VI. INTERNATIONAL CITY PLANNING AND URBAN DESIGN CONFERENCE

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INTEGRAL METHODOLOGY FOR URBAN LOCATION

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Abstract

Sometimes the growth of urban territories is random, mainly when there is no urban planning project, generating multiple problems and gradually raising the cost of possible solutions. This research presents the process of locating a human settlement through the analysis and linking of models and principles of urban development and land use planning. A comprehensive methodology is generated for the location and planning of the development of an urban settlement in its early stages. The solution is based on linking territorial information analysis processes, allowing the generation of a didactic tool for the technical teams in charge of planning and managing the development of settlements, among others. The methodology will allow to determine the parameters for the development of the various vocations of land use (agricultural, residential, industrial, ecological reserve activities, etc.), establishing growth thresholds and development directions.

BACKGROUND

Concern for environmental problems has grown as a result of an accelerated deterioration in the quality of life. After decades of intense and accelerated exploitation of natural resources, multiple territories show significant degrees of disturbance of their ecosystems.

The main cities and productive areas present problems of environmental pollution and loss of resources such as soil, vegetation and fauna. Likewise, the landscape has been transformed with economic and social development, giving rise to new relationships between its inhabitants and nature and on which we depend.

Many of these transformations are the result of planning in key sectors of the economy. Mexico has large areas where agriculture, forestry, fishing and industrial activities are practiced. The use of the land and the management of resources have been carried out to achieve the maximum material benefit of society, however, the ecological balance has been broken in the places where settlements arise or develop and various activities are developed, and not enough efforts have been made to restore that balance and conserve natural resources for future generations.

Until a few years ago, urban development planning in Mexico did not incorporate the environmental variable, which is why the growth of productive activities was encouraged by making use of technologies and forms of resource management that generated pollution and deterioration of ecosystems. The absence of adequate ecological criteria has caused, among other serious phenomena, the disappearance of the lake and forest ecosystems of the Valley of Mexico, the disappearance of 90% of the High Forests of the southeast, the lack of green areas in urban areas, irreversible erosion of the Mixteca, the contamination of the Lerma, Bravo, Coatzacoalcos and Balsas rivers, and the atmospheric contamination of the main cities of the country.

Protecting the Environment is a task that must be planned and carried out in all instances in which society is involved. From the opening of new roads to the operation of a factory. It is necessary to apply criteria for the conservation of natural resources and for the improvement of the quality of life of the population, the latter being understood as the achievement of basic satisfiers and the right to live in a healthy and aesthetically pleasing environment and cultural.

The analysis of urban processes have had an important development in recent decades and have techniques and instruments to know in detail the state of nature, as well as provide and control the negative effects produced by the use of natural resources.

Next, an analysis and linking of models and principles of urban development and land use planning is carried out for the planning and development of an urban settlement. It is proposed to link processes of analysis of methods of land use planning and urban design, generating a didactic tool to determine the various vocations for land use.

TERRITORY ECOLOGICAL ORGANIZATION PLAN (POET).

In the case of physical planning, a concept that has more than thirty years of application in developed countries and in Mexico resurfaces, this is that of the Ecological Land Management (OET), which is considered as a planning process aimed at evaluating and program the use of the land and the management of natural resources in the territory and study areas, to preserve and restore the ecological balance and protect the environment.

With this term and the work discipline that it implies, it is intended to give greater and more complete technical support to the Administration of Natural Resources and the Prevention and Control of environmental pollution, both activities carried out separately in most countries that carry carrying out work to protect nature and public health.

From this process, proposals arise that are embodied in Plans for the Ecological Organization of the Territory (POET), of a regional and programmatic nature, in which specific uses of the land and norms for a rational and sustained use of natural resources are determined. For this, physical and biological analyzes of the ecosystems that make up the area of interest must be carried out, in order to determine the potential of their resources.

This information is combined with the socio-economic characteristics of the population and the trends of occupation of the territory by human settlements and the development of productive activities, in order to establish an approach that positively contributes to the integral development of the area.

In the conformation of these POETs and their application, the participation of all sectors of society and the performance of works, services and actions that prevent or reverse the continuous deterioration of the Environment must be encouraged.

The Methodology presented is aimed at technicians and professionals linked to environmental sciences and planning, it contains the logical and consecutive steps to carry out an interdisciplinary work in which information from specialized studies of the physical, biotic, social and social characteristics is superimposed and combined economic areas subject to ordinance.

The main product of a POET is a base plan of the territory under study in which the land uses are specified, accompanied by a set of tables that indicate the guidelines and regulatory criteria for the use of natural resources. This base plan is capable of being decreed for its mandatory observance, given its utility and public interest.

Additionally, a POET contains a programmatic approach in which the Works, Services and Actions that need to be carried out to restore and protect the Environment are specified.

The Methodology contains constructions and specifications for a model POET, to be elaborated in an area that hypothetically possesses the set of attributes of the national territory and all the deterioration and transformation processes of natural resources registered and studied to date.

Methodology of a POET (SEDUE, s.f.).

From a theoretical point of view, there are several technical proposals to define the most appropriate land uses in a territory. It is recommended that the work team that carries out the Plan for the Ecological Organization of the Territory (POET), integrates a referential framework around this discipline.

The development of a POET is divided into six phases (Fig. 1):

1. Organization Phase. The scope of the POET is defined in order to establish the work team, implementation schedule and budget.

2. Descriptive Phase. The physical, biotic, socio-economic and environmental problems of the area subject to Ecological Planning (AOE) are delimited and described.

Natural components, guide to geophysical elements that are part of the city; Which must be analyzed and broken down one by one within the framework of a POET. (Schjetnan. M. 1997)

Weather	Relief	Fauna
Water	Geology	
Edaphology	Vegetation	

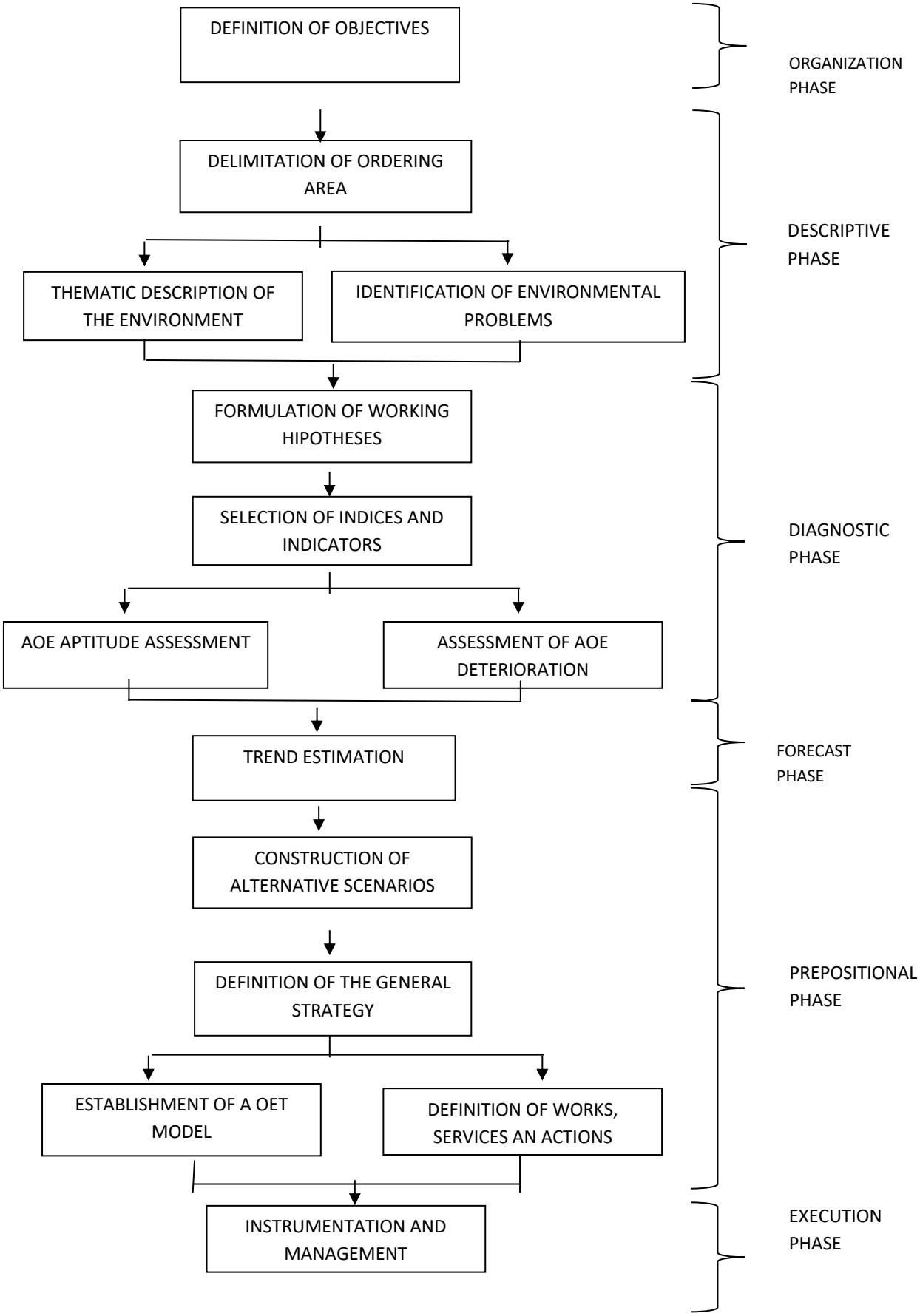
3. Diagnostic Phase. With the information from the previous phase, the current situation of the AEO is evaluated with ecological criteria and the causes that originate its state are defined.

4. Forecast Phase. To carry out adequate planning, it is essential to estimate the behavior trends of the AOE, in this phase those that are of interest for the conservation of the environment are forecast.

5. Proposal Phase. With the results of the previous phases, the policies and strategies to be followed are established, in order to define the land use model to be promoted in the AOE, the guidelines and regulatory criteria for the use of natural resources, as well as the works, services and actions.

6. Execution Phase. Finally, the legal, administrative and financial instruments applicable to the POET are established, as well as the way in which it will be managed before authorities and the general public are defined.

Fig. 1 Methodological background for the elaboration of a POET. (SEDUE, s.f.)



ON CARTOGRAPHY POSITION (ORTIZ, CUANALO, HERIBERTO 1984)

Goals.

• Combine or add cartographic information to identify territorial areas with common characteristics.

• Define the various levels of ecological regionalization and environmental management units of the AOE.

• Generate information to apply environmental indices or indicators and identify areas with environmental deterioration processes.

Phase and step of the methodology where it is applied.

The overposition of maps is a technical resource that is applied throughout the development of a POET, from the definition of the AOE to the proposal of the land use model.

In addition, it is a recurring tool in the analysis of any environmental factor as it allows homogenizing information and comparing it from a territorial perspective.

Description of the steps to apply.

If two maps or thematic letters with different information or attributes are to be superimposed (eg Vegetation with Soil Science), it is necessary to verify in the identification or footer of the letter that they have the following characteristics:

Same scale

Same projection (eg Lambert Conic or UTM –Universal Transversal of Mercator).

Same territorial coverage or that one letter includes the other.

If the above is true, it is possible to superimpose the two maps

1. Prepare each map highlighting the basic reference lines, these can be:

• Coordinates (latitude and longitude)

• Heights in meters from the equator and zero meridian.

• Main features of the territory such as:

Rivers, streams or lakes.

Important cities and towns.

Roads or rail lines.

Coastline.

Political-administrative borders.

Volcanoes, mountains, ravines, or relevant physiographic features.

2. Overlay the two maps on a light box of a size larger than the maps, matching the basic reference lines (manual procedure).

3. Superimpose the base map of the AOE, made on a paper or transparent material that allows the cartographic overlap, on the two maps (manual procedure).

4. Draw on the base map the areas where two different attributes coincide as a single unit (eg pine forest with lithosols).

5. If the homogeneous units are too many, refine the grouping establishing criteria for aggregation of attributes, which will vary depending on the scale of work, the level of ecological regionalization and the specific objective of the over-position. Some of these criteria may be the following:

• Eliminate non-representative areas of the set or areas smaller than 3% of the total territory (with the exception of those that represent an ecological value).

• Eliminate the areas whose attributes are not very representative of the whole or not relevant in the analysis carried out.

• Add the attributes of each map.

• If the scale and purpose of the overlap allows, group the areas that have a relevant physical linear envelope. For example: Areas isolated by roads, rivers, watersheds, irrigation canals, etc.

6. Prepare a working memory where the criteria for adding attributes and the procedure for adding unit pairs are documented, noting the characteristics of the limits and the criteria used in their definition. Preferably, the areas in km2 or has of each homogeneous unit should be calculated, as well as naming them with an easy-to-read code system or by designating them with a toponymic name.

RECOMMENDATIONS

1. It is not convenient to superimpose more than two maps at the same time; or dump the information from one original chart into another, you should always use a dump map (ideally a base map).

2. In the case of needing information from more than two cards or maps, the overlap must be done two by two, previously choosing the sequence to follow according to the importance of each map or card and the product to be obtained.

3. To facilitate the work, automated tools can be used for overlaying maps or charts.

STUDY AREAS FOR THE DESIGN OF THE CITY

A complete planning of the city will require the observation of the relationships between the community and the physical environment through a multidisciplinary study.

The physical environment of a city is made up of two types of components:

Natural components -proposed in phase two of the section Elaboration of a POET-.

Artificial components (Fig. 2), those that have been built by man and which must be planned and analyzed after the definition of the vocation of land use product of POET.

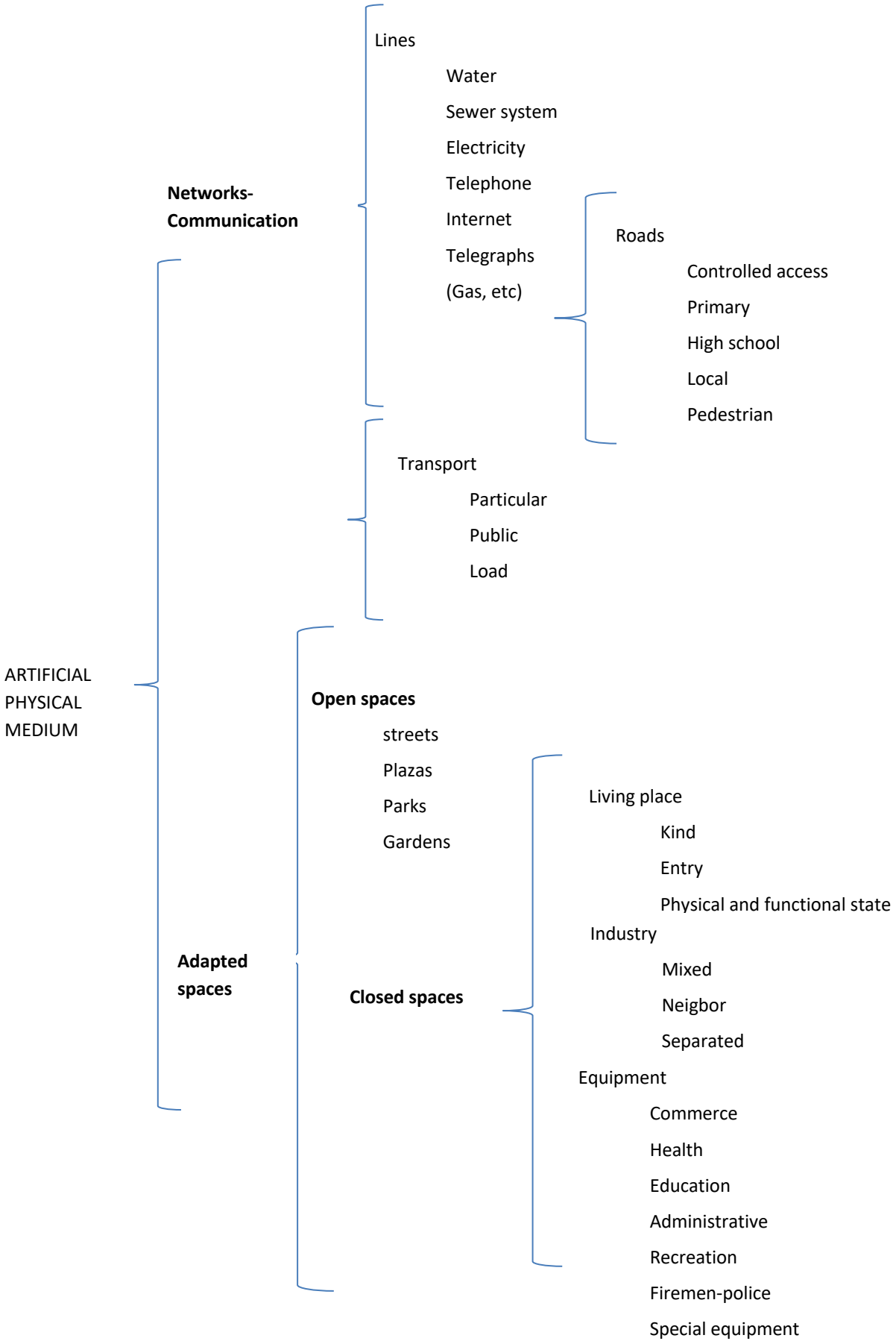


Fig. 2 Components of the artificial physical environment. (Schjetnan. M. 1997)

ASSOCIATION DETECTION

In this stage the main associations of components that are part of the artificial physical environment and the natural physical environment are defined. Generally speaking, associations can be classified into two basic types.

Natural Associations or Environmental Units. Associations of this type were built through POET by closely correlated natural elements that were grouped in a defined area to settle a city or grow. These associations are characterized by their delicate balance, which can be easily destroyed by altering any component.

Artificial Associations.

This class of associations is made up of a set of open and closed spaces built by man and natural elements - not built by man - that dominate and characterize an urban area. This type of association usually presents complex conditions of relationship and balance. Which in turn generates a greater movement and concentration of people, cars and transport that demand parking spaces, pedestrian paths, sidewalks, squares, etc. The alteration of any of the component parts of an association of this type affects the other components, modifying its character and affecting its relationship with the urban structure.

Formulation of proposals, policies and guidelines.

