, also known as Ali Ekber'in Kahvesi, was a notable establishment in the 1940s-50s situated on Kurbağalıdere Street, a bustling thoroughfare filled with traffic lights and pedestrians today. Operated by Ali Ekber for an extended period, the coffeehouse retained its name, "Ali Ekber's Coffee," despite changes in ownership over the years.

(v) Söğütlüçeşme Hamam (Abidin Bey Hamam). Constructed in 1875 by Abidin Bey as a private establishment, hamam became known as Abidin Bey Hamam due to its owner. Art historian Selçuk Seçkin suggests that the absence of information regarding its use by either men or women implies that certain hours may have been designated for men while others were reserved for women. Besides serving as a bathhouse, the building also housed several shops. In 1985, the property underwent expropriation and partial demolition as part of the renovation project for Söğütlüçeşme Train Station. After this event, the building lost its structural coherence, with approximately 2-2.5 meters of it buried due to ground elevation.

Consequently, the bath ceased to function. During the same year, the surviving sections of the structure had their entire interior covered with cement-based plaster. According to academician Sercan Sağlam, the existing concrete additions suggest the incorporation of non-traditional materials and alterations, such as the removal of the core stone, indicating a shift in the building's original purpose to "save space". Presently, the deteriorated structure, situated in a verdant area, remains without a designated function.



Figure 2. 5 Left: House of Mahir Çayan’s mother. Right: Ali Ekber’s Coffeeshouse [18]



Figure 2. 6 Söğütlüçeşme hamam [20]

- Poor maintenance of Neighborhood Dominants

In addition to the poorly maintained and abandoned historical heritage sites, Hasanpaşa falls short of realizing its full potential primarily because of the initial

absence of adequate urban planning and the neglect or mismanagement of neighborhood dominants. Two promising candidates that could play a significant role in revitalizing the area are the Salı Pazarı market (bazaar) and the Kurbağalıdere creek.

Markets or bazaars in Turkey are not just places to buy and sell goods; they are ingrained in the culture, embody traditions, and serve as integral components of social life. In every district across Turkish cities, several streets transform into bustling bazaars one day per week. Unlike the renowned Istanbul Grand Bazaar, locally organized markets stand out for their variable working days, contingent on the district hosting them. Hasanpaşa offers a particularly unique example of such a market.

In the early 1900s, the market in Hasanpaşa was situated along the creek, while on the opposite side, activities such as picnics and fairs attracted participants. Noteworthy social establishments, including the Fenerbahçe Sports Club Lounge, Hamdi's Casino, and Kuşdili Cinema, were located in the hangar known as the Tram Warehouse, which also served as a Festival Place for many years. Recognizing its historical and cultural significance, in 1981, the area received official recognition as the "Old Kuşdili Meadow" Natural Site from the High Council of Real Estate, Antiquities, and Monuments. Arif Atılğan, the Head of the Anatolian Side Branch of the Chamber of Architects, underscored the importance of considering it a Historical Protected Area.

Salı Pazarı (Tuesday Market), situated in Kuşdili (**Figure 2.7**), became a source of significant traffic congestion on adjacent roads and intersections. Every Tuesday, the accumulation of waste was indiscriminately disposed of into Kurbağalıdere Creek, leading to severe pollution. Additionally, the absence of well-organized toilets or hygiene facilities presented a critical issue for the Kadıköy district. Consequently, the city authorities decided to relocate the market to a different area and put the current territory up for tender.

In July 2007, Taş Yapı and the company "Salı Pazarı," established by Emrullah Turanlı, secured the construction tender. The design aspect of the project was developed by Hakan Kıran (**Figure 2.8**).



Figure 2. 7 Kuşdili Salı Pazarı [21]

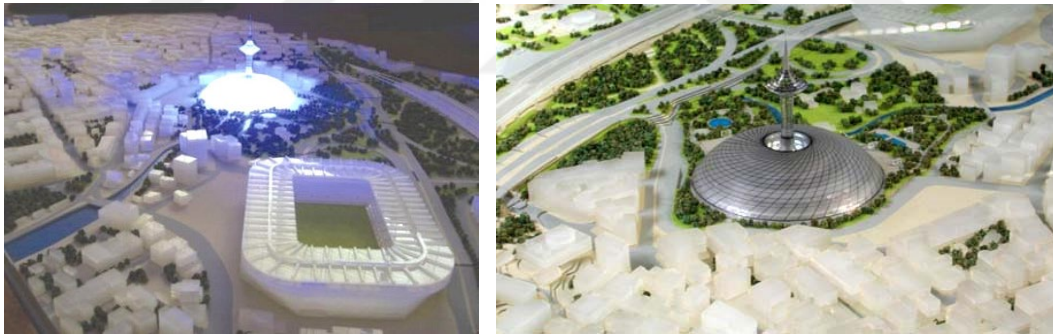


Figure 2. 8 New concept design for Kuşdili Salı Pazarı area by Hakan Kıran. Left [22]; Right [23]

After numerous years of presenting various design proposals and engaging in debates between those advocating for the preservation of green spaces and those supporting the implementation of a shopping mall project, the area now exists solely as a government-operated open parking facility called "İspark Eski Salı Pazarı".

Salı Pazarı market underwent a temporary relocation to the Merdivenköy area in 2015 and eventually found its permanent home in Hasanpaşa in 2018. The development covers an area of 80,000 m², featuring an underground car parking

facility for 1368 cars and a designated area of 16,500 m² accommodating 4555 stalls. The initial design project for the new market territory (**Figure 2.9**) incorporated walkways over the Kurbagalidere Creek and a green embankment as part of the landscape design, although it appears somewhat uncoordinated. As per the plan, approximately 3/5 of the 32,000 m² open ground area was intended to function as a public park.



Figure 2. 9 Salı Pazarı Hasanpaşa project from a bird's eye view [24]

In reality, the green areas have diminished, confined to two islands closer to the market rows and along the sides of the toilets, creating a separation between the pedestrian walkway and Salı Pazarı market. The overall space presents ample room for improvement due to various issues, including subpar quality of work (with a two-year gap between project completion and the taken photos), deviations from the project plan, insufficient green spaces, ineffective land use, and an unclear concept for public activities and leisure. While local markets in Turkey typically utilize several streets only one day a week, Salı Pazarı market consistently occupies an extensive territory despite being open to the public for just two days—Tuesday and Friday. The rest of the time, the market stands territory is closed, the stone open area remains empty, and the car parking seems to be the only useful feature for those working nearby or using it as an incentive parking space before switching to the Metrobus (**Figure 2.10**).

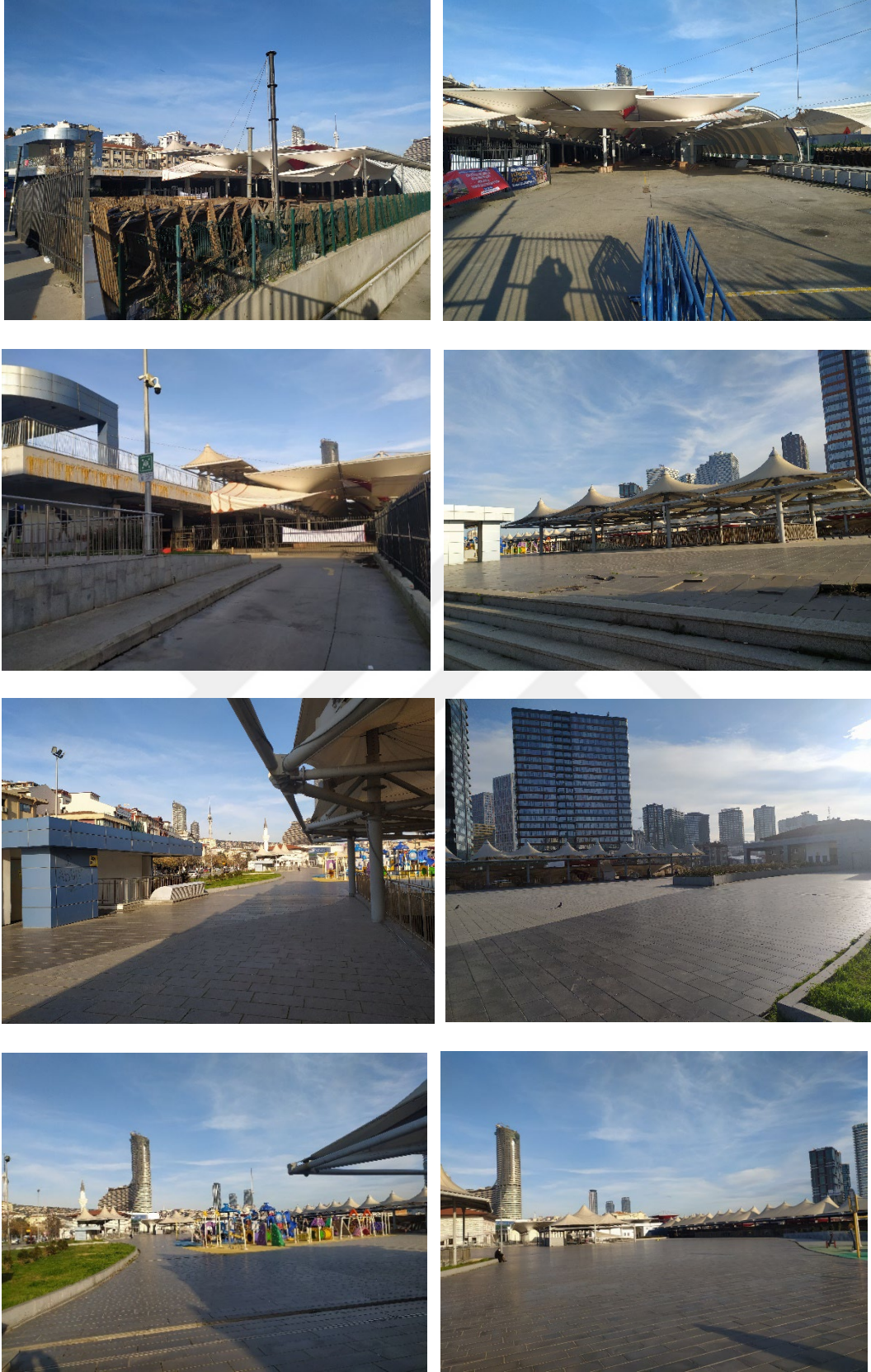


Figure 2. 10 Hasanpaşa Salı Pazarı condition and land use

Certainly, the Salı Pazarı market project requires a thorough reconsideration and analysis as part of a comprehensive sustainable neighborhood regeneration strategy. Through an open competitive tender process, there is an opportunity to enhance Hasanpaşa, making it equally attractive to nearby and beloved neighborhoods such as Moda or Acıbadem.