Once the detection, summary and synthesis of the associations of the studied area have been carried out, it is possible to detect the limitations and opportunities (natural, functional and landscape), to proceed to the formulation of concrete proposals, specific policies and detailed guidelines of urban structuring.

The types of actions and policies you most frequently consider are the following:

Growth

Increase

Conservation

Regeneration

Rehabilitation

CONCLUSIONS

The linking of models and principles of urban development and land use planning generates a comprehensive methodology for the location and planning of the development of a sustainable urban settlement. The solution is based on linking proven territorial information analysis processes allowing the generation of a didactic tool for the technical teams in charge of planning and managing city development, among others.

The methodology will determine which are the suitable areas for the development of the vocations of land use, establishing the thresholds of growth and the directions of development and decongestion.

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SOCIABILITY OF PUBLIC SPACE THROUGH MUSIC: STREET MUSICIANS OF ISTIKLAL AVENUE

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Abstract

Street music is a social event shared by the performer(s) and the audience. Contrary to fixed spaces, mobile music coming from street corners are shaped by public spaces that the city provides. In the presence of street music, the city enlivens with movement, dance, gestures and other non-verbal cues which lead to communication. Throughout history, street musicians, also known as traveler musicians have occupied public spaces. At the present time, street musicians have continued their presence in the prominent streets of major cities. In the case of Istanbul, Istiklal Avenue is a unique neighborhood that has a long-standing history of street music. Therefore, the research aims to observe communicative transactions on Istiklal Avenue and link them with the sociability patterns between people in public space. The question to be answered is 'how does socialization occur in the presence of street music in Istiklal Avenue?', adopting sub-topics such as site selection for the performance; the transformation of pedestrian movement at the presence of the performance; patterns of interaction among the audience; patterns of interaction between the audience and the musician. Unstructured observations of street music on Istiklal Avenue has been conducted by the researcher for one month during the fall of 2019. As a regular pedestrian, the researcher shuttled up and down Istiklal Avenue, observing and recording the street music performances. The narration of personal experiences and encounters of the researcher while moving through urban space required a unique mapping technique; psychogeographic mapping. The adopted mapping technique has enabled the researcher to transfer the observations through maps, photographs, collages, diagrams and key-words. The results show the importance of site selection in attracting crowds to join the performance. Additionally, the change in movement patterns, particularly the semi-circular shape of the audience were observed to break the routine of pedestrians, which may result in their curiosity towards the performance. And lastly, the non-verbal cues shared by a common culture has been observed to play a crucial role in the socialization of individuals during the show.

1.INTRODUCTION

The evolution of distance receptors such as seeing and hearing has enabled humans to advance in the field of music and arts (Hall, 1966). Music, when conducted as a performative event, activates seeing, hearing and even emotions. The experience becomes a social event shared by the musician, the performer –in cases where they differ- and the audience.

Majority of research combining urban space with music has been made in the field of geography involving identity, memory and culture (Cohen, 1995; Watson, 2009; Mitchell, 2009) and in the musicology field referring to creativity and space (Bywater, 2007; Cohen 2012). Although valuable research discusses music in urban studies (Connell & Gibson, 2003; Doumpa, 2012; Kaymaz, 2013), a gap remains on the sociability of public space in the presence of street music.

1.1.Live Music in Public Space

Live music, besides being seen and heard, can also transmit emotion (Thompson, 2005). Merely heard music from radio broadcasts or other devices may not be as effective as live music. Moreover, the impact may vary between fixed and mobile aural space. Fixed spaces such as cafes, bars or concert venues provide a different experience with the help of music industry infrastructures (Watson, 2009). On the other hand, mobile music coming from street corners are shaped by public spaces that the city provides.

The street forms a connection between roads, public transports, shops and much more (Watt, 2016). The blend of sounds coming from various activities, combined with street music, results in distinct experiences. Movement of the crowd emerges; dances and gestures arise. The performer and the impatiently waiting audience transform the street into a stage (Harrison-Pepper, 1990). Therefore, street music has a unique knowledge, concept and pattern (Ozden, 2013) that may enrich the city life both aurally and socially. It can be concluded that the socialization of crowds during a street performance improves the quality of public space.

1.2.Cultural Background of Street Music

The history of street musicians in Turkish culture dates back to the 'traveler musicians' of antiquity. Also known as 'Ozan' or 'Asik', they travelled around and performed requesting shelter, food or money. Besides composing music, they have helped in the narration of oral culture, educating the society and at times even criticizing the emperor (Malkoc, 2018). Although it is possible to see certain characteristics of traveler musicians among the present-day street musicians, the performances have evolved to mostly entertainment and socialization.

2.INVESTIGATING SOCIABILITY THROUGH STREET MUSIC

2.1.Research Aim and Objectives

The presence of music brings movement, dance, gestures and other nonverbal cues (Watt, 2016). The enlightening data from theoretical readings has shown the connection between nonverbal cues and communication. This research aims to observe these transactions on Istiklal Avenue and link them with the sociability patterns between people. The question is; how does socialization occur in the presence of street music in Istiklal Avenue? The following sub-questions have been of guidance through the research:

How does site selection (for the performance) effect social integration?
How does pedestrian movement effect social integration?
What are the patterns of interaction among the audience?
What are the patterns of interaction between the audience and the musician?

Street music can be widely encountered in various neighborhoods of Istanbul: Investigating the site selection of street musicians in Kadikoy, a research has been conducted focusing on the musicians of the area (Can, 2012). Another research has obtained a cultural approach towards street music in Istanbul (Ozden, 2013). This research

differs from the mentioned papers in terms of its content of socialization and offers a new approach in the field combining music, public space and sociability.

2.2.Scope and Limitations

The observations on Istiklal Avenue were made for one month, on weekends between October and November, 2019. General visits to the site has shown that street music was also present during weekdays, yet the majority of the performances took place during weekends, which made it a preferable period for observations. The limitation of the research was that the observations were conducted for a short –one month- period. Although none of the observations coincided a rainy day, it was relatively colder compared to summer which may have caused a decrease in the observed performance amount. Being aware of the limitations, this paper intends to be a guidance for further research on sociability of people during a street music performance.

2.3.Methodology

Firstly, a literature review has been conducted in order to have a familiarity with previous research as well as different approaches towards street music. The information combining sociability and street music were limited, thus the two concepts of 'socialization' and 'music' has been examined separately.

Unstructured observations have been the focus of this research in understanding how street music ensured social relations to occur in urban social space. Further research practices has been segregated as on-site and off-site, occurring in engagement rather than an ordered procedure.

During the visits to Istiklal Avenue, the site selections of musicians during daytime and nighttime has been marked on a map of the area. The features of chosen sites, façade characteristics, usages of surrounding buildings and other activities have been noted. As a second step, every encountered music performance has been observed not only during the performance but also on every phase from the preparation –for the show- until the end where people cleared away. Video shooting has been carried out at intervals during the performance. As a last step, observations of human interaction before-during-after the show were photographed and noted.

The recorded videos of performances were repeatedly reviewed during the off-site phase of the research. Firstly, the movement of pedestrians has been identified and the movement patterns were diagrammatized. Secondly, the positioning of musicians -in the case of group performances- among themselves were identified. The proximity of the musicians to each other and the proximity of the audience to the musicians were emphasized on the diagram. The observational data collected from maps, videos, photographs and diagrams were combined to form a psychogeographic map.

The methodology for writing this paper has also been a question. Theoretical background and the observations were detected to support one another substantially. Therefore, it has been decided that the theory and the evaluations of observations were to be nested in the paper. Thus, a separate section for the theoretical background has not been written.

3.CASE STUDY: STREET MUSIC IN ISTIKLAL AVENUE

Istiklal Avenue extends for 1.7 kilometers from Taksim Square to Tunnel (Can, 2012). The width, generally uniform throughout the street, is approximately 15 meters. The peak at Taksim Square marks the beginning of the street and walking towards Tunnel, adjacent buildings embody passages, shops, consulates, religious structures and many more. Contrasting features such as historical and contemporary, lively and lifeless, firm and decaying stand side by side.

Known for its diverse and complex social dynamics, the area accommodates crowds from various ethnic backgrounds, age and sex (Can, 2012). As Watson (2009) states, a diverse population brings with it, distinct

musical styles. The question is how does street music bring these crowds together and how do crowds socialize during the performance?

The dramatic expansion of Istanbul has diversified the mainstream areas in the city. Concordantly, Istiklal Avenue has gone through numerous interventions transforming the street dynamics but music has remained regardless. Bringing together diverse crowds in unique patterns of socialization, Istiklal Avenue calls for a study.

3.1.General Observation Results

Differences between site selections have been observed during daytime and nighttime. Since the paper focuses on socialization patterns, only an overview of these differences will be mentioned in this section. Additionally, an uneven distribution of street musicians were observed between the parts closer to Taksim Square and the area closer to Tunnel. This situation led to a segregation of 'upper Istiklal Avenue', which can be identified between Taksim Square and Galatasary High School, and 'lower Istiklal Avenue', which corresponds to the area between Galatasaray High School and Tunnel.

Upper parts of Istiklal Avenue mainly has shops, cafes and restaurants as their ground level usage. Their entrances are directly from the street and the busy circulation of going in and out make them hard to accommodate street musicians out front. The shop owners should also be considered in this equation. Although this kind of situation was not encountered during observations, shop owners might react to street musicians in the case of blocking the entrance of their shops. Additionally, the density of pedestrians were observed to be more towards Taksim Square compared to the lower parts towards Tunnel. The lower parts of Istiklal Avenue also have shops and cafes but other usages such as consulates, culture and art buildings that are not commonly used during weekends. Another observation showed that various buildings remained empty and unused towards the lower parts, which made their forefronts suitable for street musicians. Consequently, the street musicians were mostly seen towards Tunnel during daytime.

It can be predicted that various shops and cafes close after a certain hour throughout the street. Thus, it was observed that street musicians were located both at the upper and lower parts of Istiklal Avenue during nighttime. It should be added that the lower parts become less dense during night, which may affect the preference of street musicians since the event desires a crowded audience.

3.2.Psychogeographic Mapping of Street Music in Istiklal Avenue

The crucial scope of this study was to transfer the experience of the researcher during the observations of street music performances in Istiklal Avenue. As Doumpa (2012) states, music performances in public space carries certain features particular to that event. The site selections of musicians, changes in the movement patterns and interaction among individuals are several examples out of many more. The narration of personal experiences and encounters while moving through urban space required a unique mapping technique; psychogeographic mapping. Moving away from conventional mapping techniques, psychogeographic mapping was put forward by the Situationists as not just mapping the built environment but also including the experience of users (Sadler, 1999).

The produced psychogeographic map showing street music experience in Istiklal Avenue can be seen in Figure 1. Firstly, the encountered street music performances can be seen as marked on the map. The map also contains collages of photographs from those spots, keywords and important locations as well as diagrams of movement representing the playfulness of the urban environment.

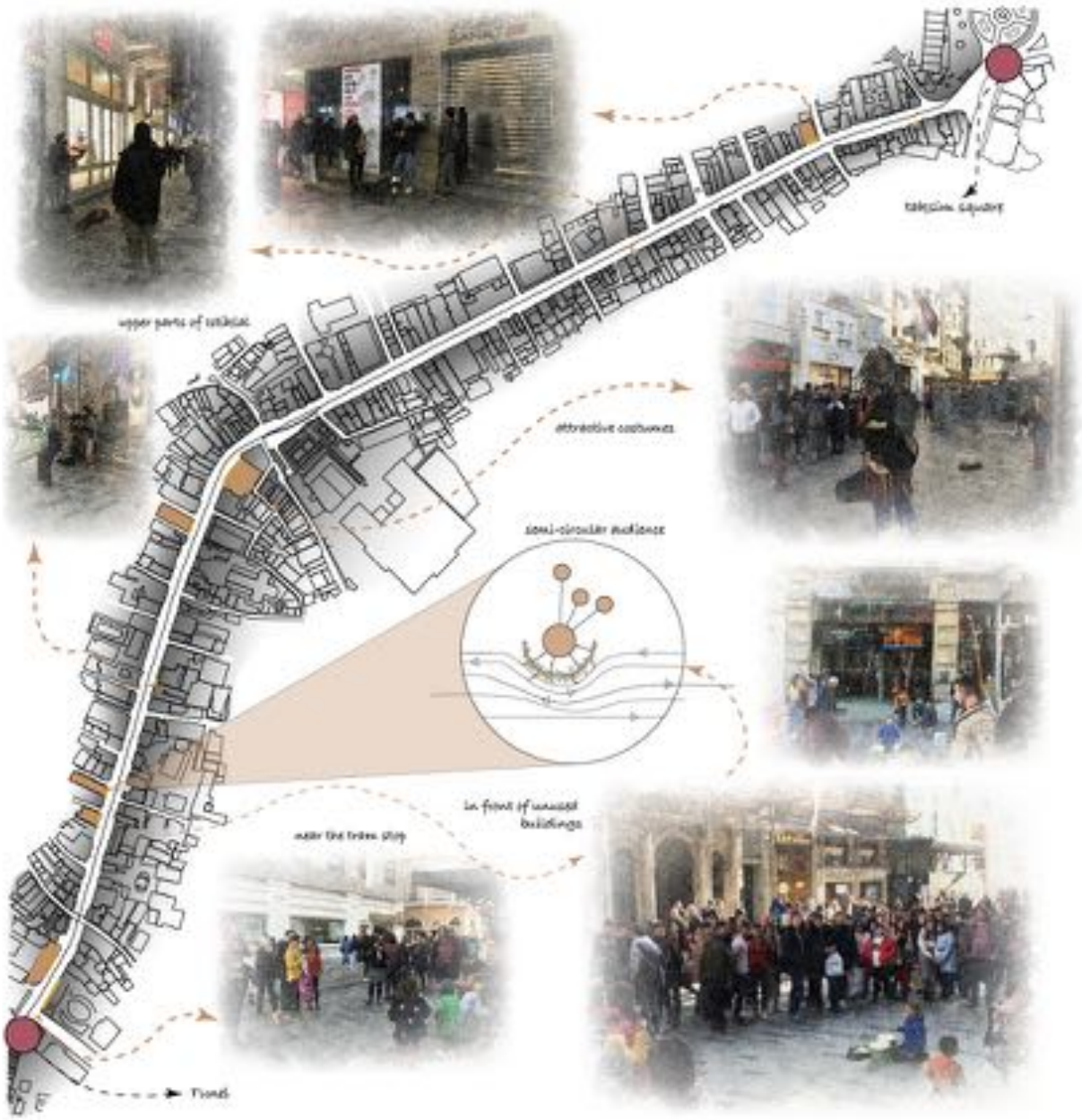

Figure 1. Psychogeographic map of street music and socialization in Istiklal Avenue.

4.EVALUATIONS: STREET MUSIC AND SOCIALIZATION IN ISTIKLAL AVENUE

4.1.Site Selection of Street Musicians

The positioning of performers in space effects their communication with the audience and with the surrounding environment, making site selection a non-negligible aspect for socialization. Private performances happening in concert venues and pubs are mostly selective about the attendees to the show. On the other hand, Tanenbaum (1995) implies that music in public space embodies individuals from all income, race, gender and age. In this respect site selection gains prominence on issues concerning accessibility and participation. Public events promote the participation of crowds therefore revealing the feeling of being welcome (Doumpa, 2012). Another study on site preferences of street musicians in Kadikoy show that crowdedness, state control, shop owner attitudes and inhabitant attitudes should be considered.

Site selection of street musicians in Istiklal Avenue was observed to depend on crowdedness, building usages and scales, shop owner attitudes and state control; showing similarities with alternate research mentioned

above (Figure 2). Crowdedness, in my opinion, is a critical variable when selecting the convenient spot. Towards Taksim Square, Istiklal Avenue was observed to be exceedingly crowded, which may be a reason why upper parts were not preferred by performers during day time. On the other hand, the musician would desire a certain amount of people present in the area. This may explain the observation of street music near the public transport waiting areas. Observations on building usages showed that musicians generally chose the front of unused buildings because they offer blind façades. Referred in the above section, daytime observations showed that lower parts of Istiklal Avenue were favored in comparison to upper parts. These preferences may indicate a drawback from shop owner attitudes since upper parts of Istiklal Avenue contains frequent shop entrances. Additionally, wider façades were preferable compared to narrow ones which may indicate that they offer broader space for performances. General patrols up and down the street and barricades in front of Galatasaray High School were observed during the visit to the site. Although the patrols did not seem to disrupt the performances, surroundings of Galatasaray High School might have offered an appealing setting for street musicians if the area had not been blocked by the police.

Figure 2. Photographs of site selections of street musicians in Istiklal Avenue.

4.2.Movement Patterns of the Audience and the Pedestrians

Music brings out bodily experiences and reveals movement and emotion in an individual (Cohen, 1995). Besides the movement that occurs with music, the regular movements of pedestrians in public space are also present in the scene. During his observations of a street performance, Simpson (2011) noticed that the pattern of the audience completely changed the regular flow of passersby. Figure 3 illustrates three conditions that was observed in Istiklal Avenue, similar to Simpson's implications. The first condition shows the movement of pedestrians before the show has started. While street musicians are getting prepared for the show, the regular movements of the pedestrians haven't changed. The pedestrians were observed to pass through the street

musicians in straight lines. The second condition illustrates the pedestrian movement during the performance. A semi-circle formed by the audience around the musicians can be seen while the pedestrian flow is distorted accordingly, similar to a semi-circle. Complex movement of passersby were observed where some curious individuals peered through the crowd or changed their way to join the audience, resulting in a disconnection in the flow of pedestrians. It can be stated that the change in the flow pattern may attract passersby into the crowd, preparing the ground for sociability. The third condition shows the movement patterns observed after the show. As the crowd cleared away, some individuals from the audience approached the performer to have a chat while others slowly broke the semi-circle and joined the regular flow of pedestrians. Only after a certain time had passed, the movement pattern returned to the first condition.

Edward T. Hall (1966) has stated that distance receptors in humans have enabled the development of aural fields, in our case the ears. The ear functions well up to 6 meters in a healthy human being and only after 30 meters, efficiency is lost (Hall, 1966). In the case of Istiklal Avenue, the width is generally uniform throughout the street and it is approximately 15 meters. Thus, the auditory field can effect the pedestrians walking on the opposite side of the street (Figure 4). The observations has supported the predictions where some individuals walking on the opposite end looked towards the performance area or even joined the crowd at times.

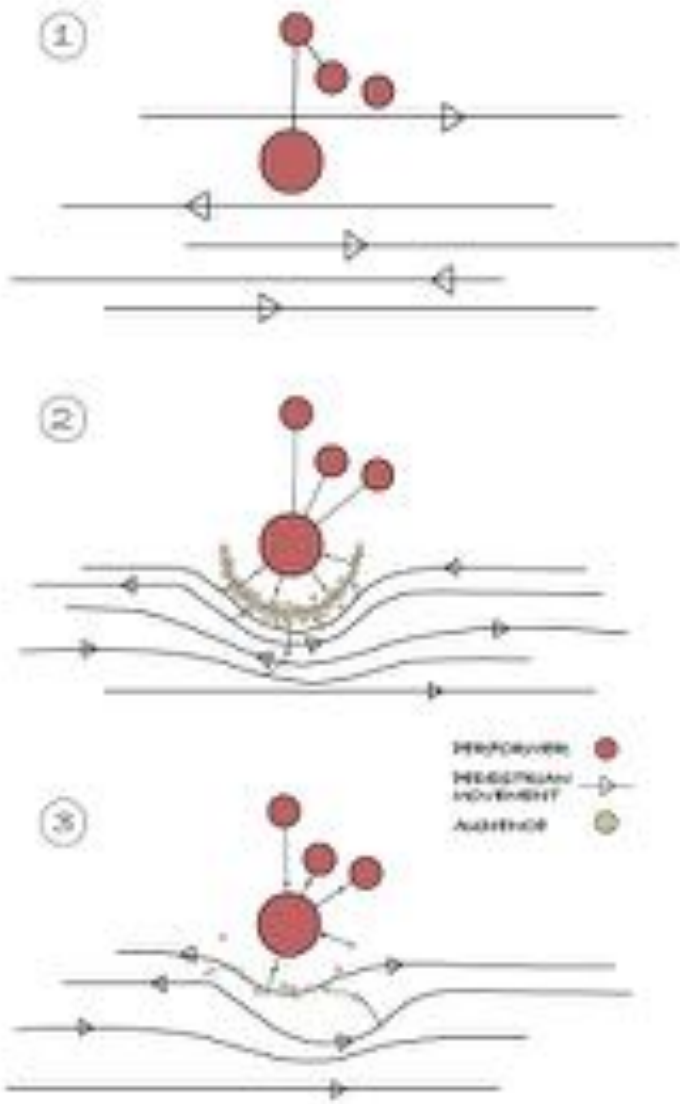

Figure 3. Movement patterns of pedestrians before, during and after the performance.

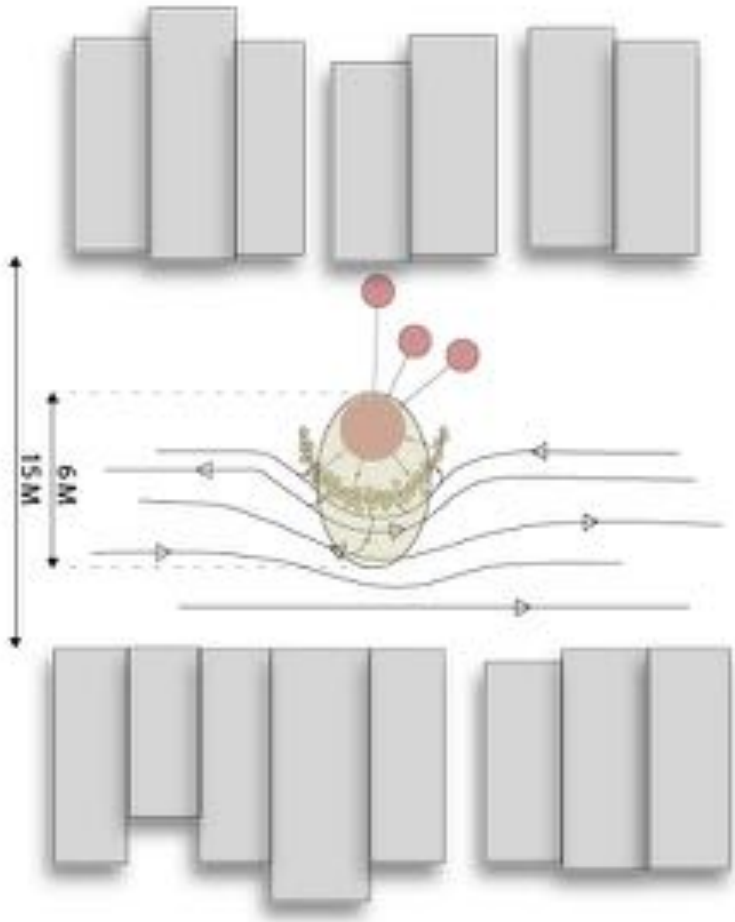

Figure 4. Efficiency of the ear and the aural field compared to the width of Istiklal Avenue.

Apart from the auditory field, the physical aspects of the street and crowdedness creates a forced proximity between individuals (Simpson, 2011). The intimate distance from contact to 46cm, the personal distance between 46 and 122cm and social distances that start from 122cm are some of the proximity measures indicated by Hall, conducted on citizens living in The United States (Hall, 1966). These various proximity measures created by the movements of individuals have been observed in Istiklal Avenue during the performances. In most of the observed street performances, musicians had placed a money sack in front of them. Individuals from the audience approached the sack at various intervals to make a donation to the musicians. This movement exposed that the performer and the individual came as close as the 'intimate distance' at these moments (Figure 5). It may be concluded that the proximity occurring with movement may form ways for communication and socialization.

Figure 5. The movement of members from the audience while donating the musicians.

4.3.Interaction Among the Participants of the Performance

Public space, a place for practices of sociability, paves the way for encounters between strangers (Simpson, 2011). Sociability of participants occur at varying patterns during the performances. The interaction can be studied in two sections: first, occurring between the performer and the audience; second, taking place among the individuals of the audience.

Music performances reveal emotional exchange among the participants of the show. Non-verbal cues; the indicators of emotion such as facial expressions, body movements and gesture expose a way of social interaction (Thompson, 2005). Emblems are defined as gestures shared by individuals from a common culture, illustrators give the content of a message through gestures and lastly affect displays narrate emotion (Thompson, 2005). The three non-verbal communication instruments have been observed to be common among interactions between the musician and the audience. During the performance of a Native American, a little girl after enjoying herself to the music, kissed her hand and waved the musician goodbye, a common cultural emblem that shows love and admiration (Figure 6). Another observation during a traditional music show accommodated a few women clicking their fingers -a cultural dance move- and dancing towards the musicians. One other Native American performance was encountered during visits to the site. While the performance was going on, couple of men wanted to take a photo with the performer (Figure 7). Since the musician was singing and playing, verbal communication would have been tough, thus the men used hand signs meaning to ask permission for a photo. The musician nodded as in giving permission. This case can be evaluated as an example for the use of illustrators. The last observation towards non-verbal communication contains affect displays of a youngster, giving a percussion performance with buckets. The child musician seen in Figure 8 had opened his mouth at intervals, expecting a reaction from the crowd. The crowd was observed to smile back at the kids, conceivably a demonstration of sympathy. To sum up, although in most of the performances, some kinds of emblems, illustrators and affect displays appeared, the given examples were thought to be the more apparent.

Figure 6. The little girl showing admiration to the Native American musician.

Figure 7. A couple of men wanting to take a photo with the Native American costumed musician.

Figure 8. The youngster musician opening his mouth in expectance of a reaction from the crowd.

The second type of interaction, between the individuals among the crowd have been based upon the 'triangulation' process put forward by William Whyte. In the book The Social Life of Small Urban Spaces, Whyte (1980) emphasizes that strangers may get into communication by the help of external factors. 'Triangulation' occurs when two people witness an abnormal –or funny, cute etc.- event before them and start to exchange comments about it (Whyte, 1980). This particular case has been observed in Istiklal Avenue during an accordion performance near the tram stop. As illustrated in Figure 9, the two children of a family were dancing to the music near the musician. In the first figure, a kneeled down photographer can be seen, taking a picture of the kids. After a while, the mother approached the photographer to ask her if she could send the taken photos by e-mail. The witnessed scene continued for almost five minutes where the mother and the photographer had a chat while exchanging contact information. Presumably, a variety of cases may have been encountered similar to this that may cause an interaction among the individuals that form a crowd at a street music performance.

Figure 9. The photographer and the mother exchanging contact information.

5.CONCLUSION AND FURTHER RESEARCH

The city provides spaces for social encounters between individuals. The first issue has been made the importance of site selection in attracting crowds to join the performance. Next, the change in movement patterns, particularly the semi-circular shape of the audience, were observed to break the routine of pedestrians, which may result in their curiosity towards the performance. And lastly, the non-verbal cues shared by a common culture has been observed to play a crucial role in the socialization of individuals during the show.

Site selection of street musicians were seen to be highly dependent on available façades of the street. For buildings that were not in use, the availability of a façade was an important criteria. Alternatively, another possibility being the opening-closing hours of the particular shop. Thus, the city offering blind façades on a constant basis or at certain times during the day, may benefit to creative fields such as art and especially in our case street music. One other variable has been the scale of the façade. Street musicians were observed to select relatively wider façades and conversely the city may contain several other activities for narrower façades. It can be concluded that a variety of scales in buildings may benefit the city in embodying diversified activities.

Istiklal Avenue is generally uniform in width but if the street had widened or narrowed at certain areas, the movement patterns would have varied accordingly. Narrower areas could be predicted to hold a dense circulation keeping the crowdedness in mind. Under the hypothetical circumstances, the street performance may not have had the preferred effect. Conversely, if the street width had exceeded 30 meters, the aural field would have been ineffective, again damaging the performance. In conclusion, Istiklal Avenue was observed to be mainly suitable for street music considering the physical properties of the place.

Street music and socialization holds a gap in the academic field of urban studies. As mentioned in the section of general observations, site selections of street musicians in Istiklal Avenue had differed between daytime and nighttime. Exceeding the scope of this paper, further research may be carried out investigating this variation. Furthermore, additional observations were carried out on site that could be connected to street music and socialization. For example, the costume choices of musicians could have an effect on attracting crowds. Another observed situation was that the number of individuals in the audience varied between the performer being one person or being a group of musicians. These remarks should be considered for future investigations on the field.

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THE EFFECT OF OUTDOOR DESIGN ON THE SMELLSCAPE

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Abstract

Senses, which are one of the most powerful tools of communication with space, affect the use of space in many ways. The space, which has been communicated with the visual values of the space in the past, has led the designers day by day to new searches and within the scope of the sensory space design, its auditory, olfactory and tactile features have been examined. One of them, the odor value, has not been studied much because of the volatile nature of the odor source and its invisible to the eye. However, it has been demonstrated that with the developing technology and methods, odor is an important element of the space and the odor character changes due to environmental factors. In the scope of this study, observations and walks in the scent landscape, as well as the openness-closeness and slope of the space, as well as how the climatic changes affect the odor character and thus the scent landscape. The study was carried out within the urban site area in Kastamonu city center. In the urban site, observations were made according to different seasonal conditions in the circulation varying according to different floor heights, slope, and intensity of use. As a result of the study, it was determined that there are changes in the character of the smell perceived according to the openness-closure of the space and the slope due to temperature, humidity, wind changes. In this context, the perceptibility of the scent element in urban spaces depending on the character of the space and how it should be used in space designs will be revealed, and the users will be able to direct the spaces to different use with its sensory dimension.

Keywords: Smellscape, Sensory Space, Kastamonu Urban Site Area, Smell walk, Odor perception

INTRODUCTION

Research on sensory space experience primarily focused on visual dimensions. When space production in architecture is widely thought of as a visual experience in common practice, it appeared elsewhere. Rasmussen (1962) stated that in order to make our architectural experience multi-sensory in nature, people evaluate using space, matter and scale using various senses (Fernando & Hettiarachchi, 2017). For example, the 1960s flight Kevin Lynch revealed the urban image by evaluating how we can see and remember a city according to our ability to navigate (Lynch 1960). The design idea has been tried to be applied differently for all the senses and more pleasant sounds and landscapes are included in the surrounding environments.

When we look at spatial designs today, it is seen that multi-sensory approaches are in the foreground, more attention is drawn to daily practices, and perception is an important factor in spatial design in this perspective. Multiple sensory evaluation; It is described as a set of reactions consisting of variables related to visual, olfactory, auditory, touch, walking, air movement and temperature. Widely used in evaluating and measuring aesthetic preferences in landscaping; The methods used to define their qualities, protect valuable spaces, or make design decisions largely refer to criteria for the evaluation of visible spatial forms (Kljenak, 2014). According to Tuan (1997), space can turn into a place only by the cognitive evaluation of sensations and the realization of actions, and it forms a whole with the interaction of human relations and senses. Heidegger (1988) expresses experiencing a place as feeling that space through a layered matrix like sights, sounds, smells, touch sensations, pleasures, and often other sensations. Therefore, Hough (1990) claims that the understanding of space starts with emotions (Kljenak, 2014). A person sees, hears, tastes, smells, touches through the five senses, and feels and comprehends what he has gathered from all senses by associating with each other. Physical space is seen with images, felt with its texture, smell, taste, heard with sound, but it is comprehended by our feelings and experiences through time filter (Gezer, 2012). For this reason, it should be taken into consideration in planning, design, protection and management as an important criterion in other sensations in the landscape dominated by visuality. It is seen that non-visual factors have value as an indicator, and these values in aesthetic quality affect the definition, function and weight (Shahhosseini et al.2014). In this context, it plays an important role in the aesthetic quality of the landscape as well as its visual effect.

The sense of smell triggers emotional senses and, unlike vision, it involves direct thought and consciousness. It is stated that scent has a direct relationship with the subconscious. A scent can remind you of a situation, place or city better than an image. It is very important to the human spirit and behavior and has a significant impact on the planning and development of the city. The cultural diversity of odors becomes an environmental component of the difference between places (Sepe, 2013). Emphasizing the evaluation of all factors as a whole within the scope of the sensory dimension of the space, Degen and Rose (2012) state that the senses are a key in the coming together and regeneration of different spaces, and in this case, scent is as important as touch and sound. Szczepańska et al. (2013) stated that in the urban environment, the landscape not only affects visual stimuli, but also other senses (smells, sounds, touch - non-visual perception) and that in addition to the sense of sight, odor plays an important role in the perception of the landscape, and that in contemporary cities the visual stimuli to people. They mentioned the necessity of creating multi-sensory spaces and educational private spaces beyond the landscape. In this context, the value of auditory, olfactory, tactile and gustatory landscapes, beyond the visual landscape in the context of multi-sensory perception in urban areas with the scent feature of space and landscape, is beginning to gain meaning day by day.

Smell is expressive and is a subtle but important component of culturally normative and aesthetic rituals of everyday life. While it is used by the society as a cultural value as a tool for identification and communication, it is also a tool in the examination of cultural history (Classen et al. 1994). Generally, when defining a fragrance, it is assumed that its two properties, namely quality and density, are fully identifiable. The quality of a scent is explained by the different profiles of the essence of the fragrance. When determining the quality of the scent, the concentration level of the mixture is also important (Chastrette, 2002). It is stated that the visual value of the source is effective in sensing odors and this effect is related to the visual color of the source in the odor-color match. Looking at the relationship between odours and colors, it is stated that there is a cross relationship

between color and odor. For example, with the perception of the smell of strawberries in a market area, there is a visual tendency towards red fruits (Dematte et al. 2006). The response to a particular olfactory stimulus can vary from person to person when exposed to the scent again. The subjective responses related to sensation here depend on the intensity and intensity of the smell, the duration and frequency of exposure, as well as the pleasant / unpleasant sensation caused by the scent (Blanes-Vidal et al.2012), and these features constitute the character of the scent. Factors that characterize a fragrance; climatic conditions are density, duration, volumetricity and volatility, and fluctuations in temperature, wind speed, relative humidity and / or atmospheric pressure significantly affect the odor character and, accordingly, the sense of odor (Badach, 2018). The evaluation of Xiao (2016) regarding the scent landscape of a place is given in Table 1. According to Table 1, it is stated that the scent landscape is affected by the contexts of both people and the space.

Physical environmental features	Spatial form, materials, topology, closure of the area, sources of odor, etc.
Time and weather	Temperature, ventilation, wind, etc.
Emotional, physiological and behavioral responses	Memory relations and thought processes, human perception, socio-cultural status
Type of environment	History, culture, public or private, function etc.
Environmental issues	Traffic flow, incidents, crowds, etc.
Other sensory relationships	vision, thermal comfort and sound

Table 1. Scent landscape components (Xiao, 2016)

Canniford et al. (2017) express that the scent is the abstracted experiences of the space, the comprehensibility of the scents and the behavior of people connected to smells in certain areas, and their experiences depending on time and region are in a relationship with each other.

Considering that the scent character varies according to various factors, in this study, the smellscape was examined with observations in different usage areas in order to examine the change of the scent due to the spatial characteristics.

MATERIAL AND METHOD

The study, Kastamonu is located in Turkey's western Black Sea region constitute the main core of the center of the city was carried out in the urban historical area. When the studies on smellscape (Henshaw, 2011; McLean, 2014; Bouchard, 2013; Xiao, 2018) are examined, it is seen that the odours that vary depending on the use of different areas in urban spaces are examined. Within the scope of this study, the places used for recreational, commercial, religious, gathering and ceremony with high historical value in Kastamonu urban site are morning and evening) were observed between 2018-2019 and the average climate data for these periods were obtained from the meteorology station located in the city center. The observations were carried out by walking and standing in the spaces, and the act of sniffing was carried out by touching them with the odor sources. Short notes were taken to facilitate observations and a scoring from 1 to 5 was created for density.

In terms of environmental factors that characterize the odor, the slope conditions of the space in terms of openness-closure, building heights, size and topographic movements were examined and the odor sources and densities obtained from the observations on the development plan obtained from Kastamonu Municipality were mapped using the Vectornator program.