Having a water source within the urban fabric is highly advantageous for the overall composition and appearance of an area. In countries like Turkey, this feature also serves a practical purpose by helping to cool the air, especially when combined with an abundance of vegetation. Adjacent to the Salı Pazarı market is the Kurbağalidere creek, originating from Kayışdağı and flowing into Kalamış Bay. This creek has been a part of Istanbul since the Paleolithic Age and was initially known as the Kalkedon River, representing one of the earliest settlement areas. However, as the water level decreased significantly, it became known as Kurbağalidere Creek. In the 1930s, the shores of Kurbağalidere were surrounded by meadows and green areas with rich vegetation. The settlement area was concentrated along the western coast, renowned for its mansions, picnic areas, and scattered boathouses [25].

The initial design of Hasanpaşa Salı Pazarı (**Figure 2.9**) had envisioned the fully-watered creek to be an integral part of the landscaping around the market. However, the current state, as depicted in photos (**Figure 2.11**), tells a different story. Regrettably, the creek now appears more neglected than the market area itself, resembling a concrete garbage bin rather than the envisioned revitalized water feature.



Figure 2. 11 Kurbağalidere creek condition

- Deprived housing exposed to the highway. Inconsistency in urban pattern and visual segregation.

The contrasting appearance of the residences along both sides of the Metrobus route near Fikirtepe station is disheartening (**Figure 2.12**). The presence of even a single dwelling in such an unsuitable condition would only be justifiable if it serves as a poignant symbol of inequality, poverty, a violation of the human right to a healthy environment, flawed urban planning, and the absence of a sustainable urban development strategy (**Figures 2.13, 2.14**).

The segregation between skyscrapers and partially demolished slums, coupled with evident social inequality and exposure to highways leading to air, noise, and light pollution, underscores the urgent need for a comprehensive solution that addresses all these challenging issues.



Figure 2. 12 View from the Fikirtepe Metrobus pedestrian bridge



Figure 2. 13 Fikirtepe metrobus station. Hasanpaşa side slums view



Figure 2. 14 Fikirtepe Metrobus station Hasanpaşa side and second-row slums view

2.4.3.2 Measurable Characteristics

Measurable characteristics within the SUT framework are classified into three main categories: environmental, social, and economic.

Measurable neighborhood indicators related to the environment encompass the levels of air, noise, and light pollution, as well as the effectiveness of waste management practices. Air Quality Index (AQI) range from 55 "Moderate" to 125 "Unhealthy for Sensitive Groups" [26]; the noise level was measured by the sound level meter Unit-T Ut 353 Mini in June 2023 [Appendix A]. Obtained results determined noise levels higher than 78.5 dB, 82 dB, and 81 dB at night time, in the evenings, and during the day accordingly; Average light intrusion into windows by the front dwellings line exposed to the highway was determined as ~ 6 lux [27].

Social measurable characteristics in Hasanpaşa are quantified by the number of green areas per capita, which amounts to 1.2 m² [28]. Additionally, active recreation fulfillment constitutes 30% (0.36 m²) of the total green area within the neighborhood.

Within the economic category for a separate neighborhood, the average unemployment rate per year is considered. According to published data for Hasanpaşa in 2022, the unemployment rate was reported to be 12.3% [29].

The most recent statistical data on safety has only been published for Istanbul, indicating a rate of 3.9 crimes per 100,000 inhabitants as of 2018 [30]. The lack of national or global norms for childcare and health facilities has created a gap in this

study, resulting in a reduction of items under the social category. This gap limits the ability to precisely determine the neighborhood's necessity for SUT. These characteristics were not considered in obtaining the results.

2.5 SUT Framework Evaluation

Summarizing the results for the tangible and measurable characteristics of Hasanpaşa neighborhood within the proposed SUT framework, it reveals that 11 out of 19 characteristics, or 58%, have declined. This assessment excludes the safety category and indicators related to health and education under the social category due to the absence of norms and statistics in those areas.

Additionally, the framework has been evaluated by 5 experts, who graduated as urban planners or are currently involved in urban projects professionally. The survey consisted of a problem abstract, developed framework, and questionnaire, and conducted the evaluation. Participants are individuals with 9-14 years of experience currently working in Russia, Germany, and Turkey in private companies. Participants were invited to answer questions regarding the clarity and applicability of the framework to the neighborhoods in particular; the ability of the framework to determine the trouble points related to social, economic, and environmental sectors; the possibility of the framework to contribute to the development of sustainable cities and communities. It was offered to add alternative indicators that could help with developing of more accurate framework. Participants showed overall satisfaction with the framework and 40% of them advised adding indicators reflecting the childcare, educational, and health facilities. The absence of national or global standards aligned with the mentioned indicators elicited a research gap. To integrate into a framework a category related to the educational and health sector, there should be national or nationwide legit norms for the number of schools, kindergartens, hospitals, and sports facilities according to the number of dwellings, population data, and public migration analysis. School and sports facilities fulfillment standards should also rely on the national development targets. The government should encourage public participation in education and aim for a healthier nation, consequently reducing the budget for health services.

2.6 Communication

For foreigners, certain urban features within the country where they currently reside may be more pronounced compared to local citizens. One prominent negative feature of Istanbul, frequently emphasized, is the issue of inequality. Poorly arranged and occasionally partially damaged dwellings, which constitute entire micro-districts, encircle modern "site" — protected areas with security services and high-class high-rise buildings, or, conversely, villa-type dwellings. Similar to the situation in the Hasanpaşa district, there are partially damaged old buildings where numerous likely low-income families or illegal migrants currently reside. Frequently, such dwellings do not comply with health and safety norms.

The Turkish government tries to promote support for indigent families through social housing initiatives facilitated by the Housing Development Administration of the Republic of Turkey (TOKI). TOKI's website underscores the recognition of the right to housing in the Republic of Turkey Constitution, with Article 56 stating that "Everybody has the right to live in a healthy and balanced environment," and Article 57 emphasizing that "Our State shall take measures to meet the housing need within the framework of a plan to observe the characteristics and environmental condition of the cities" [31].

To address housing challenges, the government enacted The Mass Housing Law in 1984, aiming to provide public assistance for the housing needs of low and middle-income families facing difficulties in the current market conditions. In 2018, TOKI became part of the Ministry of Environment, Urbanization, and Climate Change. TOKI places a strong emphasis on producing social housing for disadvantaged groups, particularly focusing on low and middle-income families. Specific allocations are designated for groups such as the handicapped, families of martyrs, individuals with disabilities, and pensioners. Additionally, TOKI leads government initiatives to construct houses, infrastructure, and public utilities in areas affected by natural disasters.

The serious damages and hardships experienced nationwide due to the earthquakes that occurred on February 6, 2023, resulted in reconsideration and an amendment to Law 6306 "The Transformation of Areas Under Disaster Risk" initially published in May 2012 [31]. According to the law, it aims to identify areas at risk of disasters

and risky structures within and outside these areas. Consequently, it has been enacted to carry out improvements, liquidations, and renewals in order to create healthy and safe living environments in accordance with engineering and architectural standards and regulations in the said areas and on the land and plots where risky structures exist. Ultimately, the final goal is to ensure that there are no more casualties in the event of any disaster and to transform cities into healthy and safe living environments. Under Law No. 6306, “urban transformation” will primarily begin in provinces located in the first-degree earthquake zone with high population density. In this context, provinces such as Istanbul, Kocaeli, Sakarya, Bursa, and Izmir are prioritized for transformation due to their location in the first-degree earthquake zone.

The Law refers to such definitions as “urban transformation” or “healthy and safe environments”, but in fact, we are witnessing that actions taken under this legislation concentrate only on the demolition of the old and risky building structures and execution of the new earthquake-prone ones. Unfortunately, this cannot be considered as a complex urban transformation process that includes analysis and solutions for multiple aspects of social, economic, and environmental sectors. However, Law No. 6306 and initiations taken under it could form a part of a complex legitimate framework for sustainable urban transformation that would reflect the “Housing condition” indicator within the environmental sector.

Despite the incontestable value of the existence of the Housing Development Administration, it is noticeable that there are gaps between the real well-being of the end user, complex and inclusive urban planning, professionals who advise on design statements and scope of works, and decision-makers.

The website allows for a review of past, ongoing, and future projects undertaken by the Housing Development Administration (**Figure 2.15**). However, a common issue across the presented projects, whether involving an excessively tight allocation of too-high buildings for public housing without adequate landscaping or a more reasonable number of storeys, is the complete absence of a scenario for integrating the newly constructed dwellings into a sustainable neighborhood, district, and city.

Architectural plans typically include apartment buildings, standard children's playgrounds, car parks, and occasionally schools or mosques. However, there seems to be a lack of comprehensive planning for social infrastructure, public areas, and potential locations for cafes and shops – elements that are essential for creating a socially and economically functional neighborhood. It appears that there is no developed strategy to anticipate the interrelation between neighboring districts, the proximity to essential facilities like schools, hospitals, municipal offices, large markets, and shopping malls, as well as transportation connections and the provision of sufficient green areas. Addressing these aspects is vital for creating holistic, sustainable, and well-integrated urban developments.



Figure 2. 15 Examples of TOKI projects [33]

It's unfortunate to observe that modern projects developed by TOKI and other private enterprises in Turkey appear to mirror negative experiences that were acknowledged in Europe back in the 1960s (**Figure 2.16**). Learning from historical urban development mistakes is crucial to avoid replicating challenges and to foster more sustainable and community-oriented approaches in contemporary projects.

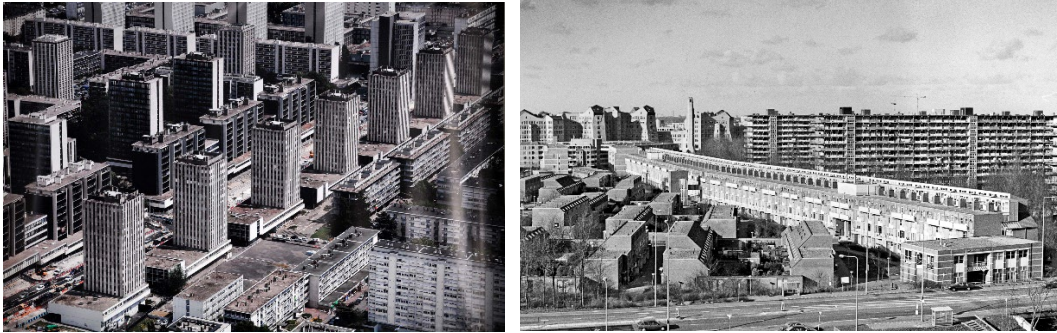


Figure 2. 16 Failed examples of urbanization in Europe (Left: Sarcelles, France [34]; Right: Bijlmermeer, Netherlands [35])



Figure 2. 17 Failed examples of urbanization (Left: Changzhou, China [36]; Right: Saint-Petersburg, Russia [37])

The gaps identified in the chain between decision-makers and end-users contribute to an ineffective, untimely, and outdated approach to urban development. This approach overlooks valuable lessons from different countries (**Figure 2.17**) and hinders the potential to build new or transform old parts of the city into sustainable urban forms. Bridging these gaps and fostering a more collaborative and informed decision-making process is essential for creating urban spaces that align with the needs, preferences, and well-being of the residents while considering global best practices in sustainable urban development.