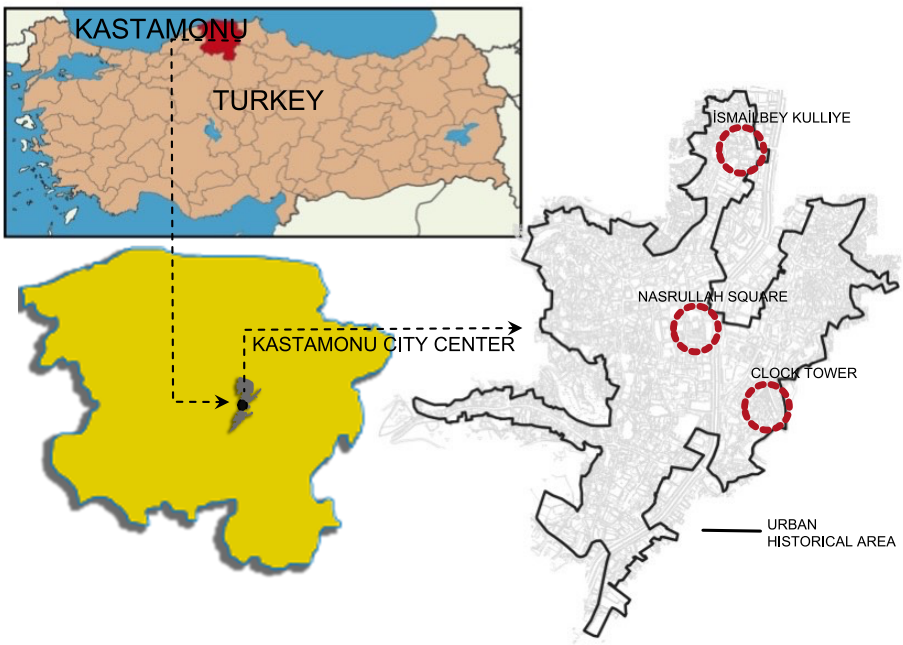

Figure 1. Study area

Chosen as a study area; The İsmailBey Kullıye includes İsmailBey Mosque, Tomb, Fountain, Deve Han, handicraft bazaar and residential areas around it. There is a pool in the handicraft market (previously used to study astrology phenomena) and commercial shops selling antiques, wooden products, and woven fabric products. Soap sales and hot drinks are served in winter in Deve Hanı. Kulliye is higher than the main vehicle and pedestrian road elevation of the city center, and access to the area is provided by an inclined road, and it is seen that these roads are narrow and their surroundings consist of different floor heights.

Nasrullah Square is located on the western front of the main carriageway of the city center. Nasrullah Mosque and Fountain at the focal point of the square, and the Frenkşah Bath in the northeast, with commercial and food and beverage areas around it. The area has been the center of the commercial district of the city from the past. All four sides of the square are surrounded by buildings. While there are single or two-storey buildings on the south facade, there are two, three and four-storey buildings on the northern facade. Local products are sold in commercial shops at the entrance of the square, and local food and food products are sold in food and beverage areas. There are 2 inns in the upper part of the square. While one of these inns is currently used as a hotel, the other has commercial shops and a tea garden in its courtyard. The Münire Madrasa is located on the back facade of the Nasrullah Mosque. Today, there is a food court and commercial shops in the madrasa. Nasrullah square is surrounded by new and old buildings with different storey heights connected to the main carriageway, where the surrounding area has a wide spatial opening.

The Clock Tower and its surroundings are located on the Sarayüstü Hill on the east side of the city center. It was built in 1885 by Governor Abdurrahman Pasha in a plan model without a balcony, at a height of 13 m (Bakırcı, 2005). There are residential areas around the clock tower, which is one of the important landmark points of the city. In this area, which is visited by citizens and tourists, there are eating and drinking places, a children's playground and outdoor seating units. The Clock Tower is located behind the Cumhuriyet Square, the main square of the city, and is at a higher elevation than the square and its surrounding old residential areas.

RESULTS

Considering the observation results of the change of the odor character according to the physical properties and climatic characteristics of the space, when the meteorological data of 2018-2019 are examined in terms of climatic, it is seen that the average temperature in the summer months is 20,15 ^{o}C and the humidity is 72,8%, in the winter the temperature is 0,25^{o}C and the humidity is 90,1% (Table 2).

Monthly Average 2019-2020												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Temperature oC	0,25	2,65	5,75	8,65	14,5	18,45	20,15	20,1	17,5	13,65	5,6	2,4
Humidity%	90,1	84,25	75,8	72,5	78,75	84,55	72,8	67,15	71,9	78,3	86,3	93,4
Wind m / s	1,15	1,4	1,55	1,6	1,35	1,35	1,6	1,6	1,35	0,9	0,95	0,95

Table 2.Climate data for 2018-2019

Studies on odor show an increase in odor density due to temperature increase (Le et al., 2005; Lin et al., 2006; Badach, 2018; Billottet, 2020; Ayan Çeven 2020). In the observations made within the scope of this study, it has been determined that odors are felt during the summer months when the temperature is above 25°C, the humidity is above 50% and the wind speed is below 8km/h. When the spaces with 3 different areas of use are examined, it has been determined that the diversity and intensity of the odor varies according to the climatic factors with more artificial odor diversity in terms of odor sources.

When the physical properties of the spaces are examined, it is seen that the structural elements in and around the İsmailbey Complex are more than the vegetal elements, while the registered residences have 3 floors at most, while the new buildings have 6 floors. Due to the elevation difference, there are one-way vehicle roads with a slope of 10-15% around the complex. It has been determined that the smell of water coming from the fountain and water pool inside the complex is felt only in the winter months in the summer months. As a result of the observation made in the İsmailbey Complex, the smell of plants from natural scents (*Cedrus libani, Rosa sp.*), The water smell coming from the astrology pool in the handicraft market of İsmailbey Madrasa and the fountain in the garden of the kulliye, the smell of natural stone from the building, and the wood from the souvenirs. its smell is felt. In terms of artificial smells, the smell of metal and books coming from the antique shop in the handicraft market, the smell of fabric coming from the shops selling souvenirs, the smell of fabric and soap from the Deve Han in the garden of the kulliye and the smell of the stove that is lit in the winter season can also be felt. You can feel the smell of mosque from the smells. When the immediate surroundings of the complex are observed, one can feel the natural smell of madder from the local stone printing workshop, the smell of wood and natural stone depending on the building materials. When artificial smells are examined, the smell of food coming from the residential areas, the exhaust smell coming from the vehicle roads and the soot smell originating from the stoves that are burned for heating in winter are felt. It has been determined that the diversity of artificial fragrances in terms of odor sources in and around the complex is greater than the natural odor diversity and it is felt more intensely (Figure 2). The smell of soot and exhaust is the most intense in and around the complex. Although the plant community is high, it is low in density due to the lack of plants with odor characteristics. In the handicraft market, the smell of wood is the most intense, while the fabric smell is the least intense.

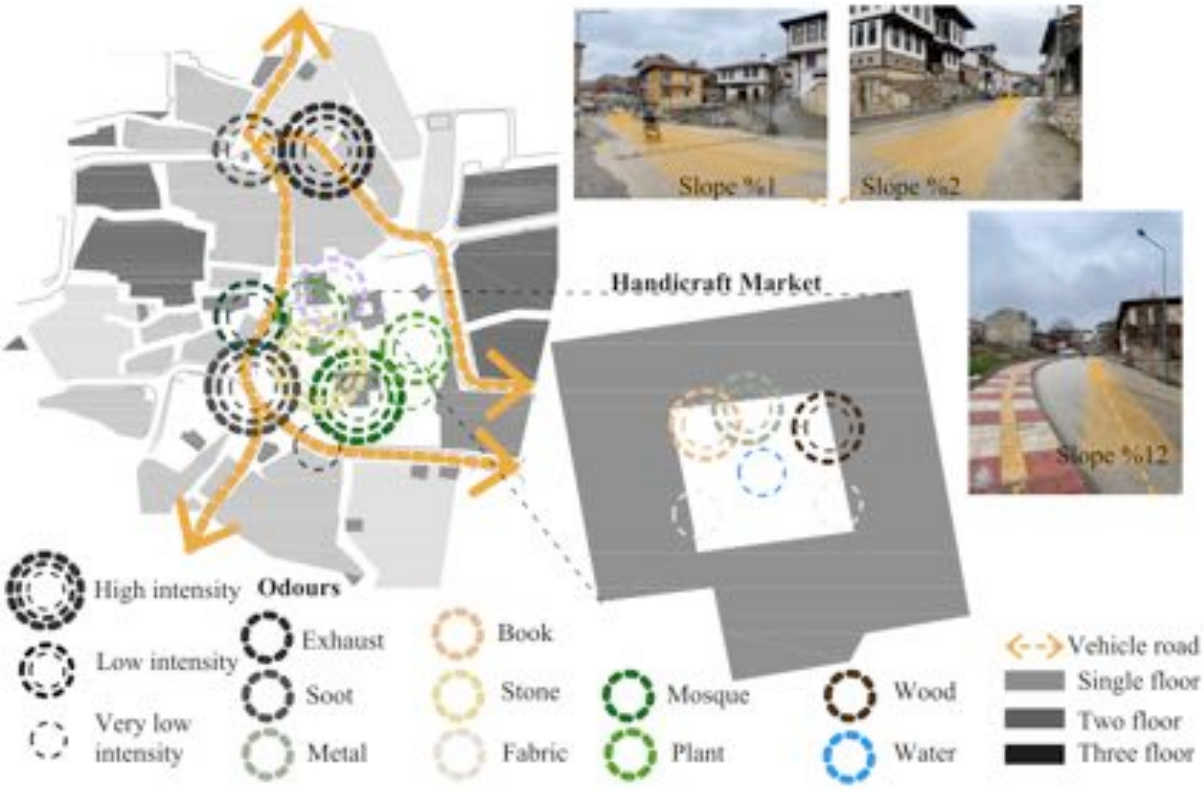

Figure 2. The Smell map of İsmailbey Complex and its surroundings

As a result of the observations made in Nasrullah Square, the smell of plants (*Cedrus libani, Tilia tomentosa*), the smell of water coming from the fountain, the smell of stone (travertine), the smell of garlic coming from the sales units, the smell of the bird (pigeon) feeding in the square. In terms of artificial smells, the smell of stone (andesite), pulling halva from food smells, bald bagel smell, bacon smell, newspaper smell coming from the sales unit, fabric smell originating from the local woven cloth and food smells from the dining areas can be felt. It has been determined that the artificial fragrance diversity is higher than the natural fragrance diversity in this region in general. While the smells of plants, stones, garlic, pastırma, water are constantly felt in the area, the smells of bagel, exhaust, food, leather are felt between 8.30-18.00 hours of the day. It is seen that the structural elements of the Nasrullah Square are more than the vegetative elements and the buildings around the square are at least 2 and maximum 5 floors, the areas of the square that are at the same level with the main vehicle road, and the upper part of the square is solved with ladders and ramps due to the elevation difference. Vehicles are allowed in certain areas and there is one-way traffic. Odor intensities coming from odor sources such as garlic, bagel, pastrami, food, and birds are more common in summer. The intensities of the smell of pigeon and bagel come after the garlic smell. It has been observed that the large amount of garlic is sold at the first entrance of the square and its density is higher due to the fact that it is a place with a more closed ratio compared to the square (Figure 3).

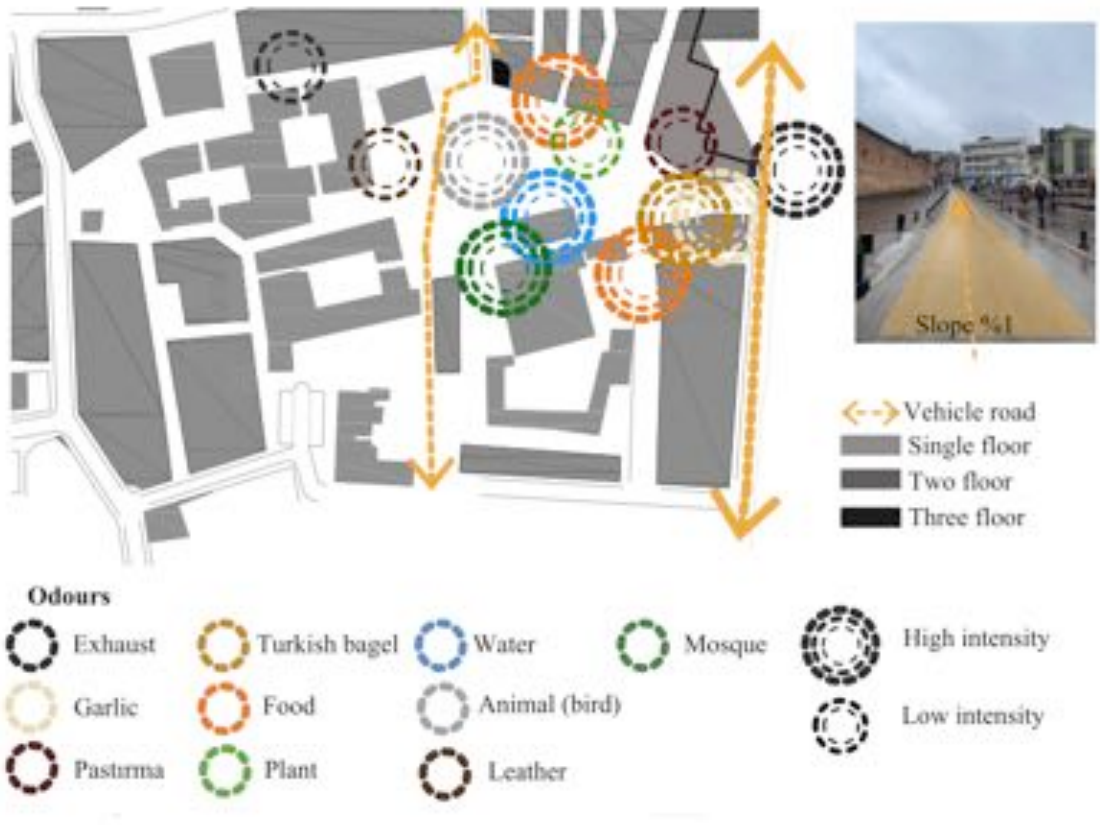

Figure 3.The smell map of Nasrullah Square.

As a result of the observations made in the Clock Tower, the smell of plants (*Tilia tomentosa*), natural stone, and the smell of food coming from the food and beverage area in the clock tower and the smell of food coming from the residential areas around the tower and the smell of the exhaust from the carriageway. It is felt. It is felt that the artificial fragrance diversity of the surroundings of the tower in terms of odor sources is greater than the natural odor diversity. It is seen that the plant elements in the Clock Tower and its surroundings are more than structural elements and the construction is at most 4 floors. Due to the difference in elevation with the city's main road, there are roads with a slope of 10-40% around the Clock Tower, and it is seen that the vehicle roads are one-way. While the variety of artificial arrow is higher in the area, it has been determined that the plant scent *Tilia tomentosa* plant, which is one of the natural odor sources, has a high odor density during the flowering season.

Figure 4. The Smell map of the Clock Tower and its surroundings.

It was determined that there is diversity in the sources of odors in 3 different places, which were examined according to spatial and climatic features above. Nasrullah Square offers more variety of fragrances depending on religious, tourist and commercial use. The Clock Tower and İsmailbey complex do not offer much fragrance diversity due to their location around their living areas. However, when examined according to the spatial features, the streets are narrow and depending on the construction, these two areas contain areas with more closed space than Nasrullah Square. Due to this situation, the exhaust odor was felt more in areas with high closure rates, especially on sloping vehicle roads.

CONCLUSION

With the popularization of the concept of sensory space, the auditory landscape has taken place with various approaches in addition to the visual landscape. In the last 10 years, scent has started to be emphasized alongside these senses, and the scent landscape has also been guiding the design as a value in spatial arrangements. Therefore, depending on the relationship between sensation-behavior-experience in the space setup, it is seen that the scent character can change depending on the physical characteristics of the space. It is seen that especially the openness-closure of the space allows the scent to be trapped in a certain area, so that the fragrance character is felt more. At the same time, it is seen that in the pedestrian and vehicle circulation created in the inclined areas, the undesirable exhaust smell due to motor vehicles is felt and this action increases in narrower spatial corridors. At the same time, it is observed that odors vary according to climatic characteristics, especially in areas with a high rate of closure, which is caused by stoves used for heating in winter.

Therefore, in terms of the physical characteristics of the space according to the odor sources that are preferred or not within the concept of smellscape;

• At the points where the pedestrian and vehicle circulation should be resolved together, keeping the closure rate lower, analyzing these circulation in wider openings and screening with fragrant plants between the pedestrian and the vehicle road,

• The orientation to the space by creating corridors with high and narrow circulation, depending on the function of the space in the spaces that vary according to the purpose of use,

• Considering the increase in the character of the odor sources due to the height of construction and the high rate of closure, for odors that are not preferred to be used in the space, creating screening air corridors to prevent the distribution of the odor to the whole space,

The contribution of odor sources, whose character changes depending on the physical characteristics of the space, to the identity of the city, especially in urban spaces, is important. Many local products that take place in geographical indications and the fragrances of these products constitute an important component of the space. As a result, it shows that the unique fragrances of various places used for religious, recreational and touristic purposes should be evaluated together with many factors in the design and planning stages, keeping the role of the space in the definition, experiencing and orientation. Thus, the space will offer different experiences with its scent dimension beyond just visual pleasure. At the same time, the fact that the odor character of the exhaust odor, which emerged as a striking result as a result of the observations, is more noticeable due to the slope and closure, indicates the need to evaluate the odor factor in terms of both health and satisfaction, as well as an important factor such as safety in vehicle and pedestrian circulation.

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COASTAL LANDFILLS AND THEIR GREEN HERITAGE POTENTIALS - CASE OF ISTANBUL

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Abstract

The coastal landfill areas have been increasing in number as a response to the needs of the coastal megacity of Istanbul. The history of coastal filling in Istanbul dates back a long time ago. This study brings the cultural and historical coastal landfills into the discussion and attempts to evaluate the performance of them by comparing the literature-based data and experts' interviews for the sustainability of Istanbul's coastal heritage.

This study handles nine of the historical areas of the European and Anatolian Peninsulas of Istanbul, which are the coastal-filled areas of Dolmabahçe, Haydarpaşa, Fenerbahçe peninsula, Haliç shipyard, Galata pier, Ortaköy square, Üsküdar square, Moda and Rumeli fortress. The time interval of the selected coastal-filled areas ranges between the 17th and 21st centuries. Even the coastal-filled areas within the near-century are the filled areas attached within the historical units.

This study establishes a four-phase process. The first phase, which relies on revealing the literature-based values of case studies, benefits from the old photographs, old maps, and narratives. Following these literature-based studies, interviews were conducted with 15 experts from the disciplines of architecture and landscape architecture. Some questions regarding the relation between green heritage and coastal landfill areas were forwarded to the experts in advance of the interviews. Then, experts were inquired about the dominant features, landscape characteristics and values for the selected case studies by showing the old and current photographs, maps, and air photographs. To evaluate the green heritage perfomances of the case studies, a multi-criteria analysis was conducted benefitting from the Likert scale grades forwarded by the experts to determine the parameters as ecological, social, historical, cognitive, and physical.

This study focuses on the interplay between the coastal city, filled areas, culture, and landscape character to evaluate the green heritage performances of the selected coastal landfills. Discussions on the green heritage capacities of the coastal-filled areas are essential for developing holistic coastal landscape strategies for the cities. This study attempts to open a discussion on the coastal green heritage concept, not only for the benefit of Istanbul megacity but for the other coastal cities.

Keywords: Historical city, Coastal landfill, Multicriteria analysis, Green heritage, Istanbul

INTRODUCTION

Land reclamation has been widely adopted throughout the coastal zone to accommodate the new urban development projects (Sengupta et al., 2018). In Istanbul, which has been a significant historical coastal city, the numbers of the coastal-filled areas have increased throughout the years depending on the response to the needs of the rapid urbanization.

Indeed, the history of coastal filling in Istanbul dates back a long time ago. Such that, coastal filled areas have taken part in the *Kanunname-i Arazi* (1858), which was a regulation about the coastal sites (Kılıç et al., 2014).

There is an ongoing discussion about the adverse and positive impacts of coastal-filled areas. The coastal-filled areas generally have been mentioned for their adverse effects on the natural environment. The significant adverse effects of these coastal areas on environment can be classified as "*loss of natural habitat and the subsequent potential reduction in biodiversity, erosion of the coastline and pollution of the marine environment especially from acid sulfate soils*" (EPA Northern Territory, 2006).

This study interrogates the green heritage potentials of the cultural and historical filled areas of Istanbul. Person & Li (2018) define green heritage as;

"What then is green heritage? In brief, it is the part of our history that is about plants and plant environments. Most people tend to associate history and cultural heritage with man-made things such as buildings, books and beads. Plants, on the other hand, are not typically associated with history or cultural heritage. Unfortunately, the role of the green heritage in human history has too often been ignored by organisations working with preservation, study and display of historical sites and artefacts. In many cases, plants and plant locations have even been destroyed in the process."

In this study, green heritage is handled as *"natural and cultural heritages that are subject to landscape planning and design studies"* (Tekeli & Turer Baskaya, 2015). Cultural heritages are defined by their inestimable and unchangeable values pertaining to all of humanity and are required to be defined, preserved, managed, demonstrated, and transferred for generations to come (UNESCO World Heritage Centre, 2019). Olmsted had started the first leg of his project depicted as a 'Green Ribbon' with the Back Bay Fens, benefitting from salt marshes to get rid of a swamp clogged with sewage and a series of flood gates to redirect Muddy River's sewage to the Charles (Bilis, 2018). The Boston Emerald project ,enriching all way to Brooklyn, is still significant for citizens as a 'backyard' and for more than one million tourists every year as a 'destination point' (Url-1).

Boston Emerald Necklace project has been referred to as an example of the *"Preserving Historical Junctures: The following infill projects enabled significant cultural districts to emerge:"* (Url-2). Thus, considering the Boston Emerald Necklace project and the literature study, this study brings the historical coastal-filled areas of Istanbul to discussion and attempts to evaluate the performance of the coastal-filled areas as a green heritage for the sustainability of Istanbul. Because *"cities rely on the functionality of their infrastructures"* (Turer Baskaya, 2018).

MATERIALS AND METHODS

This study brings the cultural coastal-filled areas of Istanbul into a discussion. It attempts to evaluate the performance of the coastal-filled areas within these environs by comparing the literature-based data and expert interviews for the sustainability of the coastal megacity of Istanbul. Nine coastal infills dating back to different time periods were selected as case study areas which are Dolmabahçe, Haydarpaşa, Fenerbahçe peninsula, Haliç shipyard, Galata pier, Ortaköy square, Üsküdar square, Moda, and Rumeli fortress. Selected areas are marked on the Istanbul Metropolitan Municipality (IMM) map in order to show the dispersion of the sites in Figure 1.

Figure 1. Selected case study areas are marked on the map adapted from IMM map (Url-3).

Nine case study areas dating back to time periods between the 17th and 21st century are shown in Table 1. While some of the coastal-filled areas hold the historical units on them, the others are attached to the significant historical units.

Coastal Fills	Periods
Dolmabahçe	17th century
Haliç shipyard	Earlier 18th century
Haydarpaşa	19th century
Ortaköy square	Late 19th, Early 20th century
Moda	20th century
Galata pier	20th century
Fenerbahçe peninsula	20th century
Üsküdar square	21th century
Rumeli fortress	21th century

Table 1. Coastal fill periods of the selected sites (Çelebi, 1896, Url-3, Url-11, Url-12).

Among the nine study areas, five of them stand on the European Peninsula while the others take place in the Anatolian one. The coastal-filled areas of Dolmabahçe, Haliç shipyard, Galata pier, and Rumeli fortress are situated within the historical areas of the European Peninsula of Istanbul, as shown in Figure 2.

Figure 2. The historical and cultural coastal-filled areas within the European peninsula of Istanbul (Url-4, Url-5, Url-6, Url-7).

The coastal-filled areas of Haydarpaşa, Fenerbahçe peninsula, Üsküdar square and Moda are situated within the historical areas of the Anatolian Peninsula of Istanbul as shown in Figure 3.

Figure 3. The historical and cultural coastal-filled areas within the Anatolian peninsula of Istanbul (Url-8, Url-9, Url-10).

This study establishes a four-phase process. The first phase, which relies on revealing the literature-based values of case studies, feeds on the historical photographs, maps, and narratives. In order to demonstrate the spatio-temporal change of the coastal filled areas, *Seyahatname* first volume (Çelebi, 1896) for Dolmabahçe, 1882 city map and 1913-1914 German Blues for Haydarpaşa and Ortaköy square, 1918 Necip Bey Map and 1922 city map for Moda, 1922 city map and 1966 air photographs for Galata pier, 1946 and 1966 air photographs for Üsküdar square, 2017, 2018 and current air photographs for Rumeli fortress (Url-3, Url-11, Url-12) are superimposed.

In the second phase, interviews were conducted with 15 experts. Few questions regarding the definition of green heritage and the relation between the green heritage and coastal filled areas were forwarded to the experts in advance of the major interviews. Then, experts were inquired about the dominant features, landscape characteristics and values for the selected case studies by showing the old and current photographs, maps, and air photographs.

To evaluate the green heritage perfomances of the case studies, a multi-criteria analysis was conducted benefitting from the 3 point (Exists, Medium, Does Not Exist) Likert scale grades forwarded by the experts to determine the parameters as ecological, social, historical, cognitive, and physical. In the third phase, the green heritage performances of the case study areas are evaluated. Last phase has attempted to develop holistic coastal landscape strategies for the coastal megacities.

Figure 4. Flowchart of the study.

Flowchart of this study is shown in the Figure 4.

RESULTS AND DISCUSSION

Dominant features of the case study areas revealed from the expert interviews have shown that in comparison to the soft landscape features, hard landscape features have a more dominant character within the case study areas. Selected areas stand out as significant heritage and tourism sites. Although it appears that a significant landscape characteristic as existing as a component of the urban green network has been lost in the course of time. Besides, coastal landscape characteristics concerning environmental issues such as tidal areas have been unread in these selected areas, which should be a priority in terms of coastal landscape strategies.

According to experts' interviews, these cultural and historical coastal landfills possess some social, collective, historical, and visual values, although they are inadequate in terms of their ecological values. It needs to be highlighted that other significant values were the economic values that point out the vulnerability of the sites and make them open to speculations.

Figure 5. Ecological parameters determined by the experts' interviews and literature based studies.

The results coming from the expert interviews and literature-based studies have verified the existing risks for the coastal-filled areas during the sea-level rise, floods, and earthquakes (Figure 5). Particular attention should be paid for these areas, which are heritage sites with specific hard-soft landscape elements and public identity. The vulnerability of these specific hard-soft landscapes to sea-level rise has been revealed in the *'İklim Riski Olay İncelemesi Türkiye Raporu'* (Url-13). Üsküdar square, Haydarpaşa, Moda and Fenerbahçe peninsula in eastern Marmara was considered high risk in the tsunami risk assessment actualised by Turer Baskaya (2018).

Another significant main parameter for the ecology parameter is the blue-green infrastructure. It is observed that these areas have a poor blue-green infrastructure system. Although the report of Ministry of Culture and Tourism declares that during the construction of the Dolmabahçe place, underground tunnels were constructed to discharge the waters coming from the high points such as Taksim, Nişantaşı, Fulya, Ihlamur to the sea without damaging the palace as well as to ventilate the palace floor, there are still robust concerns about the nature sensitiveness of the study area (Url-14). Also, as another case study, Ortaköy Dereboyu avenue had been Ortaköy stream before (Url-15). Therefore, rich flora and fauna are absent in the majority of the selected coastal-filled areas.

Figure 6. Social parameters determined by the experts' interviews and literature based studies.

Selected coastal-filled areas such as piers and squares are strong in terms of social performances such as various activities taking place, being a meeting point, and being a part of a promenade (Figure 6). It also should be highlighted that inclusiveness is an another significant social parameter that is needed to be addressed primarily. The design project for Ortaköy square was developed from the surveys conducted with the users of the area. The entire area has been freed from the vehicle traffic. Damat İbrahim Pasha Fountain, which remained underground for years, has been removed across the mosque and placed above the ground level. The square has become a more frequented place than other Bosphorus villages after the replacement of the coverings of the floor, sitting, and landscape arrangement (as cited in Öztürk, 2009).

Figure 7. Historical parameters determined by the experts' interviews and literature based studies.

The time interval of the selected coastal-filled areas ranges between the 17th and 21st centuries. The representativeness of being a cultural heritage was at the medium level in the younger filled areas which are the ones staying beside the historical units but not carrying them onselves. The knowledge of the coastal infill history has differed in accordance with the different time periods. Evliya Çelebi mentions that the name of Dolmabahçe comes from the fact that Dolmabahçe was filled with stones brought by the ships on the Sultan Osman's decree (Çelebi, 1896), which strengthened the historical potential of Dolmabahçe.

Figure 8. Cognitive parameters determined by the experts' interviews and literature based studies.

Cognitive parameters were one of the primary parameters in terms of the evaluation of the coastal-filled sites' potential as green heritage areas. The impact of the coastal-fills to the identity of the coastal sites was remarkable in some of the selected cases as Ortaköy Dereboyu avenue was Ortaköy stream before (Url-15). In most of the cases, universal and individual connections were high. Universal connection can equal to the cultural and historical meanings of the selected case studies. Individiuals' connection to these places can be related to the frequency to areas such as Ortaköy square and Moda (Figure 8).

Figure 9. Physical parameters determined by the experts' interviews and literature based studies.

The results from the expert interviews and literature-based studies have demonstrated that spatial tissue consisting of a distinctive morphology and dense green areas was questionable in the coastal-filled areas. Although there were questions about the accessibility to the site areas within a bicycle network, their proximity to residential areas and ferry transportation was a significant parameter measuring their potential. Characteristic hard-soft landscape elements were less evident in the near past accomplished coastal-filled areas. High-level visibility and ensuring a good scenery were the other dominant physical sub-parameters.

CONCLUSION

The history of coastal filling in Istanbul dates back to a long time ago, since the Ottoman period. The numbers of coastal landfill areas have been increasing considerably in Istanbul, as in other coastal megacities. Considering their time interval, this study brings the nine cultural and historical coastal landfills into discussion and attempts to evaluate their ecological, social, historical, cognitive, and physical performances with the help of literature-based studies and experts' interviews.

As the numbers of coastal landfill projects are increasing, this study attempts to take ongoing discussions regarding adverse and positive impacts of the coastal-filled areas into a new direction by discussing their green heritage capacities, which are essential for developing coastal landscape strategies for the cities. It is thought that other coastal cities, developing coastal landfill projects, can benefit from the example of Istanbul coastal megacity.

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A GLOSSARY FOR THE POST-PANDEMIC CITY

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Abstract

In this paper, I attempt to compile a glossary of relevant terms and themes that appear in the discussions regarding the post-pandemic city. To do this, I compile a group of academic papers on the subject, analyze them, and detect the most frequently recurring terms. After forming a list, I attempt a brief articulation these terms depending heavily on the initial compilation of papers but benefitting from others as well. In the end, rather than formulating a novel argument for the post-pandemic city or venturing an in-depth study of a single or a few themes related to it, my aim here is to lay out and map the landscape of discussion through a literature review.

Introduction and methodology:

Although the COVID-19 pandemic is still far from being over its aftermath is being discussed for some time now. The effects of the pandemic have been very dramatic, widespread, and life-altering. That is why there seems to be some consensus that even when it is over and we go back to "normal," it is going to be a different kind of and new normal; in that we will live with the consequences of the pandemic, that it will change us and how we relate to the world. As with the previous public health crises of comparable scale, such as the cholera outbreaks in the 19th century or the so-called Spanish Flue in the aftermath of the First World War, COVID-19 too will definitely have various effects on planning, urban design, and architecture. We do have some initial thoughts on what those might be, yet it is next to impossible to be sure as it is unclear how and when we will exit from the pandemic. As these changes are inevitably connected to the post-pandemic society much will depend on what that will be like. It is somewhat easier to imagine that in the cases where the pandemic strengthened or accelerated the already existing societal trends its effects will likely be more permanent; trends such as digitalization, shifting of retail to online, remote working, and the like. Yet the effects of the pandemic will definitely be more than these.

Here I try to figure out what are the relevant themes and terms for the discussions on the post-pandemic city. In order to that, first I compile a limited set of papers on the subject. Among the results of a Google Scholar search with the "post-pandemic city" entry, I selected 8 papers that: 1. appear on the top of the list, 2. do not focus on a single city, 3.do not dwell on another major topic, 4. were cited by other papers. Then I initially used a quantitative method to determine the most frequently appearing terms. More specifically, with the help of a simple code I listed all the words in each paper and ordered them on the basis of their frequency. After this initial automatized stage, I grouped some of the terms manually. This grouping was quite straightforward in some cases, for instance in the case of grouping of the same word with different prefixes and suffixes, such as 'work,' 'working,' 'worker,' 'telework' and the like. These were shown with the root word followed or preceded by a hyphen. Other groupings had more to do how these words were being used in the texts and which were used interchangeably, for example 'international' and 'global'. While these terms have their differences the way they were used in papers were similar, consequently it made sense to group them so they would make the cut. All this resulted in a table of terms and frequencies. Within this table I selected the top four frequent term in each paper. While making that selection, I deployed two rather straightforward decisions and two that relates more to the content. On the straightforward side: 1. I excluded words like prepositions, modal verbs, 2. I excluded words that are the very subjects that these terms aim to describe, for example city, urban, architecture,

pandemic, virus. Coming to the decision that relates more to the content and explanation the terms, 1. If two terms are very closely related I picked the one that is more comprehensive, and incorporating the other, for example from 'mobility,' 'biking,' and 'walking,' I picked the first one and touched upon the latter two within the context of the first, 2. Lastly, I chose terms that relate more to the scope of the paper; in other words, since cities (pre and post pandemic alike) as the primary context of most human activities are extremely complex, comprising a myriad of social, economic, political facets, I limited the selection to the terms that have a stronger spatial aspect. After this process, the resulting list comprised 16 terms, since there were overlaps between the selected papers. These terms in the alphabetical order are: environment, data, density, dispersal, economy, global, government, home, local, mobility, network, online, public, social, sustainable, work.

Authos(s)	Barbarossa	Batty	Couclelis	Parnell	Kellerman	Kleinman	Nathan & Overman	Sahrifi & Khavarian-Garmsir
Four most frequent terms	mobility	world, global-	world, global-	government	global-, international	economy	work-	social
	sustainable	network	people, social	local, national	domestic-, local	social	home	economic
	public	work-	work-	world, global-	-work-	global-, international	social, people	data
	people, social	social, people	dense	public	online	work-	economy	environment-

Table 1. Four most frequent terms in the selected eight papers.

ENVIRONMENT

The pandemic came on top of an ongoing environmental crisis, or as many have commented, in relation with it. Aaron Bernstein asserted "we don't have direct evidence that climate change is influencing the spread of COVID-19, but we do know that climate change alters how we relate to other species on Earth and that matters to our health and our risk for infections" (Bernstein). He adds that climate change makes animals change their habitat and deforestation causes loss of habitat, both of which entail animals "coming into contact with other animals they normally wouldn't, and that creates an opportunity for pathogens to get into new hosts." Bernstein also warns that industrial livestock farming "can also serve as a source for spillover of infections from animals to people," which means a decreased demand for meat and sustainable animal husbandry "could decrease emerging infectious disease risk and lower greenhouse gas emissions." Besides increasing the risk of pandemics, environmental problems make them deadlier as well. For instance, studies have shown that mortality rates due to COVID-19 is higher among people who live in areas with air pollution (Wu et al, 2020). In any case, a renewed understanding of our relationship with, or rather 'in' the nature, is much required to lessen our effect on the environment.

DATA

During the pandemic, especially in its earlier months, many have become careful observers of the data on the spread and effects of coronavirus with the hope of getting a better grasp of the situation. Daily figures of new cases, causalities, and later of vaccinations are being followed not only by the experts but also by a large part of the population. Yet, obviously these and more comprehensive data is not only used to monitor the situation but for developing responses and measures for containing and controlling the pandemic. An OECD report lists the uses of relevant data as: "taking informed policy actions quickly, improving communication on the current state of play, carrying out scientific analysis of a dynamic threat, understanding its social and economic impact, and enabling civil society oversight and reporting" (OECD, 2021, 3). In some cases, as Sharifi and Khavarian-Garmsir report, data was used in order to refrain from "total lockdown that has major socioeconomic ramifications".