Urban planning should also anticipate and address environmental pollution issues, ideally by avoiding the routing of highways through residential areas. The emissions from vehicular traffic on highways contribute to air pollution, with the release of pollutants such as particulate matter, nitrogen oxides, and carbon monoxide. The constant flow of vehicles also generates noise pollution, impacting the surrounding environment and potentially affecting the health and well-being of nearby residents. Additionally, the lighting infrastructure along highways can

contribute to light pollution, disrupting natural lighting conditions and affecting ecosystems and human activities in the vicinity.

The negative impacts of noise pollution appear to be underestimated in Turkey based on the current state of city development. Studies have shown that excessive noise levels can lead to hearing impairment, sleep disturbance, stress, and an elevated risk of cardiovascular diseases. The economic consequences are also noteworthy, as noise pollution can influence housing prices in the real estate market. Additionally, health-related issues stemming from noise pollution incur costs both for individuals and the national health service. Addressing noise pollution comprehensively is crucial for mitigating its adverse effects on public health and the economy.

In Turkey, noise restrictions are governed by the "Environmental Noise Control Regulation" (Çevresel Gürültünün Kontrolü Yönetmeliği), initially introduced in 1986 and subsequently amended in 2022. This regulation establishes maximum allowable noise levels for various types of areas and specific periods, encompassing residential, commercial, industrial, and silent zones. The maximum permissible noise levels from urban traffic are stipulated as follows [38]:

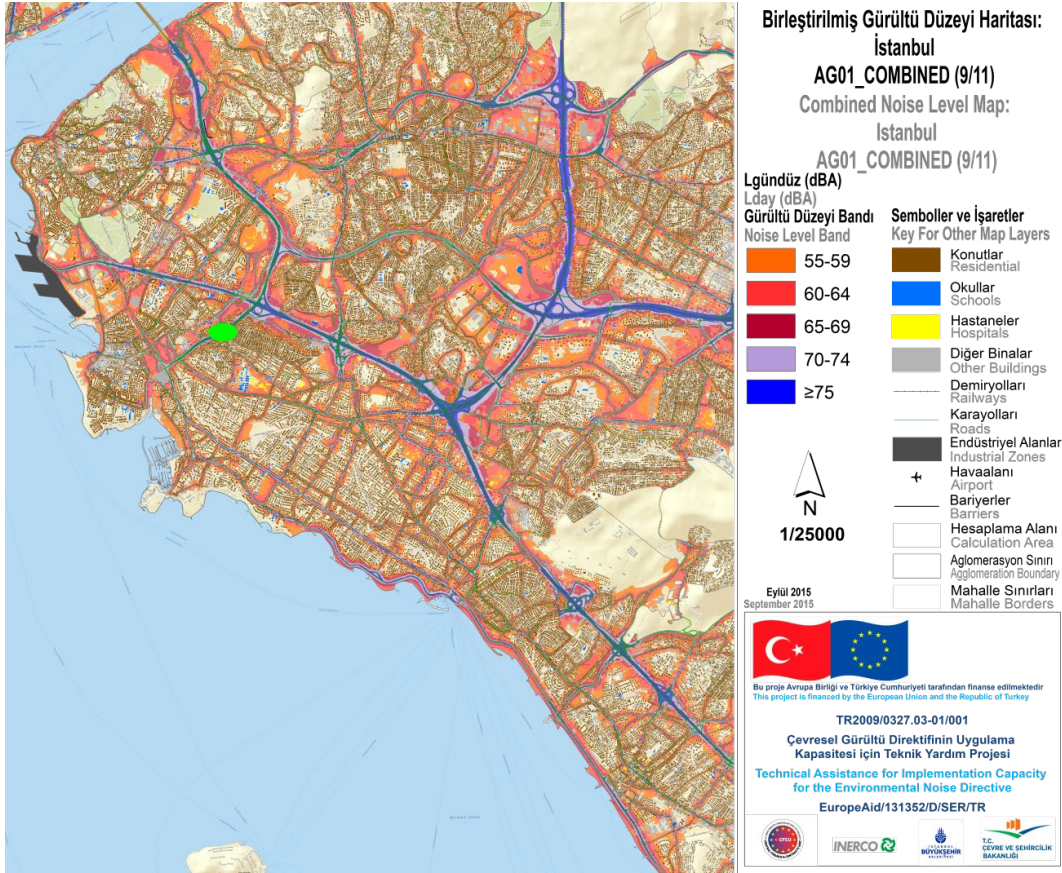
- (i) 65dB during the daytime (7 am-7 pm);
- (ii) 60dB in the evenings (7 pm-11 pm);
- (iii) 55dB at night time (11 pm-7 am).

The following data is presented to enhance the comprehension of the noise impacts on human health. (i) 30-65 dB: discomfort, boredom, anger, concentration, and sleep disturbance; (ii) 65-90 dB: change in a heartbeat, accelerated breathing, decrease in brain pressure; (iii) 90-120 dB: metabolic disorder, headache; (iv) 120-140 dB: disorder of the inner ear; (v) 140 dB and above: rupture of the eardrum.

According to the Environmental Noise Evaluation and Management Regulation, which was prepared by the European Union Environmental Noise Directive (2002/49/EC) [39], the Ministry of Environment, Urbanization and Climate Change prepared strategic noise maps for every province in Turkey. This project has been financed by the European Union and the Republic of Turkey.

In regards to the published noise map of Istanbul (frame 9 of 11) [40], Fikirtepe Metrobus station reflects the uppermost noise level indicated in the legend of the

map as more or equal to 75 dB while permitted noise level from transport should not exceed 65dB (**Map 2.2**).

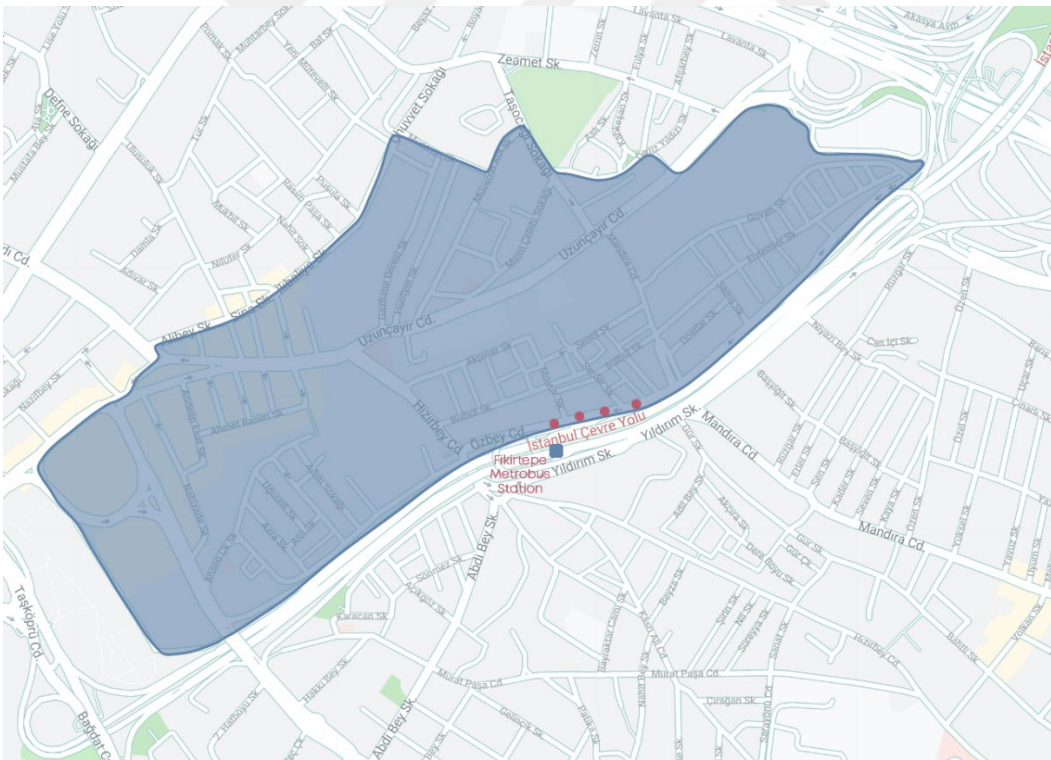


Map 2. 2 Combined noise level map. Frame 9 of 11. Üsküdar and Kadıköy districts [40]

As the measurements' top border has been set as 75dB, additional local noise measurements have been executed for the Fikirtepe metro bus station and surrounds. Obtained results determined noise levels higher than 78.5 dB, 82 dB, and 81 dB at night time, in the evenings, and during the day accordingly. The table with measurement results separated by hourly gaps is presented in **Table A.1** [Appendix A]. **Map 2.4** illustrates the locations of noise measurement points adjacent to the first line of residences near Fikirtepe Metrobus station.



Map 2. 3 Combined noise level map. Frame 9 of 11. Kadıköy district and Hasanpaşa neighborhood [40]



Map 2. 4 Noise measurement points near Fikirtepe Metrobus station by the first line of dwellings

When a highway is already integrated into a neighborhood, the following standard solutions are typically recommended to mitigate noise pollution. (i) Erection of noise barriers made of concrete, wood, or plastic that absorb, reflect or diffract

sound waves along the highways; (ii) Implementation of traffic management measures like speed limits, roundabouts, and traffic signal synchronization; (iii) Application of low-noise porous asphalt, rubber, or cementitious pavements on the highways that may reduce noise levels by up to 5 dB; (iv) Promoting public transportation to reduce the volume of vehicles on highways, thereby lowering noise levels; (v) Planting vegetation as trees and bushes along the highways that absorb sound waves.

Some conventional approaches, such as merely constructing a wall along the roadside, are subjects of debate. Instead of opting for a simple wall, it is advisable to consider more aesthetic and advantageous methods within urban areas. These methods should not shift the discomfort from noise to our ears to discomfort from monotonous concrete views for our eyes. Implementing speed limitations and traffic synchronization may deviate from the original purpose of highways. Once the budget has already been allocated, it is essential to let highways compensate for their cost.

Another often overlooked issue within the realm of environmental pollution is urban light pollution. Light trespass, a form of light pollution, occurs when undesired light infiltrates people's property, predominantly impacting their living conditions. This phenomenon can lead to issues such as sleep disturbances, disruptions to the biological clock, and an increased risk of cancer. In urban residential settings, light trespass primarily emanates from two sources: advertising billboards and street lighting. Dwellings located by the first line from Istanbul's circular road represent an example of the light pollution coming from the street lighting within the area of the study (**Figure 2.18**).



Figure 2. 18 First-line dwellings of Hasanpaşa exposed to the street lighting

In 2003 International Commission on Illumination (CIE) issued a “Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations”, in 2017 it was updated. This Guide aims to aid in the development of criteria for evaluating the environmental effects of outdoor lighting and to provide suggested thresholds for pertinent lighting factors, aimed at mitigating the intrusive consequences of outdoor lighting to acceptable levels [41].

According to the CIE150 technical report, the benchmark for evaluating light trespass focuses on the vertical illuminance of house surfaces or relevant boundaries, particularly the positions of windows. **Figure 2.19** defines four environmental zones, from E1 to E4, delineated by CIE to serve as the foundation for outdoor lighting regulations [42].

Light Technical Parameter	Application Conditions	E1	E2	E3	E4
Illuminance in vertical plane (Ev) (lux)	Pre-curfew	2	5	10	25
	Post curfew, 23:00~06:00	0*	1	2	5

E1 : Natural – Intrinsically dark – National parks or protected sites
E2 : Rural – Low district brightness – Industrial or residential rural areas
E3 : Suburban – Medium district brightness – Industrial or residential suburbs
E4 : Urban – High district brightness – Town centres and commercial areas
* NOTE : If the luminaire is for public(road) lighting then this value may be up to 1 lux

Figure 2. 19 Maximum Ev limit and zoning

According to **Figure 2.20**, the first line of the dwellings located on the right side of the Istanbul circular road experiences a more significant effect from light trespass. This is determined by the number of floors (GF~2F) and the height of outdoor lighting fixtures [28].

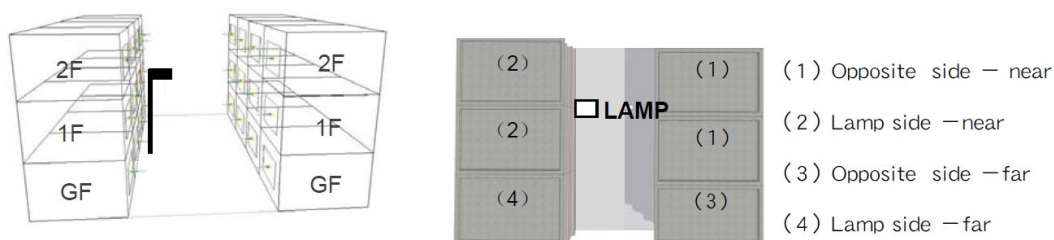


Figure 2. 20 The relative positioning of street lamps and residential buildings [28]

The ground floor windows are receiving the highest level of light trespass from outdoor lighting situated on the opposite side of the road, reaching 11.5 lux (**Figure**

2.21) [28]. This value exceeds the recommended level for the E3 zone by 3.8 times or for the E4 zone by 1.9 times, respectively.

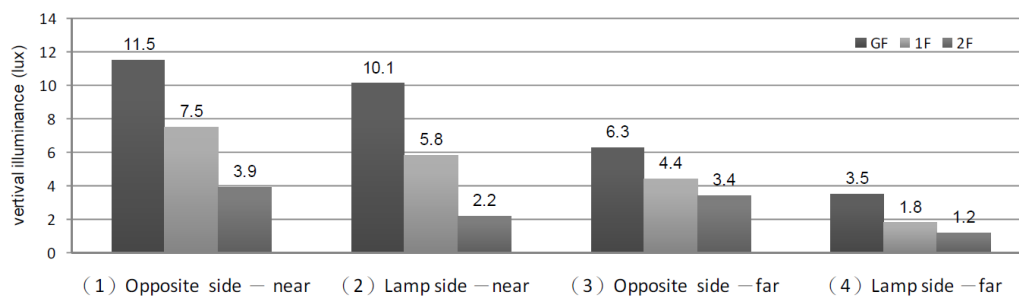


Figure 2. 21 Vertical illuminance (E_v) values according to the window height and street light position [28]

Given the mentioned conditions, including the deprived state of dwellings, questionable approaches to noise pollution, and the presence of illumination and air pollution along the first dwelling line near the highway, it becomes imperative to categorize these characteristics as part of a common urban challenge set. A comprehensive solution should be devised and implemented to address similar urban issues effectively.

Depending on the range of declined characteristics educed after the application of the SUT framework, further possible solutions can be developed based on the positive national or nationwide practices in the first instance. As every neighborhood has its specifics and problematic components vary, the set of such trouble points should be translated in particular. Sometimes, a combination of declined characteristics can form a mutual solution. If to spread such a decentralized approach for SUT around the world, after some time it could form a solid database that could provide ready-to-use solutions for future generations based on inserted data.

3.1 Possible Tools for SUT

Based on Hasanpaşa's case, possible tools for SUT include (i) a survey of the neighborhood territory for buildings falling under the category of historical abundance, their analysis, and prompt preservation. (ii) Revitalizing the existing neighborhood dominants, along with the restored heritage sites, will enhance the appeal of the area. (iii) A comprehensive approach that can be applied in similar scenarios involves addressing neglected residential dwellings situated near highways, thereby exposed to air, noise, and light pollution.

3.1.1 Historical Heritage Integrated to the Urban Fabric

Despite the historical heritage situated in non-touristic neighborhoods not being universally recognized as a primary focus of government oversight, fortunately, some buildings and locations with historical significance have been safeguarded, preserved, and renovated. These now serve as potential attractions for people:

(i) Gazhane Museum (Hasanpaşa Gazhanesi/ Müze Gazhane)

The Hasanpaşa Gasworks, established in 1892 as the second gasworks on the Anatolian side and the final one in Istanbul, played a crucial role in supplying lighting and fuel to the city for 101 years. However, as time passed, its technology became outdated, and its operations were deemed environmentally and health-wise

problematic. In 1993, along with other gasworks in the city, its production was halted. After serving briefly as an IETT garage, the historic building, boasting 130 years of history and recognized as one of Turkey's significant industrial heritage sites, fell into disuse. Through years of public advocacy, it underwent an extensive restoration process. The result was the Museum Gazhane, which adopted a "living space" concept centered on culture and art in the modern era. On July 9, 2021, the museum opened its doors to the people of Istanbul. With a focus on culture and art, Museum Gazhane aims to be a vibrant hub for individuals aged 7 to 70, striving to become an inspirational haven for Istanbul residents. By blending the strength derived from its local heritage and public structure with a universal vision, the museum aspires to be a transformative and inclusive stop in the life of the city [43].



Figure 3. 1 Museum Gazhane (Hasanpaşa Gasworks) in its neglect [44]



Figure 3. 2 Museum Gazhane after restoration. Central square [43]



Figure 3. 3 Museum Gazhane after restoration. Gas storage towers [43]



Figure 3. 4 Museum Gazhane after restoration. Concert at the central square [43]



Figure 3. 5 Museum Gazhane after restoration. Outdoor Sculpture [43]

(ii) The Cartoon House (Karikatür Evi)

Constructed in 1906 and serving as a residence to this day, the Cartoon House underwent restoration by the Kadıköy Municipality, officially reopening on September 30, 2016. Located in Kadıköy, a city known for its cultural and artistic vibrancy, the Cartoon House is dedicated to promoting the art of caricature. Its primary goals include introducing caricatures to residents of all ages in Kadıköy and establishing an educational hub to sustain the art of caricature for future generations. The Cartoon House engages the public through panels, conferences, and exhibitions, aiming to cultivate a culture of critical thinking and humor. It strives to preserve the values conveyed by cartoons throughout history and share them across diverse segments of society. While the archive/library section is still in progress, the future facility will house an archive and library dedicated to preserving the memory of cartoons, particularly Turkish cartoons. This archive will document the historical development of Turkish cartoons, serving as a repository for the products generated within this evolution. The Cartoon House aspires to be a central gathering place for enthusiasts of the art of caricature, a unique form of expression found in newspapers, magazines, books, and digital media. The forthcoming

archive is envisioned as a comprehensive resource for cartoon-focused research, providing source data. Open to undergraduate, graduate, and doctoral students, as well as independent researchers and citizens interested in the subject, the Cartoon House aims to be a reference point for those exploring the world of caricatures [40].



Figure 3. 6 Kadıköy cartoon house [18]



Figure 3. 7 The mansion of Dr. Ali Rıza Gültekin [18]

(iii) The Mansion of Dr. Ali Rıza Gültekin (Dr. Ali Rıza Gültekin köşkü/ Kadıköşk). The well-preserved two-story wooden summer house, dating back to the late 19th century and situated in a garden by the stream on Andelip Esat Street,

was originally constructed by Dr. Ali Rıza Gültekin. In the 1940s, Dr. Ali Rıza Bey and his wife resided in this historic mansion. The adjacent parcel to the northeast, also owned by Dr. Ali Rıza Gültekin, accommodated a hut where the household servant lived. Today, this mansion stands as one of the few remaining structures from its era and has been repurposed as a restaurant [18].

The positive examples of giving historical heritage a second life, as mentioned above, demonstrate that it is indeed possible to manage and repurpose them to serve the public in contemporary times. Neighborhood territory should be surveyed, buildings falling under the category of historical abundance should be analyzed, and decisions regarding their regeneration and preservation possibilities should be made promptly, as their condition tends to deteriorate over time.

3.1.2 Urban Dominants

Salı Pazarı market occupies around 10% of Hasanpasa neighborhood area and is the front runner to bear the title of the main dominant. As bazaars in Turkey do not just fulfill their direct function as being public markets but represent ancient national endowments, it is important to preserve this tradition and encourage its existence among new generations. Thanks to the broad area occupied, it is possible to zone the territory by several spaces and implement each space its function to attract the public of all ages and social classes, which would provide sustainable development, economic growth, and attraction to the neighborhood.

An essential method for developing sustainable solutions involves examining analogous experiences from the past and incorporating valuable lessons into the present context. The positive social and economic dynamics observed in the markets of Barcelona (Spain) and Moscow (Russia) serve as notable examples. These instances treated both as separate projects and as contributors to the overall positive development of the neighborhood, offer valuable lessons that can be adopted for the current subject.