South Korea, for instance, "has, since the early stages of the pandemic, applied extensive surveillance based on anonymized spatio-temporal mapping, using smart technologies including debit/credit card transaction data, mobile phone data, and CCTV data, to trace the mobility of patients". We have seen other cases where already existing infrastructure for smart city governance were being used for providing information that can help formulating and testing coronavirus measures. However, unsurprisingly, all these data collected and monitored by the authorities also raised concerns for privacy protection. Another issue regarding the state-data relation is transparency. Although the issue is complex, one of the areas where it becomes most apparent is whether the authorities are sharing reliable and correct data with the public or not. In Turkey, for example, the amount of new cases was undisclosed for long period which arguably caused many to underestimate the risk of infection.

DENSITY

Since the coronavirus spreads mainly through close contact between people, densely populated cities were quickly blamed for the contagion. Many big cities actually did report very high numbers of cases from time to time. Then again not all of them did. Richard Florida reminds that "some hyper-dense Asian cities, like Singapore, Seoul, Hong Kong and Tokyo, succeeded in managing the initial outbreak quite well" and there were differences between metropolises in the US, for example, "San Francisco, the second-densest city in the U.S., had much more success than New York at limiting the impact of the virus" (Florida, 2020). He goes on to argue "COVID-19 has not only taken root in dense, global cities, but in several other kinds of places. It spread through workers and factories in interconnected supply chains in the industrial centers of Wuhan, Detroit, and Lombardy. Global resorts on the Alpine ski slopes of Italy, Switzerland and France, and their counterparts in the Rocky Mountains, were also well-known hotspots for the virus's spread. By late April and early May, the virus was spreading faster in rural or non-metropolitan areas than urban centers." Hamidi *et al*, who studied 913 US metropolitan counties asserted that "findings suggest that connectivity matters more than density in the spread of the COVID-19 pandemic" (Hamidi *et al*, 2020, 495). They added "counties with higher densities have significantly lower virus-related mortality rates than do counties with lower densities, possibly due to superior health care systems." Other commentators pointed to overcrowding instead of density. Adam Rogers wrote, "when it comes to density, the trick is picking a scale. COVID-19 isn't a problem of square kilometers, but one of square meters—of the number of people per unit of housing" (Rogers, 2020).

Figure 1. Photograph CNN.

DISPERSAL

Mark Kleinman noted that during the pandemic "the very benefits of global cities – high degree of connectivity, density and agglomeration – have been found also to be vulnerabilities," and asked "are we now headed for a new Age of Dispersal – an era marked by lower population densities, lower rates of mobility – especially long-distance mobility – and the growing importance of smaller cities and towns?" (Kleinman, 2020). Dispersion has a long history, at least since Ebenezer Howard's Garden City. Especially after the Second World War ideas of diffused, fragmented urban areas gained momentum. Theoretical positions such as *La Città Diffusa* or Los Angeles School found a sizable audience and urban areas such as Dutch Randstad, German Rehn-Ruhr metropolitan region, or Pearl River Delta of China provided examples of interdependent, well connected group of relatively smaller cities. Yet during the pandemic the idea gained further momentum especially when the dense centers of big cities were hit hard. Decentralization comes, however, with costs: urban areas growing at the expense of countryside or nature, more and wider infrastructural networks, longer commutes, more emissions, and the like. Kleinman goes on to argue that polycentric "may have some advantages over the traditional urban pattern in which a dense center of concentrated economic activity is surrounded by successive rings of mainly residential development" as long as such spreading out of economic activity also retains "connectivity and some aspects of centrality" (Kleinman, 2020). Helen Couclelis seems rather sure about the future of cities as she asserts, "as for the flight from the dense city, this has been around a very long time, both as fact and as ideal," because of various motivations such as "the desire of avoiding polluted air and disease," or "for more land, for safer places to rear children," due to "the love of open nature," and even because of the "fear of being the target of nuclear bombs" (Couclelis, 2020, 1123). She adds all these have been "expressions of one-half of the love-hate relationship people have with cities," which "continued to thrive, regardless."

ECONOMY

The pandemic had major consequences for economy, especially at times of lockdown. These are uneven too. While essential sectors continued at some cost or retail shifted more to online, some sectors took heavier hits. Kleinman asserts "leisure, hospitality, culture, night-time economy and events sectors that are a vital part of many global city economies, social distancing is not just an additional cost factor but a possible threat to the viability" (Kleinman, 2020). For manufacture, even if the pandemic were to end tomorrow, recovery will be painful on a global scale. While news and figures about the increasing fortunes of the superrich circulate in the media (Neate, 2020), the majority of the people are facing, and likely to continue experiencing, economic hardships. Michael Batty, among others, predicts some parts of the economy will never come back as "some businesses will have gone broke, unemployment is bound to rise," moreover even in the UK about half of all employers will not be able to return to "their former life styles, at least for a while" (Batty, 2020, 549). The pandemic associated global economic recession will be a strong determinant for the post-pandemic city. Another economy related issue is possible changes in the structure of demand. If knowledge workers, especially in developed economies continue to work more from home in comparison to pre-pandemic world, the demand for office space, retail space, cars, gasoline, and clothing may decrease while that of housing and electronics may increase (Dollar, 2020).

GLOBAL

In the second quarter of 2020 global trade dropped 18.5% (WTO, 2020). Many borders were closed the same year. Many global networks and relations be them business, leisure, or supply were disrupted. It is expectable that the reliance on global networks and foreign goods will be questioned in the near future. Batty argues, even "before the pandemic, there was already a strong movement globally in many nations where the concern was with bringing production back onshore" (Batty, 2020, 548). It is being speculated that the "current crisis will fundamentally change key economic actors' risk appetite, triggering a renewed risk assessment that will lead to the comeback of buffers and borders across industries," and this "partial return to regionalization will involve a

form of de-globalization" (Brakman *et al*, 2020). On the other hand, there others who, although understands the tendency to move manufacturing onshore and build up local inventories, remains skeptical. Willy Shih argues that "the cheap labor and reduced manufacturing costs that drove production overseas in the first place haven't changed," in fact, "an argument could be made that with the global economic downturn, they are a greater draw than ever, with millions out of work and short on money" (Powell, 2020). He points to the fact that re-shoring and low costs are in direct contradiction right now.

GOVERNMENT

Susan Parnell asserts that "for COVID-19 reconstruction to work, all of government has to become more active and visible not just in rolling out stimulus packages but in making the much long-term commitment to reshaping how urban systems function for the public-good and how money and power are distributed at the sub-national scale to provide protection to the vulnerable and uphold safety and security for all (Parnell, 2020, 1143). She adds, "to properly respond to the scale and complexity that crafting post-COVID city government implies, there must be radical adjustments made to the qualification frameworks of civil servants, professional standards and the training emphasis of the millions of service providers who make cities work on a day-to-day basis. In short, a fundamental reworking of key elements of how we govern cities is required" (Parnell, 2020, 1144).

HOME

In the pandemic home became much more than what it used to be in that it had to accommodate more of our activities. For many it also became a place for work. In a lot of countries online education became widespread, especially in higher education, which translated into kids, teenagers, and young adults spending much more time at home, away from face-to-face interaction with their peers. There also other activities that we do more at home now. People exercise more at home, they rely more on home entertainment, socializing shifted to online even more than before and its physical location is again our homes. This obviously has its effects on our psychology and productivity. These effects are not the same for all as the housing conditions depend heavily on socioeconomic conditions.

As to the consequences of this context in the urban scale, Nathan and Overman argue that it may reinforce

spatial segregation, rather than 'levelling up' (Nathan and Overman, 1539). They assert that "for home-working households, less commuting weakens the link between residential and work location," which "means non-work considerations can play a bigger role in choosing where to live". This may prompt "wealthier households moving to desirable suburbs" eventually increasing "house prices in desirable non-urban locations". Since "higher-paid jobs are more amenable to remote working" in the first place the price effects would be reinforced.

LOCAL

As Kellerman argues, "governments have had to cope with new challenges regarding the balance between the domestic and the global, at times of global lockdown" and these "changes may continue to prevail, fully or partially, in post-Corona cities worldwide" (Kellerman, 1125). It is possible to imagine local will gain more importance in the near future, in terms of governance as well. Parnell argues that "government cannot define urban strategy or run cities alone, but healthy cities (like resilient cites, climate proofed cities or inclusive cities) cannot be achieved without well-informed and effective government that has credibility, capacity and good information at the local scale" and to "achieve pandemic resilient urban places, the instruments of national and local government have to be repurposed to address the pressing challenges of the day" (Parnell, 2020, 1144). While the worst-case scenario definitely did not happen, food supply chains were disrupted to some extent during the pandemic. According to Sharifi and Khavarian-Garmsir, the issue of urban self-sufficiency is becoming more prominent which may add momentum to urban farming movements aiming and shorter and local food supply chains (Sharifi and Khavarian-Garmsir, 2020).

Figure 2. Photo from the ABC News article: City farming on rise as COVID-19 makes people rethink how they source their food: "An urban farm in East Brunswick in Melbourne is seeing a surge in demand for locally grown food by those stuck in lockdown." https://www.abc.net.au/news/rural/2020-10-25/urban-farming-on-rise-due-to-covid-19-pandemic/12797672

MOBILITY

One of the major consequences of the ongoing pandemic is the restriction of mobility on virtually all scales. International, even intercity and intracity travels have been restricted or banned in various countries depending on the severity of the condition in the given country at a given moment. Many activities from business to education are shifted to online platforms and tools in order to minimize contact between people both within buildings and during travel. While mobility is reduced, it does continue. Two seemingly

Figure 3. A new bike lane in Berlin, April 2020. Photographer: Krisztian Bocsi/Bloomberg

contradicting tendencies coexist. Due to the difficulties in physical distancing in public transportation it became likely for people to rely more on their cars. This, however, is obviously not sustainable, creating problems both on practical levels, such as traffic jams, and on a much larger scale as it contributes to ongoing climate crisis. It also runs against the agenda of many cities, most notably such as Barcelona, Paris, and Milan, that have been implementing measures for reducing car use and carbon emissions. Such agenda, especially as seen in that of Paris, includes reducing mobility altogether by providing various urban functions within close, or rather, 'hyper-proximity'. As opposed to the increasing dependency on cars in certain cases, we have also seen emergency

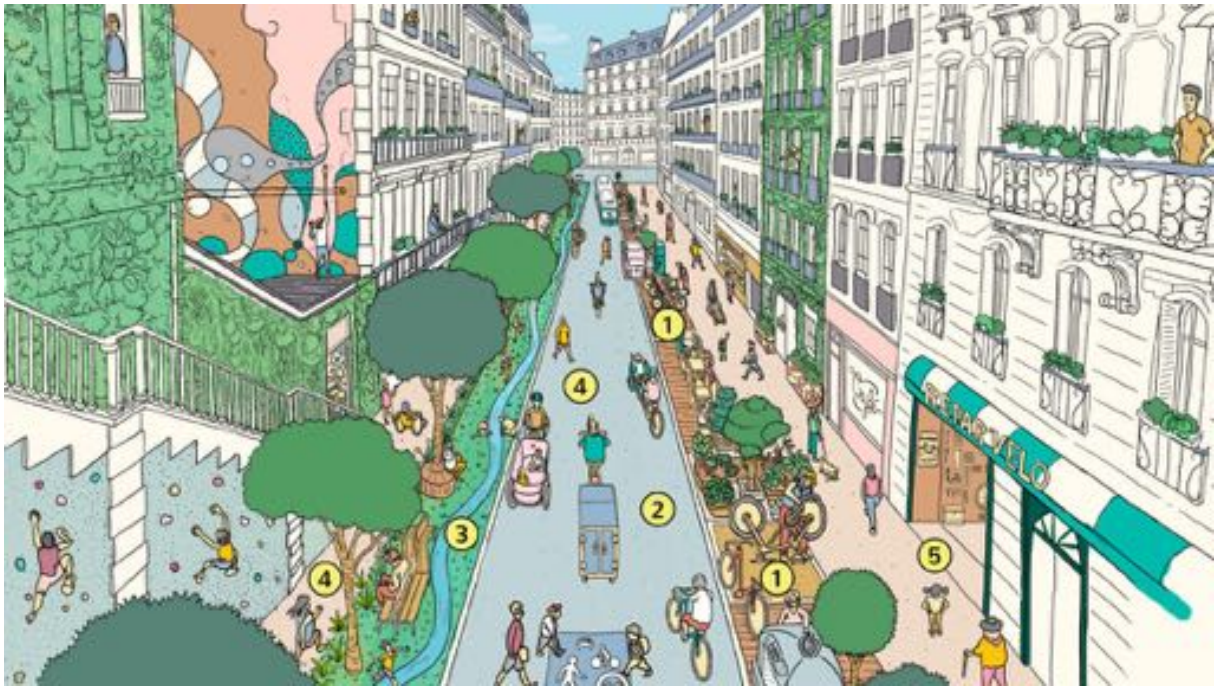

Figure 4. Poster for 15 Minute City, Paris En Commun.

street design solutions, such as pop-up bicycle lanes, which, benefiting from reduced car traffic during the crisis, created opportunities for safer and greener modes of mobility. Such experiments provide valuable feedback for non-motorized mobility that will likely be one of the issues of post-pandemic city. Luca Barbarossa asserts that the pandemic "strictly connected mobility, urban spaces and health, highlighting the need to act immediately in transforming cities through new sustainable transport models" (Barbarossa, 2020).

In some periods of mobility restrictions people could excess only to services and open spaces that are within walking distance. This demonstrated for many how reliant we are on various means transportation and how much time, effort, and money is spent for travel. Intentionally reducing mobility and providing as much urban amenities and services as possible within walkable and bikeable distances already has been an issue for some time for reducing emissions and traffic. Although the idea has a history, recent reincarnation of proximity-based planning, dubbed as chrono-urbanism by Carlos Moreno and adopted on policy level in Paris, is called the 15 Minute City. In Moreno's model residents are to be able to effectively fulfil six essential urban social functions to sustain a decent urban life, which include living, working, commerce, healthcare, education, and entertainment. It is telling that a program called "*Paris en Commun*" based on this concept helped Paris mayor Anne Hidalgo to win her second term in the office during the pandemic in June 2020. This testifies to the public support for a radical rethink of the city in terms of proximity and accessibility (Moreno, 2021, 100).

NETWORK

Batty argues many social and economic networks are extremely resilient, very difficult to bring down, which in some respects, is a great strength, for instance when, what is being communicated is essential (Batty, 2020, 548). Such networks, he continues, have so much redundancy that "it is almost impossible to bring them down, meaning stopping transmission," and that becomes a problem, as we have seen during the pandemic, when what is transmitted is undesirable. Because of the many and very active global networks, shutting which down would be very costly in many respects, we have seen a relatively quick spread of the coronavirus on a global scale. One of the post-pandemic discussions regarding such networks is likely to be questioning countries' dependency on global supply chains, which was already an issue from a sustainability and emission perspective. On the other hand, Kellerman, while observing that "the almost complete lack of international merchandize shipping during this period has strengthened the status of domestic suppliers" predicts that "this preference for

the domestic might possibly be reduced again once global leaders of online shopping such as the US Amazon company and the Chinese Ali Express return to full service" (Kellerman, 2020, 1125).

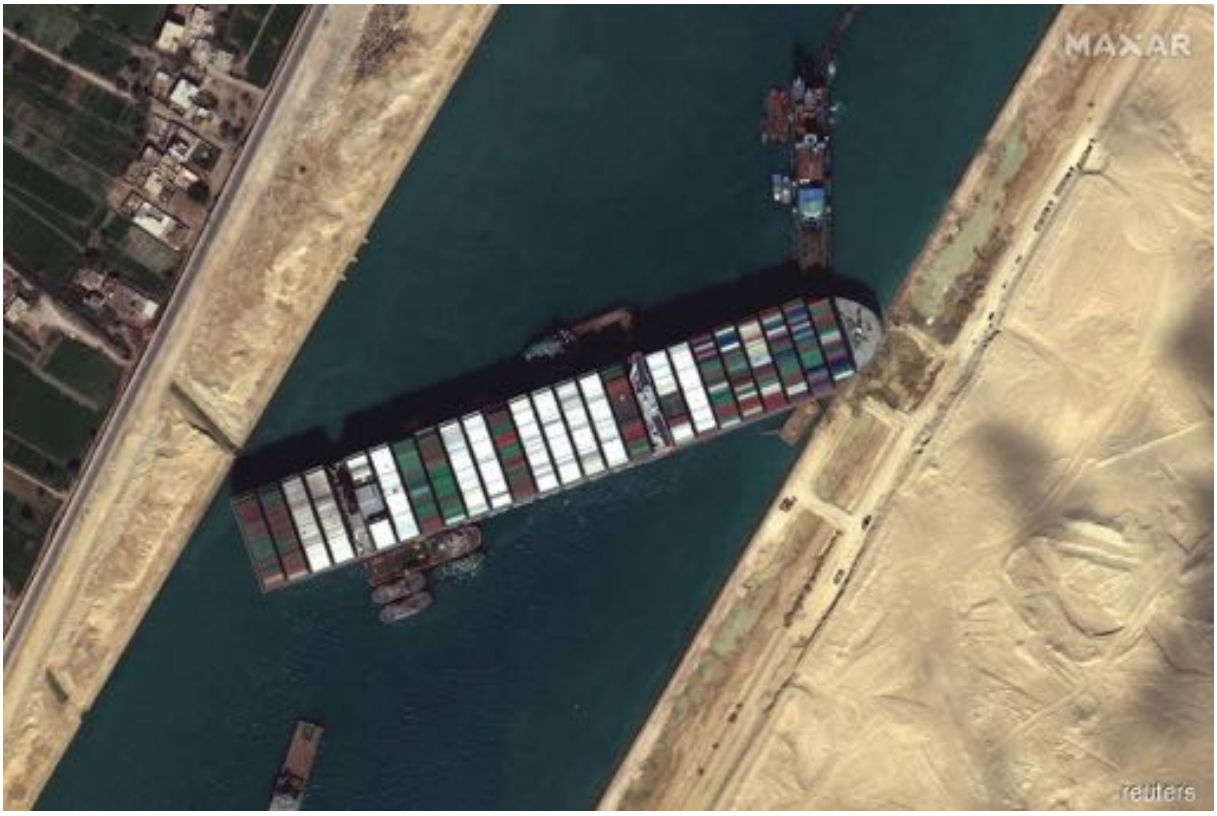

Figure 5. Vulnerability of networks: The 400-metre-long Ever Given wedged in and blocked the Suez Canal on 23 March 2021 (Photo by Maxar Technologies/Reuters).