(i) Danilovsky Market (Moscow, Russia)

In 1282 Saint Prince Daniel, the youngest son of Alexander Nevsky, built the first monastery in Moscow - Danilov. By convention on the square near the monastery, a brisk trade has developed. This fair outlived all the tsars and emperors and turned into a real Russian market. In the 1920s not far from the market, created by Moscow

and German Bauhaus architects, the Khavsko-Shabolovsky housing block was being built instead of wooden houses. It became one of the best examples of the Soviet avant-garde. In 1959 American president Richard Nixon visited the market, and in 1988 it was visited by Ronald and Nancy Reagan. In 1963 Danilovsky market becomes a collective farm market. Residents of the closest villages sell their fresh products to the citizens in the open air and still use the wooden stalls. An indoor all-season facility demand is increasing, but only in 1986, the construction is finalized. In the 1990s after the USSR collapsed, the market was going through hard times: the buildings fell into decay, trade was mixed with crime, and management has been changing almost every year. In the 2000s Danilovsky was up for auction plenty of times, but there were no bids, there were rumors that the building would be demolished for a shopping center construction. Finally, in 2015 the market shifted under the management of Ginza Project restaurant holding and immediately transformed into a new-wave market with organized and stylish counters, first cafes, coffee shops, and food courts. People started to consider the Danilovsky market not just as a place where they can buy all kinds of local and exotic healthy and organic products, but also as a meeting point, testing worldwide cuisines and just walking around. Same time sellers got access not just to the safe, clean, and organized working space, but even to the hostel organized for them on the territory of the market. Danilovsky market became a winner of "Best City Improvement" and "Best Re-branding" [46].



Figure 3. 8 Danilovsky market in 1950s [46]



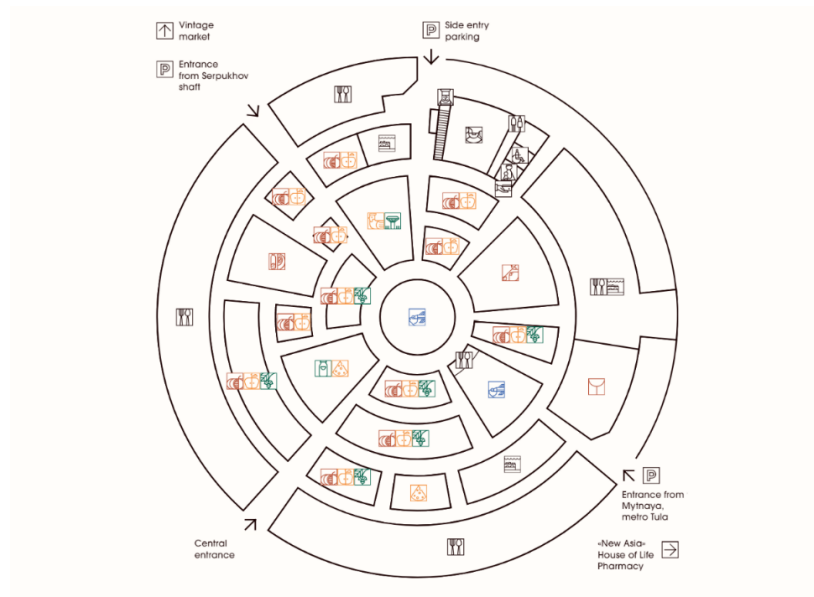
Figure 3. 9 Danilovsky market retrospective [46]



Figure 3. 10 Danilovsky market nowadays [46]



Figure 3. 11 Danilovsky renovation project [47]



Map 3. 1 Danilovsky market map [46]

(ii) La Boqueria Market (Barcelona, Spain)

The same century as Danilovsky, the La Boqueria market was initiated in 1217 with meat vendors on Pla de la Boqueria, the markets started as makeshift stalls outdoors, predominantly run by farmers from Barcelona's outskirts. Over the years, the market underwent numerous relocations and transformations. Notably, in 1827, regulations were introduced by the Marquis of Campo Sagrado, governing the 200 stalls specializing in various products. The market faced challenges, such as the Carmelite Convent fire in 1835, leading to its relocation in 1836. The subsequent construction of Plaça del Treball began in 1836, following architectural plans by Josep Mas i Vila. The market expanded, incorporating adjacent areas like the former Convent of St. John of Jerusalem in 1869. Key developments in 1911 included relocating fish stalls and installing Modernist arches and a metal roof designed by Antoni de Falguera in 1913 and 1914, respectively, signifying the end of an era characterized by exposed stalls. In 1985, the market underwent renovations, including the construction of a loading area and a parking facility. This redevelopment involved relocating the market to create additional open space along the Rambla and the removal of Plaça de la Gardunya. Between 1998 and 2001, the stall area underwent a renovation, guided by the design of architects Lluís Clotet and Ignacio Paricio. Their objective was to transform the market into not just an

enclosed structure but a covered, arcaded square. This involved the restoration of Ionic columns, the removal of the perimeter connecting the roof to the arcades to allow natural light, the reconstruction of facilities, the rehabilitation of the roof, and the addition of a glass awning around the market to showcase the side passages and brighten the Rambla entrance. In 2002, the Boqueria classroom was established. It is located on the third floor of the market office building, and it is equipped for organizing courses, workshops, and events related to cooking and gastronomy. Seven years later, in 2010, construction commenced on the subterranean parking and logistics zone, to triple the storage capacity and create additional space for waste management. The project concluded in 2013, coinciding with the restoration of the Modernist arch at the Rambla entrance. In 2015, the unveiling of the rear facade marked the completion of the landscaping project in Plaça de la Gardunya. This initiative resulted in a 1,000 m² expansion of the market's surface area. Nowadays La Boqueria, along with other central markets, that have undergone renovation and expansion, incorporate contemporary amenities and services such as home delivery, online shopping, customer parking, wireless internet access, self-service zones, leisure activities, workshops, and educational programs. These enhancements cater to the diverse needs of both residents and tourist patrons. The La Boqueria market has garnered various accolades, including the prestigious title of "Best Market in the World." This recognition was bestowed upon it by the World Markets Congress during the 2005 event held in Washington, United States [48].



Map 3. 2 La Boqueria market map [49]

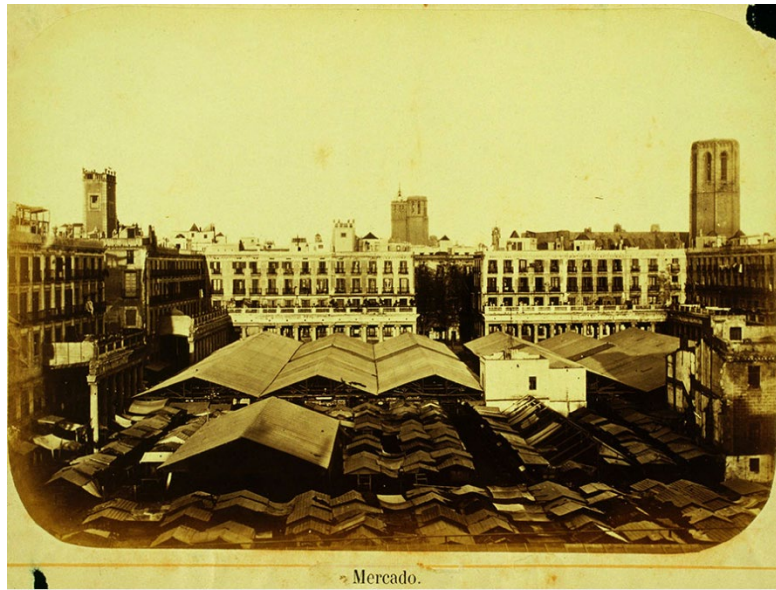


Figure 3. 12 La Boqueria market retrospective [48]



Figure 3. 13 La Boqueria market nowadays [48]

The examples mentioned earlier, along with urban research studies focusing on contemporary tools for attracting residents and tourists [50], demonstrate a growing inclination among people to incorporate new-wave markets into their leisure preferences. The specific design characteristics of markets and the close interaction between customers and sellers foster a sense of belonging and community connection. When a facility is appropriately designed, it generates sustainable public interest: satisfied and loyal customers appreciate the comfortable, welcoming, inclusive, and accessible environment, while high-quality service and effective advertising attract new customers who, in turn, become loyal and invite others to explore the space. This dynamic supports the prosperous development of the neighborhood.

The Sali Pazari market possesses several positive attributes that contribute to the transformation process: a strategically advantageous central location, easy accessibility through transportation, an existing underground car park capable of accommodating 1368 cars, and a spacious layout.

Following alternative views on the space planning and management are offered for consideration:

(i) Salı Pazarı market should operate daily, not just on Tuesdays and Fridays. In case of rapid success and overestimated attraction, access regulation or scheduling can be implemented based on the experience of La Boqueria Market. Due to the high influx of visitors, residents faced challenges and discomfort in their daily purchases. To foster social coexistence between residents and tourists, the government issued a decree restricting visits by organized groups of tourists. Additionally, working hours for sections with cafes were extended to ensure proper access for all [50].

(ii) To implement an inviting and accessible entrance group.



Figure 3. 14 Entrance group options. Left [51]; Right [52]

(iii) To integrate the concept of small local cafes, restaurants, and food corners right in between market stalls. To implement a common architectural code for all stalls and counters.



Figure 3. 15 Integrated common architectural code and seating places near the market stalls. Left [53]; Right [54]

(iv) To segregate the spaces, reserving one area for traditional Turkish goods typically sold at bazaars, and another for products from other countries and cuisines. This segregation aims to provide comfort and familiar service specifically tailored for the local elderly population of customers.

(v) To implement cost-effective solutions for the visual appearance such as unique design and color code for stalls, as well as incorporating vegetation, lighting, and projectors in collaboration with the existing white sheds. This approach allows for a variety of color schemes and visualizations that can be easily changed based on the context, holidays, or any other occasion [55].

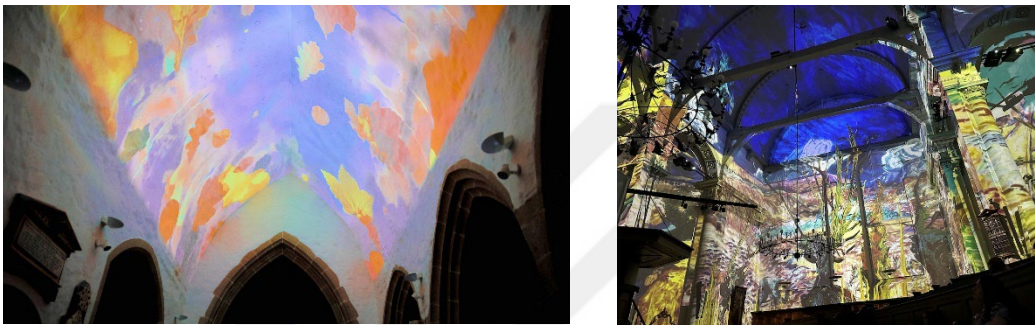


Figure 3. 16 Visual projection on white sheds example. Left [56]; Right [57]

(vi) To integrate the creek embankment as a seating area for cafes and passage embankment with the help of adequate urban furniture, lighting, and landscaping using different leveling of various perennial plantings. To ensure public access along the creek 24/7.

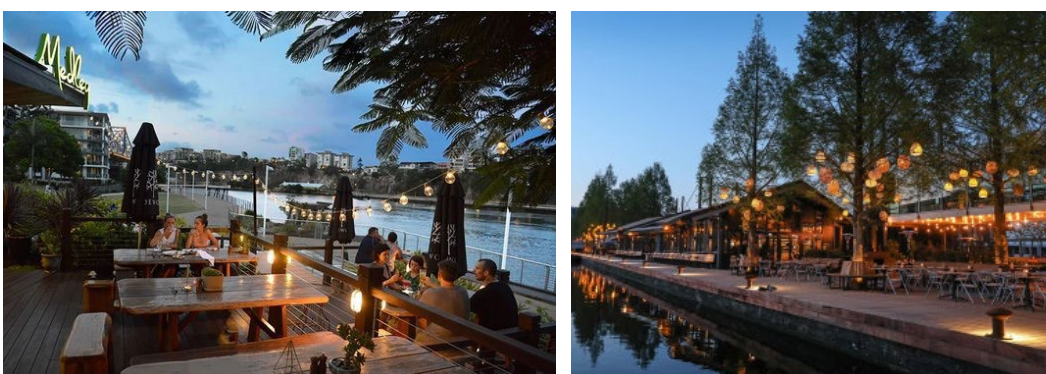


Figure 3. 17 Option for Kurbagalidere Creek's embankment renovation, walking passage, and seating areas organization. Left [58]; Right [59]

(vii) To maximize the effective use of the expansive open space in the style of pedestrian streets, consider organizing double-level cafes, restaurants,

bookstores/libraries, lecture auditoriums, open spaces, or under-the-tent cinema/exhibition and performance spaces along with supporting programs for young talents. Implementing adequate urban furniture, proper lighting, and landscaping using ground leveling, as well as incorporating various types of perennial plantings, can help create a natural children's playground within the area.



Figure 3. 18 Useful utilization of the open space using leveling [60]

Given that Kurbağalıdere Creek is recommended to be part of the market regeneration planning project, it is crucial to assess its current condition. Yoğurtçu Parkı is currently the last point where Kurbağalıdere Creek appears to be in a more or less adequate condition. Public data indicates that millions of dollars have been spent over the past twelve years to clean the highly polluted creek, and numerous tenders have been conducted to commission rehabilitation work for Kurbağalıdere. However, the appearance of the creek remains the same as in 2020 without positive dynamics, necessitating immediate action from professionals and governmental assistance for the purging and rehabilitation of the water level, its flora, and fauna. The sustainable transformation of the neighborhood cannot be achieved without the rehabilitation of the creek, which serves as a significantly important natural water source for the urban environment.

The examples provided below, such as the not fully flowing river Cheonggyecheon in the middle of Seoul, offer guidance on achieving a healthy appearance for a water source in the heart of a megapolis.

[61] Following the Korean War (1950–1953), a substantial influx of refugees into Seoul led to the establishment of shantytowns along the river. Such makeshift settlements are prevalent in Southeast Asia, where inhabitants commonly engage in activities such as washing, bathing, and sanitation concurrently within these water

bodies. The Cheonggyecheon River became overwhelmed with refuse, provoking the displeasure of authorities witnessing the emergence of an undesirable district. In 1958, a decision was made to relocate the river underground and encase it in concrete. The construction of an elevated highway promptly ensued, with the four-lane thoroughfare inaugurated in 1976. However, the longevity of the elevated highway was limited to less than 30 years. In 2003, Seoul authorities opted to rejuvenate the Cheonggyecheon River. Despite the unpopularity of this decision, as locals lamented the perceived indispensability of the highway, the municipality grounded its choice on four pivotal factors: safety, ecology, economy, and history. Predominantly, the primary factor, safety, played a decisive role, as experts had already noted in the 1990s that the elevated highway was significantly deteriorated and struggling to manage the load. Consequently, the highway was eventually dismantled, rerouting traffic within the city center. Intriguingly, post the highway's removal, the central area of Seoul exhibited increased mobility, contrary to the apprehensions of motorists, a phenomenon researchers identify as an instance of Braess's Paradox. Simultaneously, addressing the river itself became imperative due to anthropogenic activities resulting in a substantial depletion of its water content. Presently, the flow of the river is artificial, initially sustained by the daily infusion of 120,000 tons of water from the Han River, its tributaries, as well as the stations and tunnels of the Seoul Metro, where subterranean water sources infiltrate. However, the supply of "additional" water has since been restricted to ten occurrences annually.



Figure 3. 19 Cheonggyecheon River flow rehabilitation retrospective [61]



Figure 3. 20 Cheonggyecheon River replaced with the highway (Left) and rehabilitated Cheonggyecheon River (Right) [61]

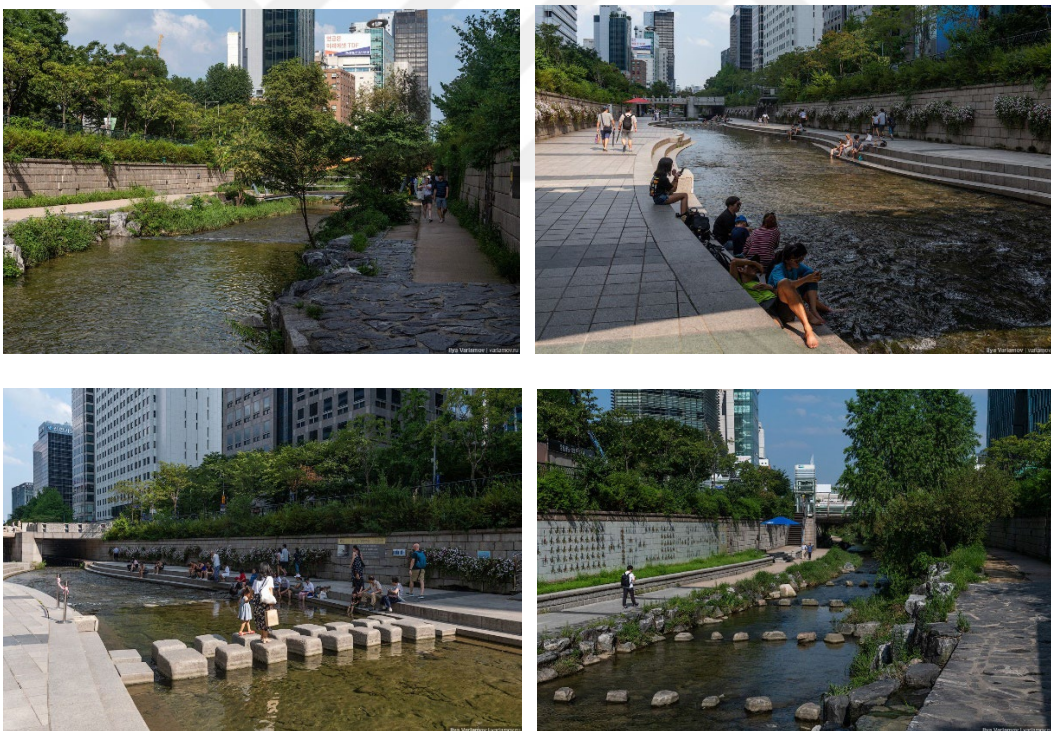


Figure 3. 21 Cheonggyecheon River appearance after rehabilitation, people attraction, and interaction [61]

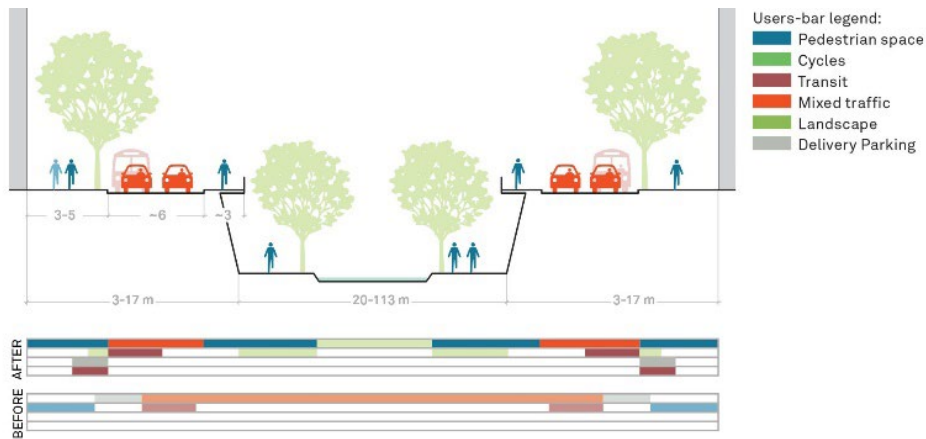


Figure 3. 22 Cheonggyecheon River section [61]

The project yielded several notable achievements. There was a substantial surge in the count of pedestrians and public transport users, accompanied by a marked reduction in the number of cars and subsequent alleviation of noise pollution. Air quality witnessed improvement, and within the vicinity of the Cheonggyecheon River, a discernible temperature decrease of 4.5 degrees compared to the rest of Seoul was observed.

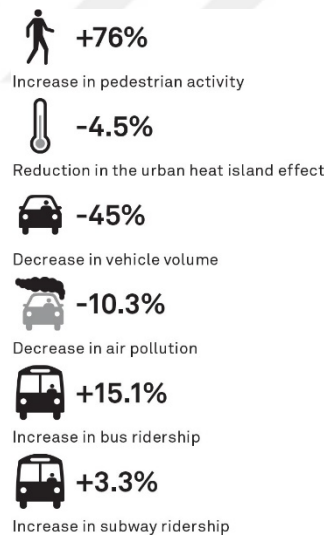


Figure 3. 23 Cheonggyecheon River rehabilitation positive impacts [61]

3.1.3 Consistent Urban Pattern and Transportation Split

Many urbanists and architects who emphasize the importance of the "Human Scale" often focus on measurements such as human height and width. The anthropometric scale of proportions is seen as a solution for achieving harmonious standardization

in mass production and serves as a reference tool in designing new buildings. Simultaneously, the term "Human Scale" in the context of urbanism goes beyond the mere comparison of human and building heights; it carries a deeper understanding related to the "human role" within the city. When considering humans as integral parts of an "urban strand," this strand takes on a circular model where humans are both the starting and final points of the loop. Following human dimensions and the Modular concept, the subsequent link in this "strand of human scale" is the "dwelling cell," specifying dimensions for comfortable activities like laying, sitting, and standing within a house. Progressing from individual dwellings to a more general perspective, neighborhoods are formed, encompassing factors like the width and length of streets, as well as the height of buildings. The structures within neighborhoods, visible, collectively shape the impression of the neighborhood environment. As the concept broadens, neighborhoods extend into districts, which are regarded as the largest cells in the urban fabric of the city. Ultimately, this strand of human scale completes a loop with the end-user, the estimator, and the primary catalyst for urban changes - the human (**Figure 3.24**). This holistic perspective underscores the interconnectedness of various scales in urban planning and emphasizes the influence of human experience and perception on the design and development of cities.