ONLINE

The pandemic and resulting mobility restrictions speeded up the already ongoing digitalization. Many, who can, shifted their work activities to online, in many countries online education became quite widespread especially in higher education, while brick & mortar retail suffered online shopping increased dramatically, cultural institutions moved many of their activities and some content to online, the shift in entertainment industry to digital streaming platforms gained momentum, our need to access information regarding the COVID-19 developments and others was fulfilled by online sources. Yet how much of these developments are to remain after the pandemic and what are the consequences? Kellerman asserts that "the increased reliance of clients on online services during the Corona lockdowns has possibly become a routine that may increase the share of online services, as compared to physically supplied ones, thus possibly bringing about additional closures of shopping malls, stores, bank branches, etc" (Kellerman, 2020, 1125). Remote working with the help of online tools and platforms become widespread due to necessity, yet it seems it will continue after the pandemic to some extent. Tsedal Neeley argues that it is unlikely for remote work to be permanent at the scale in March 2020, but as many others, she expects it to increase in comparison to pre-covid times (Powell, 2020). Yet, she adds, "the change hasn't been without negative side effects," for instance "spending hours videoconferencing can sap energy, home workers report fewer social connections and more time alone, managers say it's harder to stay engaged with workers." That is also why some experts believe a hybrid of face-to-face and online will be seen more often after the pandemic. Some aspects of business other than the daily work also shifted to online, and long-term effects are more likely to remain in large scale business activities. On this, Kleinman says many firms will now re-consider the balance of costs and benefits of the "value of expensive large national or international meetings and conferences as against online events" (Kleinman). Batty agrees that the fact that we grew more accustomed

to online tools is likely to make us reluctant about business trips in the future. He says that we have taken to Skype, Zoom, Teams and such-like web-based conferencing systems, an experience which becomes progressively more painless, that he "for one will think twice now about travelling long distances to give a talk where you barely see the place you visit and spend long hours in crowded airports waiting for planes that seem to be continually disrupted and overbooked and living in hotel rooms that are too cramped" (Batty, 2020, 550). With this much decrease in mobility due to shifting of activities to online, including intra-city mobility, Barbarossa claims "this is a big opportunity to rethink our practices on work, leisure and retail habits, and debate on encouraging affordable and sustainable travel for all" (Barbarossa, 2020).

PUBLIC

First and foremost, the pandemic is a public health problem. For many disciplines reevaluating their relation and possible contribution to public health will be an issue. Designing for public health occupies a fundamental part in the history of planning, urban design, and architecture. Epidemies and resulting legislation in public health in the 19th century was formative for planning, modern architecture was positioned precisely vis-à-vis the unhealthy industrial city, modern housing types prioritized hygiene and adopted the motto of 'light, air, and sun for all'. The issue of and discussions on public health as well as public space will be central in these disciplines again. We still do not know how the pandemic will affect the public spaces in that will people refrain from them or because of the long self-isolation will public spaces be busier than ever? Images of lively public spaces and social interaction from countries where vaccination is already widespread or almost completed are circulating in the media, but it is too soon to tell if the public space will restore to what it was in pre-Covid era. During the pandemic since people are justifiably reluctant to go indoor public spaces, we have seen open spaces, especially parks are used heavily. Will this continue in the post-Corona era?

SOCIAL

At the beginning of the pandemic some, including the British government officials, referred to coronavirus as the 'great leveler', hitting the poor and the rich alike, putting everyone in isolation and causing insecurity. This position is much criticized since as it is wildly misleading. To begin with, some are able to work from home while others are not, when in need to travel some are able to do so in their private vehicle while others have to use public transport. All this is class based. The topic of a New York Times article, published as early as April 2020, was 'Location Data Says It All: Staying at Home During Coronavirus Is a Luxury' (Valentino-DeVries *et al*, 2020). From a more general and historical perspective pandemics hit, as Sharifi and Khavarian-Garmsir assert, "minorities and people at the bottom of the socioeconomic spectrum disproportionately," who "often suffer more from preexisting conditions due to more exposure to risks, economic difficulties, and limited access to services" (Sharifi and Khavarian-Garmsir, 2020). They continue to argue coronavirus, too, "exposed some of these old problems and inequalities" and "hit the urban poor harder". As one OECD report asserts COVID-19 crisis needs to be addressed from "the well-being perspective in a holistic and integrated manner, as opposed to a sectorial approach," with special attention to the most vulnerable sectors of the society, failing to do which would risk "deepening inequalities, possibly creating new divides and undermining the resilience of societies" (OECD, 2020, 3). This perspective is crucial for the post-pandemic city.

Figure 6. Passengers on a train in Mumbai, India. Getty images. https://www.bbc.com/news/world-asia-india-51957936

The word social was arguably most used within the phrase 'social distance' since last spring. While physical distancing was, and still is, crucial for slowing down the spread of the virus it came with a cost and put a strain on mental wellbeing of people. Interpersonal contact, including that in the workplace is key for psychological wellbeing (McGrath, 2012). Engaging in interpersonal relations, social activities and integration in social networks contribute to mental health and also "directly produce positive psychological states, including a sense of purpose, belonging, and security, as well as recognition of self-worth" (Kawachi and Berkman, 2001, 459). This makes research on maintaining social contact and interaction in the post-pandemic city imperative.

Another phrase we have seen the term social in has been social media for already some time. The role of the social media arguably increased during the pandemic. On the one hand, it served more and more as a substitute for face to face social interaction, especially during periods of lockdown. On the other hand, it functioned as a medium for the circulation of information relating to the pandemic, among other things. In its latter capacity social media has the potential of doing more harm than good as misinformation spreads as much as, if not more or faster than, the valuable information and advice. Rupali *et al* asserts "because many are turning to social media for information and advice, the differentiation between individuals who are qualified to provide accurate information online and so-called armchair epidemiologists is increasingly difficult" (Rupali *et al*, 2020, 278). They maintain "all members of these broad digital social networks (including government agencies, social media companies, health-care providers, and the consumers or propagators of information themselves) share in the responsibility to help address the broader implications of this pandemic and the underlying infodemic to strengthen community resiliency." This issue, although not pandemic-specific, is indeed going to be a crucial for post-pandemic community resilience.

WORK

We have seen a significant amount of work activities shifting to online platforms during the pandemic. Prior to this, full-time 'remote' or 'tele' workers were less than 10% globally (Kellerman, 2019). It is harder or impossible for some lines of work to be done remotely. The notion of 'essential workers' came to be widely known in the pandemic. It is hard to predict the long-term effects of the forced migration to the online, as it also depends on

how the pandemic will play out and how long it will last. There are, however, major companies that already announced they are not planning to completely return to office work after the pandemic (Çakıroğlu, 2021). There are surveys showing the majority of knowledge workers wanting a hybrid of remote working and face-to-face after the pandemic (Slack, 2020). Cutting back on fixed costs makes firms more profitable, not having to commute may appear attractive for workers. However, there are reasons why physical proximity prevailed in the face of ongoing digitalization so far. As Nathan and Overman compiles from various resources 'physically co-located workers learn more easily from each other, and develop and test new ideas; as these effects extend beyond the firm, physical proximity in cities increases innovation; dense urban areas are good at generating unconventional ideas including through serendipitous interaction' (Nathan and Overman, 2020, 1538). In any case, as Kleinman says "many firms will now re-consider the balance of costs and benefits for distributed versus concentrated working" (Kleinman, 2020).

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URBAN PERSPECTIVES WITHIN BAROQUE ARCHITECTURE: BORROMINI IN ROME

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Abstract

The period between the 16th and 17th centuries is characterized by expressive events in the European cultural and scientific scenario. The Age of Discovery - the European arrival to the so called New World - coincided with significant religious turbulences derived from Martin Luther's Protestant Reformation, which boosted a Counter Reformation Movement implemented by the Catholic Church in order to reassure its power over destabilization forces, as well as expand its reach and number of believers. In this context, the germs of the Baroque ideology started being built and empowered from within the Church, and permeated all means of artistic expression: music, literature, painting, sculpture, theatrical performance and architecture. Therefore Rome, as capital of the Papal States, constituted a rich ground to cultivate interventions through which old paradigms were transformed, establishing a modern conception for multi-scalar relationships between men, building and the city, as well as creating genuine bonds between Architecture and Urban Planning.

As exponents of this period, the Pope Sixtus V (1521-1590) and the architect Francesco Borromini (1599-1667) substantially contributed to the aesthetic transformations of Rome. The Papal agenda aimed to restitute the city with part of its infrastructure that had been seriously damaged after the fall of the Roman Empire. Water systems were reestablished by the restoration of aqueducts and the construction of monumental fountains, which represented an urban equipment for both social use and a political mark. New road systems were opened to connect the city gates to important religious landmarks, capable of hosting the increasing flow of pilgrims to Rome while envisioning economic growth and urban expansion. Moreover, an architect such as Borromini was relevant by his ingenuity in embracing an ancient architectural inheritance, adapting it and transforming it into a contemporary language, while intentionally contributing to the visual identity of institutions and, more specifically, of a new Rome. Within these interventions, it is interesting to think of what are the architecture and urban features which are long lasting in history, persisting and overcoming the constant changes in the city. This paper declares that the study of these architecture and urban features can contribute to a better understanding of how different urban contexts are enriched or impoverished, and then guide the conception of contemporary projects in a historical environment as suitable synthesis of fundamentals.

In order to elaborate an analysis of the elements mentioned above, this paper will focus on the studies of four built projects by Borromini in Rome: the chapel and university complex of Sant'Ivo alla Sapienza (1632-1660); the chapel and monastery of San Carlo alle Quattro Fontane (1634-1641); the Oratorio dei Filippini (1637-ca.1650); and the church of Sant'Andrea delle Fratte (1653-1662). Through a comparative approach, assisted by Borromini's own writings and drawings, this paper explores the architect's design methods, symbolic representation, as well as his concern on the urban role of his buildings, responding to and stimulating diversity within the dynamics of the city.

That being said, it is possible to interpret the studied period as a boiling pot with many flavours, into which Borromini poured a key ingredient expressed by his ability of revolving the past into something new. As a captivating style, Borromini's Baroque gifted Rome with *genius loci* which preservation and conscious genesis nowadays represent a primary challenge in many places around the world.

MUNDUS NOVUS

In order to better understand the origins of the Baroque as an ideology as well as an artistic expression, it is fundamental to briefly explore both the Social and the Religious contexts of the period known for significant mental and technical changes that historically concludes the Medieval Era.

The Renaissance Humanism that permeated the period between the late 14th and the 16th centuries was an intellectual movement embraced by scholars, artists, writers and civic leaders characterized by the rebirth of values associated with the Classical Antiquity, suggesting a new approach towards the past, history and cultural heritage. A new understanding of the universe and our role in it as human beings has been empowered by an important Scientific Revolution, which innovations led to a geographical and then cosmological expansion of the western world. A crucial event in this sense resulted from the wish to find new routes of commerce between Europe and Asia that, assisted by advanced navigation instruments, unlocked the so-called Age of Discoveries, during which European explorers adventured themselves through unknown seas and ended up anchoring on land masses located to the west of the Atlantic Ocean, soon recognized as a new continent, a “New World''. The successive expeditions were financed by the Portughese, Spanish and English crowns, many of which with the support of Italian bankers. Therefore, the presence of Italian explorers such as Giovanni Caboto [John Cabot] (ca.1450-ca.1500), Cristoforo Colombo [Christopher Columbus] (1451-1506) and Amerigo Vespucci (1454-1512) was decisive to comprehend the new territory in geographical and anthropological terms, as well as evaluate the resources it could provide and the impact of such discovery to the European scientific knowledge.

The term “New World” was, in fact, first coined by Vespucci in a letter to the Florentine banker Lorenzo di Pierfrancesco de’ Medici, published in Latin as a pamphlet entitled *Mundus Novus*, in 1503-1504. The press guaranteed the spread, through all Europe, of Vespucci’s hypothesis that the recently found lands constituted, in truth, a non-documented continent rather than the eastern edges of Asia, as argued by Columbus until his death. This first explicit articulation in print of Vespucci’s theory was confirmed by further expeditions and the “New World” was later named after Vespucci’s first name: America.

Consequently, it is impossible to dissociate the geographical discoveries of the 16th century with a substantial transformation in the European cosmology and the strengthening of Humanism as a moral philosophy that metaphorically places the value and agency of human beings in the center of the universe. Such ideals can be seen represented, for instance, by Leonardo da Vinci (1452-1519), an unquestionable exponent of both Science and Art who symbolizes the “new man” and his relationship with nature through the “Vitruvian Man” (c.1490), as well as registers the oldest representation of the “New World” on the well known “Da Vinci Globe” of 1504.

Figure 1. The Second Borgian Map by Diego Ribero, Seville 1529.

MARTIN LUTHER’S PROTESTANT REFORMATION: *SOLA FIDE ET SOLA SCRIPTURA*

Concurrently to the explorations overseas, the 16th century strongly favoured the European intellectual strata to travel and experience new cities and different cultures within the continent. Along with them, the press guaranteed the spread of knowledge at an unprecedented speed. It was in this context of continuous travelling

and studying that Erasmus of Rotterdam (1466-1536), a Dutch humanist, philologist and theologian, first arranged in the essay "In Praise of Folly" his thinkings on the necessity of a radical renewal of the Christian conscience and its return to its fundamentals. The satirical text was published in 1511, in England, to question general superstitions and traditions of the European society, as well as to condemn the corruption of the clergy and papacy of the Western Church. Considered one of the most influential literary works of modern Western civilization, the essay constituted the germs for a reformation proposal of the Catholic Church later defended by the German Augustinian monk Martin Luther (1483-1546).

As a professor of Theology at the University of Wittenberg, an environment dominated by a rigid medieval religiosity strongly based on the ten commandments and the fear of eternal damnation, Luther was struggling with an internal crisis derived from divergences between his and the official interpretation of concepts of the Holy Scriptures. The key distinction between the Lutheran and the Catholic views is relative to the concept of Divine Justice, more specifically to the means through which one is made righteous. Constituting the core of the Protestant theology, only faith can guide the believer on the path towards salvation, and works of justice are seen as the result and evidence of true justification and self regeneration. Contrary to this view, the Catholic theology considered the works of justice meritorious for salvation beyond faith, which allowed certain practices that would end up generating resentment and indignation among members within the Church, such as Martin Luther and many others across Germany, Switzerland, and France.

In addition to the idea of reaching salvation "by faith alone" (*sola fide*), the movement back to the careful reading and interpretation of the Bible independently from the official perspective was expressed in the Protestant theology by the principle of "by Scripture alone" (*sola scriptura*), declaring that "a simple layman armed with the Scripture is to be believed above a pope or a council without it", reassuring the Bible's sole infallible source of authority for Christian faith and practice. In this sense, it is worth mentioning that Martin Luther was the responsible for translating the Bible from Latin into a standard German, in a country then fragmented by dialects, in order to ensure that people could approach the sacred text with greater autonomy.

As introduced before, by understanding that one could personally contribute to his own salvation by means of good works of justice, the Catholic theology authorized the selling of indulgences, which meant, in practice, the investment of money in religious works and initiatives as a way to be absolved from past sins and guarantee the entrance to paradise. According to this practice, Albert of Hohenzollern (1490-1545) was made archbishop by the Pope Leo X (Giovanni Lorenzo de' Medici, 1475-1521) in exchange for a substantial donation of money then needed for the construction of the new Saint Peter's Basilica. Such behaviour triggered the elaboration of a written document by Martin Luther in 1517, in which 95 theses were presented denouncing the traffic of indulgences, as well as addressing other conceptual issues dear to the Christian faith. Those theses constituted the Protestant Reformation manifesto, and opened a large academic debate in all Europe. Risking being excommunicated from the Church, Luther refused to withdraw his arguments, even when summoned by the new emperor of the Holy Roman Empire, Charles V (1500-1558, crowned in 1519), during the Diet of Worms in 1521. Luther was then banned from the Empire, but his theses, printed in more than 300.000 copies, caused a widespread anti-clericalism, reaction to a period of moral and spiritual degeneration of the Church.

THE SACK OF ROME: IF HELL DOES EXIST, ROME IS BUILT UPON IT

As head of the House of Habsburg, the Emperor Charles V had under his governance, by the second decade of the 16th century, an extensive territory from the Netherlands to Northern Italy, the unified kingdoms of Spain, Naples, Sicily and Sandinia, as well as large overseas territories in America. The Emperor's expansionism alarmed Pope Clement VII (Giulio di Giuliano de' Medici, 1478-1534), who formed an alliance with King Francis I of France as an effort to resist the influence of the Habsburg dynasty. The French army had been defeated in Italy, but Charles V's troops lost their commander in battle and a shortage of funds compromised their payment. With no money, commander or order, the troops formed greatly by Lutheran mercenary infantry soldiers headed to Rome, which became a target for sack and pillage. The Sack of Rome in 1527 has been also deeply moved by religious reasons, and many believed that such tragedy had been the result of God's judgement upon a

corrupted Church. There was a significant shift of power and the Pope remained submissive to the Emperor Charles V, whose successive demands led to his coronation as King of Italy in 1530, as well as prompted the rupture between King Henry VIII (1491-1547) and the Roman Catholic Church in 1533, resulting in the English Reformation. Thus, the violent Sack of Rome had substantial repercussions in the European politics, economy, culture and, naturally, religion. The episode marks the decline of Renaissance humanism and the orientation towards a period of religious orthodoxy, in which the Tribunal of the Holy Office of Inquisition has been repristinated, followed by decades of censorship of bibliographic and artistic works.