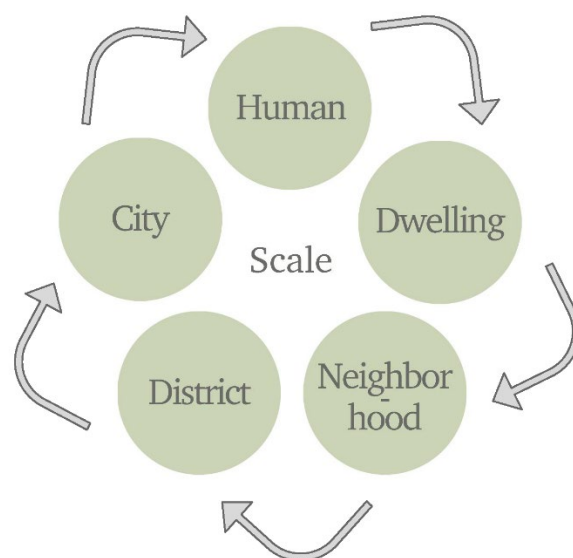


Figure 3. 24 Urban scale circular model

Applying the analogy of scaling and sequencing to the non-living component of the city system, specifically transportation, the "radius system" can be introduced for effective planning. In the system, three levels or "radiuses" are proposed. (i) Neighborhood: scooter, bicycle, walking; (ii) District: public transport, scooter, bicycle; (iii) City/ intercity: public transport, personal car.

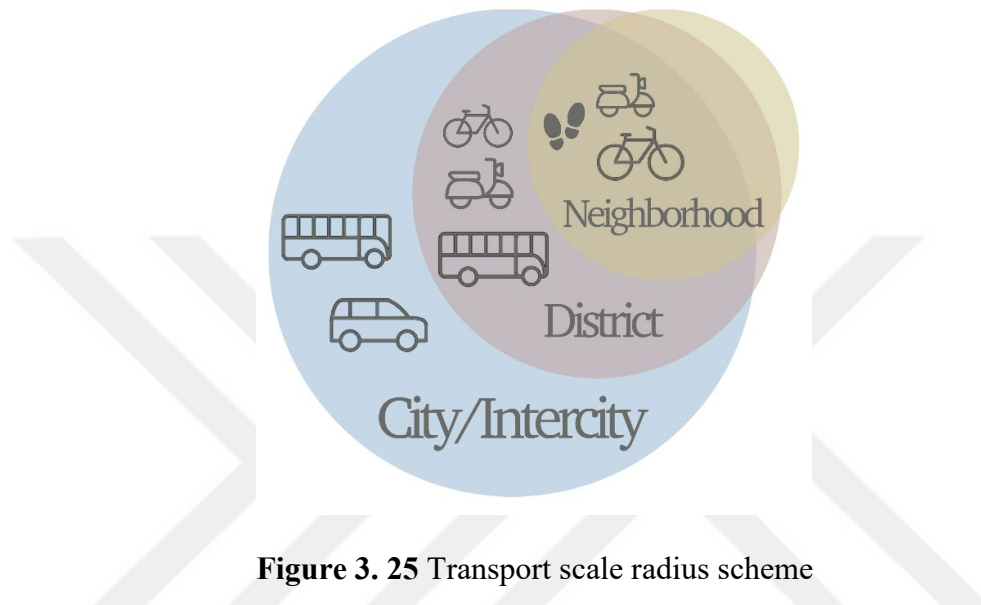


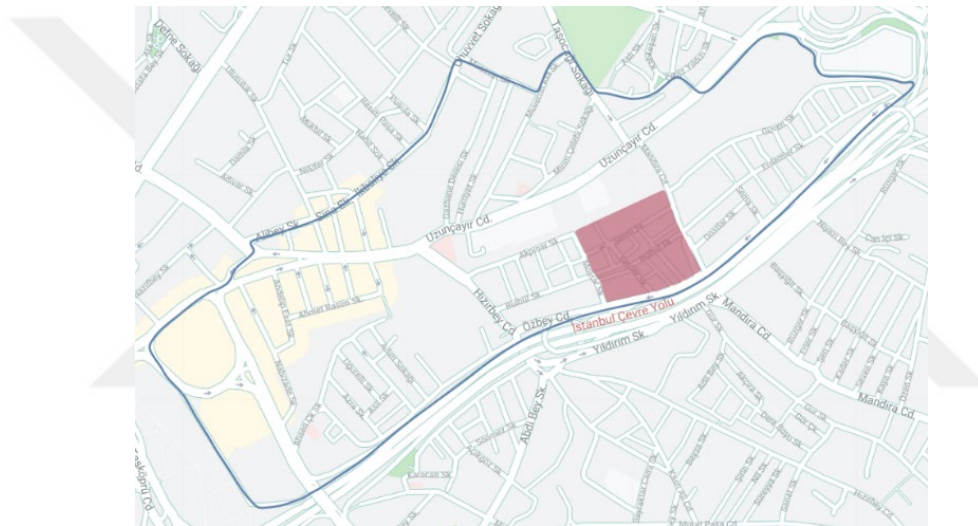
Figure 3. 25 Transport scale radius scheme

According to the scheme, the choice of transportation modes is tailored to the scale of the journey within the city. For short-distance travels within a neighborhood, individuals can utilize smaller, more agile modes of transportation such as scooters, bicycles, or simply walking. This promotes a more sustainable and environmentally friendly approach to local mobility. As the scale expands to cover larger areas or districts, public transport options become more relevant. Additionally, scooters and bicycles may still be practical for intermediate distances, promoting a seamless and eco-friendly transportation network. When commuting across the city or traveling between cities, a mix of public transport and personal cars may be the most suitable. This acknowledges the need for flexibility in transportation choices for longer distances. Such a "radial" transportation split model is straightforward to promote and assimilate into public routines. This approach not only addresses practical considerations but also supports sustainability goals by encouraging the use of eco-friendly modes of transportation for shorter distances.

3.1.4 Clean Environment, Adequate Housing, and Equality for Everyone

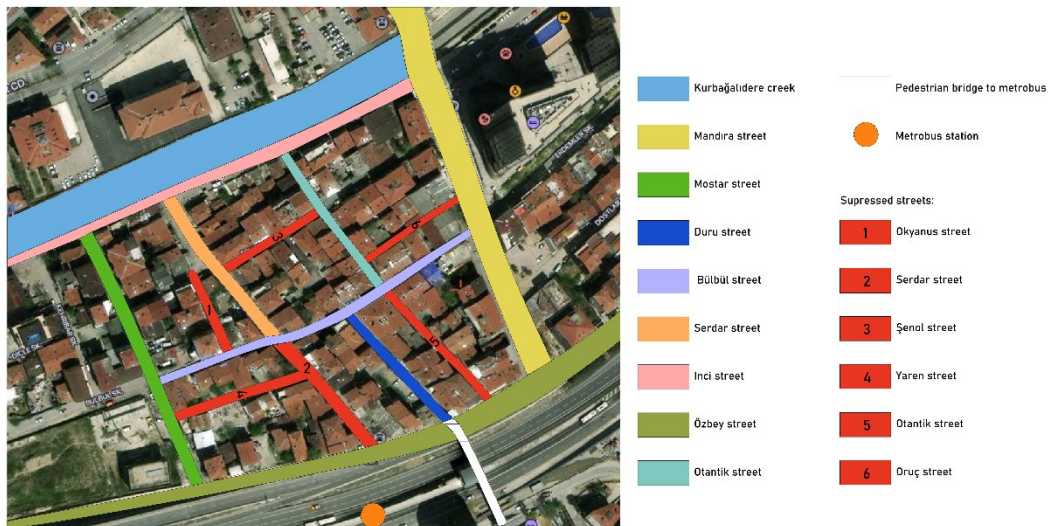
The above-suggested combination of several declined characteristics of the Hasanpaşa neighborhood into one typical set can be determined as an overall lack of well-being caused by inequality, poverty, air, noise, and light pollution. The aim is to contribute to a complex solution for the numerous urban areas worldwide characterized by inadequate housing conditions near highways, leading to issues such as air, noise, and light pollution. Additionally, addressing overall inequality and inconsistent urban patterns forms a key focus.

Suggestions given below are demonstrated on the parcel within the study area presented in **Map 3.3**:



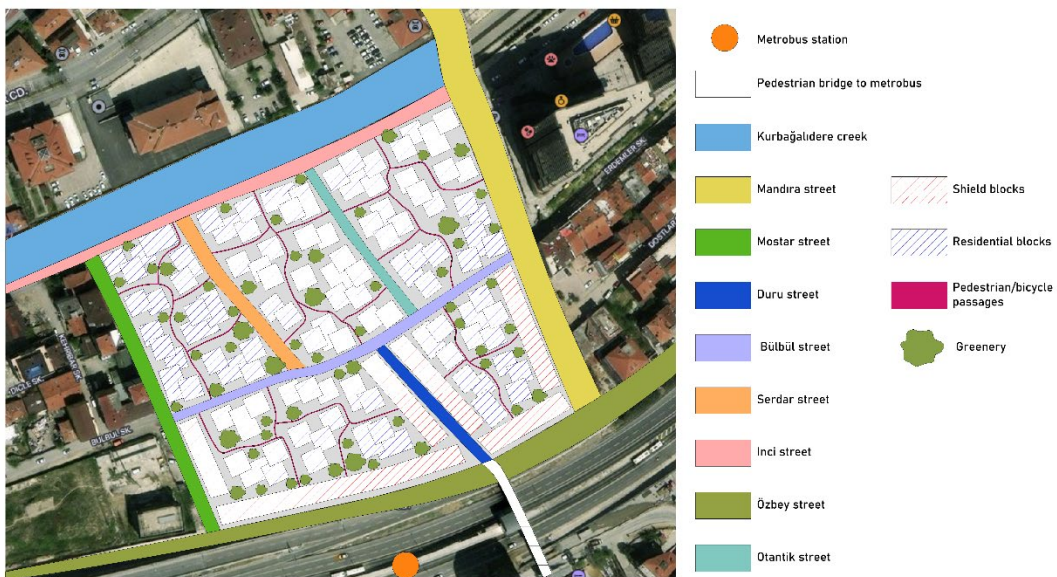
Map 3.3 Demonstration parcel

Consistency will be achieved through multi-level structures, primarily resembling mid-rise buildings. Dwellings ought to feature a vibrant design, functioning as additional dominants that draw attention to the neighborhood. The design should align with the principle of equality, ensuring that residences are affordable for all and integrated into the TOKI program. Despite adhering to the existing TOKI practices, these houses mustn't be stigmatized, so there should not be any TOKI labels applied to the buildings. They should cater to a broad audience, with creative designs enticing citizens to make purchases. Simultaneously, cost-effective design tools should be employed to facilitate the inclusion of a significant number of flats in the TOKI program. The intentional mixing of social groups with varying income levels is expected to have a positive impact on addressing the issue of inequality.



Map 3. 4 Street network arrangement

In the process of designing land blocks, it is proposed to designate certain streets for automobile use, while others could be suppressed. Instead free circulation of people and cyclists through the blocks is suggested.



Map 3. 5 Parcel planning

Addressing the challenge of exposure to highways, a solution can be found in implementing the concept of a shield, turning it into an advantage through the addition of transparency and greenery. This shield can serve a functional purpose, facilitating circulation, while within the inner yard, residential blocks can be strategically positioned. Furthermore, the ground floor of the "shield block" can accommodate public spaces such as cafes, markets, and sports facilities.



Figure 3. 26 “Shield block” design options. Left [62]; Right [63]

The incorporation of abundant greenery and landscaping aims to recreate a natural forest ambiance, acting as a source of fresh air. To minimize disturbance to residents, playgrounds should be situated away from enclosed spaces. Smart lighting should also be integrated, ensuring that only guide lights are illuminated during the night.



Figure 3. 27 Landscaping design options inside the residential inner yard with abundant greenery as a source of fresh air. Left upper [64]; Left bottom [65]; Right [66]



Figure 3. 28 Smart lighting examples. Left [67]; Middle [68]; Right [69]

The concept of social diversity should be integrated into the architectural design. Residential blocks can vary in the number of storeys, promoting inclusivity. While maintaining simple and cost-effective facade solutions, the incorporation of colorful patterns can visually enhance the buildings. These patterns serve to delineate, combine, and blend different sections of flats, making it challenging from an external perspective to discern the boundaries between individual apartments.

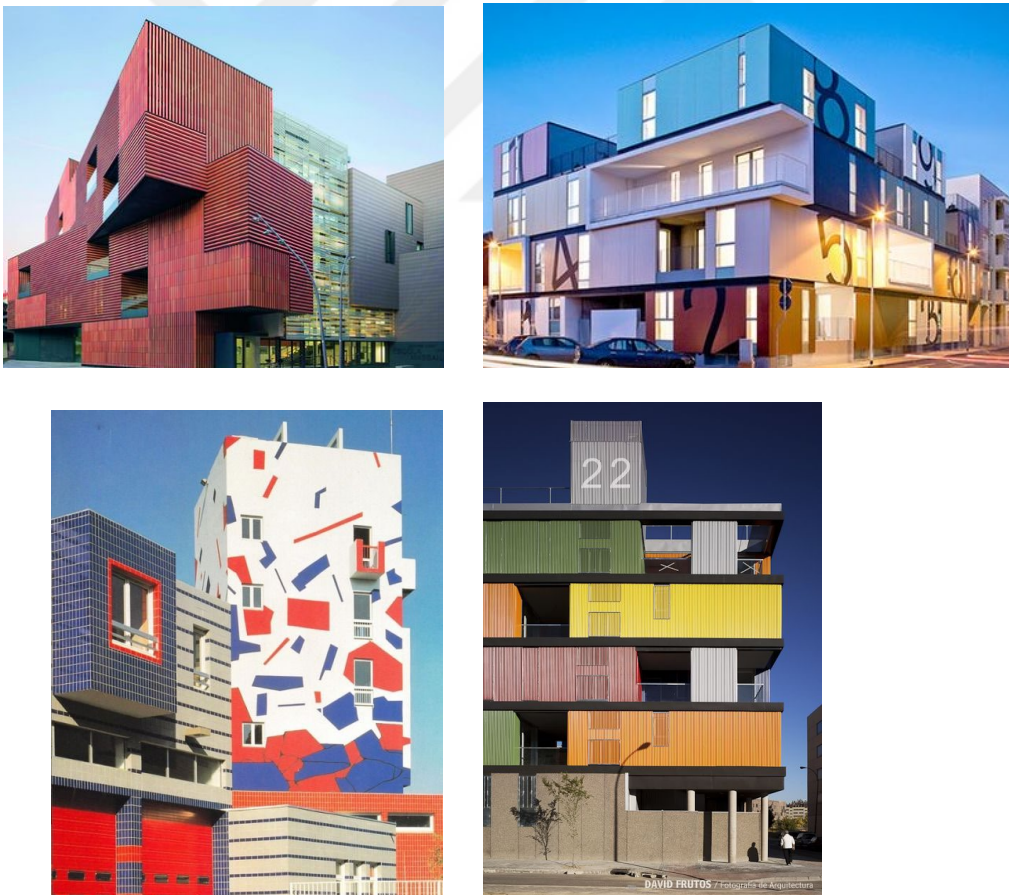


Figure 3. 29 Cost-effective residential block design that promotes the ideas of diversity and equality. Top left [70]; Top right [71]; Bottom left [72]; Bottom right [73]

This approach not only fosters social diversity within the community but also contributes to an aesthetically appealing and harmonious urban environment. In alignment with the concept of human scale and simultaneous consideration of multi-level structures, a maximum number of 10 storeys is set.

The aforementioned proposals aim to cultivate a vibrant, social, and secure environment that is not only enjoyable to reside in but also pleasant to stroll through and visually appealing.



4.1 Modern Urban Agenda and Challenges

Nowadays prevailing urban population leads to rapid growth and significant challenges for cities worldwide. Urban areas encounter numerous obstacles as they strive to cope with their constantly expanding environments. Unequal distribution of resources, opportunities, and access to services among different groups within urban communities; pressure on roads, bridges, public transportation, utilities, and other essential systems due to the growing population and urbanization; fluctuation in the economic sector; loss of unique cultural identities and heritage; constant decreasing of the well-being level due to environmental pollutions; inefficient land use, increased vehicle dependency, loss of green spaces, and environmental degradation caused by the urban sprawl. Addressing the expanding array of urban challenges SUT arises as a crucial concept in tackling them.

SUT can be explained through the capacity of the urban area and its surrounding region to sustain the community's desired quality of life without constraining the options accessible to both present and future generations, and simultaneously mitigating adverse impacts within and beyond the urban boundary. Literature sources offer numerous theories and concepts regarding the overarching features that a sustainable city should embrace. Yet, there remains a lack of existing examples of fully sustainably transformed cities by the reason of a monumental challenge to provide conceptual frameworks, models, guidelines, or sets of principles applicable worldwide to sustainably transform any city as a whole. This study aims to suggest a decentralized approach to urban transformation and attempt to develop a SUT framework dedicated to neighborhoods.

4.2 SUT Framework Results and Findings

The set of indicators and characteristics have been developed and spread under the social, economic, and environmental categories. The compact city model and the concept of the human scale in urbanism formed tangible indicators of the neighborhood. Statistical data and obtained measurements complied with the

measurable characteristics of the framework. SDGs represented an example of a legitimate staging ground for the development and application of SUT. Goals have been spread through the social, economic, and environmental sectors of the framework. The grade system incorporated into the framework determines the necessity of neighborhoods for sustainable urban transformation. The framework has been evaluated by the survey, conducted for urban experts. The evaluation resulted in overall expert satisfaction and educed additional measurable indicators related to childcare, educational, and health facilities. The lack of national or global standards that align with the indicators mentioned above has highlighted a research gap. In order to incorporate a category related to the education and health sectors into a framework, there need to be established national or nationwide legitimate norms for the provision of schools, kindergartens, hospitals, and sports facilities based on data regarding the number of dwellings, population demographics, and analysis of public migration patterns. Additionally, standards for meeting educational and sports facility requirements should be aligned with national development objectives. The government should promote public involvement in education and strive for a healthier population, which could consequently reduce the healthcare budget.

4.3 Framework Application and Possible Tools for SUT

One of the central neighborhoods of Istanbul, Hasanpaşa, has been chosen for the framework application. The necessity for sustainable urban transformation of the chosen area was determined. Declined characteristics related to the poor condition of the historical heritage and improper management of neighborhood dominants form the main reason for the attraction's lack in comparison with nearby Moda and Acıbadem neighborhoods. As a remedy, it was suggested to survey the neighborhood territory for examples of historical abundance, undergo their analysis, and prompt preservation together with revitalizing the existing neighborhood dominants in line with positive practices observed in other countries. Several declined characteristics created an interdependent issue: neglected residential dwellings situated by the first line of the Istanbul circular road, thereby exposed to air, noise, and light pollution. A comprehensive planning and renovation approach has been offered: decreasing the number of automobile roads between the

dwellings, organizing the shield-blocks by the road line, forming the inner yards of residential blocks, tracing the bicycle and walking paths through them, supplying with abundant greenery as a source of fresh air and smart lighting around residence blocks, inclusive architectural design and incorporated governmental support programs for some part of residences. Such a concept can be considered for application in similar scenarios.

4.4 Implications for Further Studies

This study intends to contribute to further studies related to the analysis of small urban forms, evolving indicators and characteristics for determination of SUT necessity and developing advanced solutions and tools for sustainable transformation and development. Possible development of the global data-base consisted of records of SUT cases with indicated initial neighborhood characteristics, applied tools, future development and impacts may contribute to prompt sustainable development of the surrounding environment. The aim of the research is to initiate a complex legit strategy for developing sustainable neighborhoods based on open source data and direct the attention of the government to the elaboration of educational and health sector standards. The objective point of the study corresponds to SDG 11 and lies in the transformation of the surrounding environment into a safe, inclusive, and prosperous, and increasing the quality of people's lives.

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A

NOISE MEASUREMENTS

Table A. 1 Noise measurements near Fikirtepe Metrobus station by the first line of dwellings

Time	Min dB	Max dB	Average dB
9 a.m.	79	85	82
12 p.m.	78	84	81
3 p.m.	77	85	79
6 p.m.	78	85	81
9 p.m.	76	83	79.5
0 a.m.	75	82	78.5

PUBLICATIONS FROM THE THESIS

Papers

1. A. Panchenko, Z. Işık, and G. Demirdöğen, “Achieving sustainable transformation in dysfunctional urban territory”, *Recent Advances in Science and Engineering*, vol. 3, issue 2, pp. 50-57, 2023.