THE COUNTER-REFORMATION MOVEMENT

Historically understood as a clear answer to Martin Luther's Protestant Reformation, the Counter-Reformation Movement consisted of a doctrinary and political reorganization of the Catholic Church, characterized by the promotion of assistance activities towards the poor and needy, and the creation of tools for religious instruction, such as catechism and seminaries for priestly formation. Moreover, it was a period of emergence of new religious orders, such as the Society of Jesus founded by Saint Ignatius of Loyola (1491-1556) and approved by Paul III (papacy: 1534-1549) in 1540, largely engaged in evangelizing missions envisioning the expansion of Christianity to the "New World".

The divergences between Catholics and Protestants have become a risk for the European stability, especially within the territory of the Holy Roman Empire. Peace, stability and the reformation of the Catholic Church were essential goals, of high interest to Charles V. After several failed attempts to organize conciliation meetings between the parties - due to political and religious issues - the Emperor finally succeeded in summoning the Council of Trent, moment of truss and opportunity for discussions regarding the different interests of agenda. The Council lasted the period from 1545 to 1563, in which agreements were not enough to fill the conceptual and doctrinal abyss that had been formed between the two Christian branches. The Catholic Church left the Council more disciplined and powerful, yet restructured, reassuring its infallibility in terms of faith and wide political power until, at least, 1870, when Italy has been unified as a kingdom, the Papal States were drastically reduced and the presence of the Pope was limited to the Vatican city.

As an inevitable result, the cultural production of the period between the second half of 16th and the 17th centuries are strongly characterized by political, religious and moral agitation. Such restlessness of spirit immersed in the revolving, anxious and insecure atmosphere of the Counter-Reformation years - managed by an adaptive skill of the Church - can be expressed by the Italian poet Torquato Tasso (1544-1595): "For in a world mutable and light, constancy often means to change one's mind" [free translation from: *Ché nel mondo mutabile e leggiero costanza è spesso il variar pensiero*] - Gerusalemme liberata, Canto V, stanza III, 1581. In conclusion, the Council is understood as the symbolic beginning of the Counter-Reformation Movement, which practices were extended for about one hundred years, and which conclusion would later coincide with the end of the European wars of religion, in 1648.

THE COUNCIL OF TRENT AND ITS INFLUENCE IN THE ARTS: *BIBLIA PAUPERUM*

The long-lasting Counter-Reformation process meaningfully affected the collective way of thinking, having influence over the morality, the artistic and symbolic representations, as well as the ideological and political models of the European society. Drifting away from Martin Luther's posture, and approaching Erasmus of Rotterdam's ideas, some German preachers harshly criticized the Catholic representation of idols, both in paintings and sculptures. According to this view, the presence of sacred images fed a pagan rite of veneration of saints, which led to an iconoclast campaign throughout England, Germany, France and Switzerland. By the end of the Council of Trent in 1563, and contrary to such an intransigent iconoclast movement, the Catholic Church reaffirmed its position regarding the didactic function traditionally attributed to images. In the Catholic view, the figurative arts are crucial for the faith and spiritual growth of the uneducated, constituting the *Biblia pauperum*, which is, the Bible of the illiterate poor, practice legitimized since the VI century.

The outcomes of the Council addressing the arts were expressed in a series of decrees and treatises. Although not providing specific and precise indications, these documents traced indirect guidelines to be followed. The local religious authorities were put into charge of controlling the artistic and architectural works, attempting to principles such as clarity, legibility, truth and loyalty to the Scriptures, being excluded distractions and lust. Treatises, such as the ones written respectively in 1577 and 1582 by Carlo Borromeo (1538-1584) archbishop of Milan, and Gabriele Paleotti (1522-1597) archbishop of Bologna, were fundamental to create a mental atmosphere that would deeply influence the artists - more successful than the imposition of rigid creative rules.

In Architecture, the effects of the Council led to a drastic typological, spatial and stylistic simplification, breaking with the Renaissance Classicism that characterized the previous decades. The first period, distinguished by a Humanistic magnificence that oriented architectural and urban projects as instruments of exaltation of human achievements, was opposed by a second period in which a countless number of small and spatially simple churches and oratories have emerged. The Papal prescriptions envisioned spatial unity for the plan of churches, reduced to only one central nave flanked by chapels, considering the altar as the fulcrum of the spatiality of the entire organism of the church. This architectural model implemented by the Counter-Reformation Movement can be mainly represented in Rome by the church Il Gesù, which would generate several affiliations.

The Baroque age was in its earlier expressions during the first decades of the 17th century and, curiously originated from the sober and conservative principles of the Counter-Reformation, would later release itself from repressive artistic boundaries and represent an explosion of new multi-scalar relationships between men, building and the city. The orthodox bond between light, shade and space required by the Counter-Reformation as a way to eliminate distractions and focus on the essence of the religious narratives has been reinterpreted by the contemporary artists, whose works of art and architecture slowly acquired a theatrical and dramatic tone, associated with the manipulation of perspectives and illusion - taking as example the works of Michelangelo Merisi da Caravaggio (1571-1610), Gian Lorenzo Bernini (1598-1680), Francesco Borromini (1599-1667), and many others. Bound up with political, intellectual and technological development, the paradigmatic revolution produced by the Baroque can be understood as "a change from rest to motion, from limitation to infinity, and from plane surfaces to curvature and depth...” (Gutkind, 1969, p. 136). From the Urban Planning perspective in Rome, the Baroque was responsible for the creation of axes interconnecting religious landmarks and the consequent improvement of the urban infrastructure required by a city eager to reaffirm itself as the symbolic core of the Christian world. The new road systems, often characterized by a radio-concentric organization wide enough to allow arterial traffic, structured a city in expansion and filled it with symbolic nodes (Lynch, 1981), enhancing permeability and encouraging urban dynamics (Kigawa et al, 2006) that “absorbed man into the passionate movement of space and made him an active participant in the play of light, coalescing forms, and contrasting effects” (Gutkind, 1969).

THE BAROQUE AGENDA

Unlike many other Roman cities that were constructed based on the “Roman grid”, such as Turin and Aosta, the natural geography of Rome’s territory presents different specificities. The city’s settlement developed from the Seven Hills, following an “urban planning” closely related to its natural geography, rather than based on a unified grid order. In this way, the “formation of settlements on ridges is thus the central feature of the proto-urban phase of Rome” (Cataldi, 2016).

After the fall of the Roman Empire in 476 AD, Rome started a process of decay that lasted for centuries, being still ”a small and insignificant town in the mid-fifteenth century because of the long absence of the Popes” (Benevolo, 1980, p. 564). The inhabited area of Rome was mainly limited to the area shaped by the meander of the Tiber river near the Vatican hill. Some few precincts centered around important Christian basilicas, and wide areas within the Aurelian walls were mostly occupied by pasture (Fig. 2).

Figure 2. Leonardo Bufalini, Rome, 1551.

In 1420, under Martin V's government, papacy returned to Rome after the end of the Avignon Exile (1309-1377) and the Western Schism period (1378-1417). This return provided an opportunity for the establishment of a particular papal power, economic growth and an architectural-urban agenda to the city. The papal processions were carried out in the Borgo Leonino and in the Campus Martius areas, eventually including churches related to each sort of event (Schwarting, 2017, p. 43). At the time, Borgo seemed like a second city with its own fortification walls, but the need for a new image of the Papal center led to a sequence of changes in the city.

Firstly, there was an emergent need for the reorganization of the road system and the creation of better connections in the city. More than one hundred thousand pilgrims used to travel to Rome during the Jubilee years, and the preexisting urban infrastructure could neither host nor support such big activities in the city. In fact, in 1450 there was a big accident due to a pedestrian congestion on the bridge in front of the Sant'Angelo Castle. The balustrade of the bridge collapsed, causing the death of many pilgrims, drowned in the Tiber. For this reason, the opening of streets connecting piazzas and bridges were crucial to provide easy circulation for the pilgrims. In addition to that, "important streets were marked by buildings that presented carefully designed façades representing the height of humanistic expression" (Schwarting, 2017). Another important issue to be addressed was the repopulation of areas within the walls of Rome that had been abandoned for about one thousand years after the destruction of the aqueducts during the invasions and sacks the city suffered in 537-538 AD. During the 16th century, ancient aqueducts were then restored and, consequently, new fountains were constructed in sparsely inhabited areas in order to encourage their repopulation. By associating the water infrastructure (represented by the fountains) and the religious needs (represented by churches previously located away from the city center), the expansion of the city was encouraged. As an example, the restoration of the Claudian Aqueduct, and construction of the Felice Aqueduct by Sixtus V were celebrated with the Fountain of Moses designed by Domenico Fontana in 1587-1588, located near the suburban churches of Santa Susanna and San Pietro e Paolo (later Santa Maria della Vittoria) as a religious and political mark that served the social function of providing a previously isolated area with water.

The process of transforming Rome into a modern Baroque city is a continuous plan carried out by different popes through centuries. The great importance of Pope Martin V lies in his creation of the *Magistri Viarum*, a group of specialists including architects and engineers that were given great power for tasks such as straightening the street pattern and building new essential roads for the city.

Pope	**Duration of Papacy**	**Related Civic Projects**
Martin V	1417-1431	*Magistri Viarum.*
Nicholas V	1447-1455	Mapping of Rome; Restoration of the Acqua Vergine Aqueduct; Road Forum Pontis - Castello St.Angelo.
Sixtus V	1585-1590	Strada Felice (Via sistina, Via del Quattro Fontana, Via Depretis); construction of the Acqua Felice Aqueduct; intervention in the Trajan's Column; involved in interventions for Piazza Colonna, node of the Quattro Fontane, Piazza delle Terme, Piazza dell'Esquilino, Via Panisperna, Via San Lorenzo, Piazza S.Giovanni in Laterano and Via di S. Giovanni in Laterano.
Urban VIII	1623-1644	Palazzo and Piazza Barberini.
Innocent X	1644-1655	Piazza Montecitorio; interventions in Piazza Navona.
Alexander VII	1655-1667	Piazza di S.Maria della Pace; Piazza San Pietro in Vaticano

Table 1: Papal civic projects for Rome.

Pope Nicholas V, who was the head of the Catholic Church and the ruler of the Papal States from 1447 to 1455, transferred the papal residence from the Basilica di San Giovanni in Laterano to San Pietro. Nicholas V rebuilt 40 of the 64 churches in the city and also repaired the Aqua Virgo Aqueduct. Another Nicholas V's project is the Forum Pontis, later Piazza di Ponte, a place that aimed to become the nodal point of converging new streets, as well as creating an important business center with foreign banks in the surrounding area.

Pope Sixtus V, with his well-known urban plan for Rome, constructed new rectilinear axes connecting the seven main Christian basilicas in Rome - some of them located in rural areas, far away from the city center. Sixtus V was the first pope to consider a restructuring of the city on a bigger urban scale, including the vast uninhabited area in the East and North parts of Rome. Such approach led to a very different urban character that strongly diverged from the former medieval city with its tortuous pattern. Sixtus V's urban plan promoted the expansion beyond the inhabited area along the meander of the Tiber and explored the economic potential around the new axes.

Urban VIII Barberini (1623-1644), Innocent X Pamphilj (1644-1655) and Alexander VII Chigi (1655-1666) were involved in the construction of significant Baroque buildings in Rome during their papacy - in a period of less than a half century - supported by prominent architects such as Francesco Borromini and Gianlorenzo Bernini. The cultural agenda that oriented these architects' work involved overcoming the methods of the previous century, as well as maturing a linguistic revolution with awareness of both the principles of ancient art and its Renaissance reinterpretation. In conclusion, the Baroque agenda aimed to restore part of the urban infrastructure that had been seriously damaged after the fall of the Roman Empire. New road systems were opened, connecting the city gates to important religious landmarks. The urban projects are designed to host the increasing flow of pilgrims to Rome envisioning the future economic growth and urban expansion of Rome.

THE URBAN ROLE OF BORROMINI'S ARCHITECTURE: FOUR CASE STUDIES

After having explored the European political and artistic contexts along the 16th and 17th centuries, Francesco Borromini can be recognized as one of the most revolutionary artists in Rome, who managed to associate his

Ancient and Medieval cultural inheritance with certain Renaissance intellectuality to produce unique architectural expressions that brilliantly expressed the historical moment in which he lived and died.

The deep studies on Ancient and Gothic architectures were not considered by Borromini as rules to be strictly followed, yet they constituted a fruitful foundation for his creative mind, in which the transformation or deformation were necessary practices (Bellini, 2004). Borromini's constructive virtuosity, geometrical control (Operative Geometry), iconological thinking and taste for plasticity and dynamics of shapes contributed to the Baroque agenda with unrealistic spaces and illusionistic effects by the skilled manipulation of spatial perceptions. The architect considered the architectural element as an organism, composed by symbolic, formal and static needs. According to this approach, his works are figuratively addressed envisioning the creation of oneiric artifacts which role is to absorb the observer into an unrealistic and evocative place where "the daily rules of life are suspended and deformed" (Bellini, 2004). The constant combination of concave and convex surfaces and the continuous rising of visual tensions are wisely executed through the careful choice for the right building materials, considering its building quality, resistance and, above all, economy. The ability of revolving the past into something new, and yet being aware of the materials in order to extract the best use out of them, empowers Borromini to turn his "dreams" concrete. Successful in achieving diversity and plurality in his architectural expressions, Borromini yet illustrates - in his own words - his preference for the good design rather than for precious materials and ornamentation (*Borromini, 1998*), revealing true qualities of an artist.

In order to elaborate an analysis of the elements mentioned above, this paper will now focus on the studies of four built projects by Borromini in Rome: the chapel and university complex of Sant'Ivo alla Sapienza (1632-1660); the church and monastery of San Carlo alle Quattro Fontane (1634-1641); the Oratorio dei Filippini (1637-ca.1650); and the church of Sant'Andrea delle Fratte (1653-1662). Through a comparative approach, assisted by Borromini's own writings and drawings, this paper explores the architect's design methods, symbolic representation, as well as his concern on the urban role of his buildings, responding to and stimulating diversity within the dynamics of the city.

Figure 3. Location of the four case studies. 1: Chapel and University Complex of Sant'Ivo alla Sapienza; 2: Chapel and monastery of San Carlo alle Quattro Fontane; 3: Oratorio dei Filippini; 4: Church of Sant'Andrea delle Fratte. (Background: Nolli map, 1748).

CHAPEL AND UNIVERSITY COMPLEX OF SANT'IVO ALLA SAPIENZA (1632-1660)

Situated between the Via del Rinascimento and the Piazza Sant'Eustachio, the complex of Sant'Ivo alla Sapienza is a papal institution founded in 1303, originally called *Studium Urbis*.

The configuration of the buildings were designed in different periods, being Borromini mainly responsible for the chapel of Sant'Ivo, built when the surrounding wings had already been built. Giacomo della Porta designed the North wing of the complex, establishing a centralizing axis that connects the gateway to the chapel in the middle. Therefore, his project already showed an urban perspective from the conception of the plan. This building has functioned as law school for the students of Sapienza, and Piazza Sant'Eustachio at the East was often used for graduation celebrations and other festivals such as the Epiphany. Although the building seems to be very rigid and closed from the main façade (Fig.4), its plan layout is connected to the urban system through the continuity of public spaces and internal roads. When entering the main door from the Western main façade, the inner courtyard transmits to the observer the feeling of standing still in a public space belonging to the city, rather than in a closed and private interior space (Fig.5). The two secondary inner routes lead to Piazza Sant' Eustachio, a few steps away from the Pantheon. Giacomo della Porta worked for Sant'Ivo alla Sapienza for twenty-five years until his death in 1602, and his design shaped the definitive layout of the Sant'Ivo alla Sapienza complex, with the two secondary inner routes that connected the street at the Western side of the block to Piazza Sant'Eustachio in the East.

The façade of the chapel towards the courtyard, composed by a concave exedra, convex drum, concave lantern and convex spiral, presents a strong sense of motion that makes the observer assume that the façade is the result of a holistic design, conceived at the same period of time. On the contrary, Borromini's chapel and spiral for its lantern were was built upon the already existing two-storey exedra, constructed from 1594 to 1597 after Giacomo della Porta's design (although some scholars, such as Heinrich Thelen, argued the general conception goes back to even earlier, to a design by Pirro Ligorio in 1565). According to Joseph Connors, the design of the chapel's façade "embraced or rejected according to the roulette of the conclave, constantly recut and reshaped like a large, plastic object" (Connors, 1996, p.38).

Before Giacomo della Porta's design, the block was occupied by a series of row houses along Via dei Sediari, and the first intervention was at the end of the 15th century: a series of rooms were aggregated and unified by an internal arcade (Fig.6), through which the serial houses were transformed into a specialized building (Fig.7), that "making the passage from fabric to building" (Strappa, 1995).

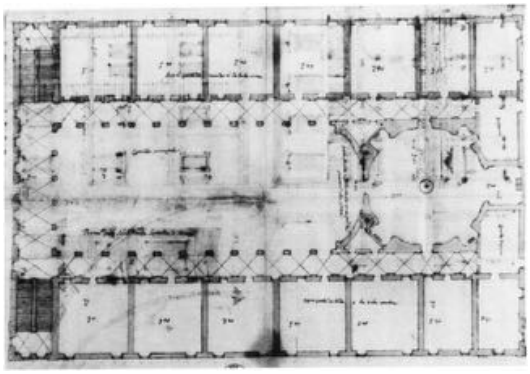


Figure 4. G.Vasi, 1747

Figure 5. Giacomo della Porta's design, Palazzo della Sapienza, drawing from model of 1581.

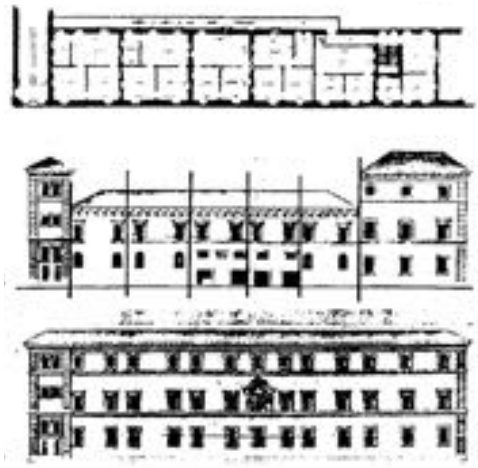


Figure 6. Leonardo Bufalini, Pianta di Roma del 1551.

Figure 7. G.Strappa, 1-2: plan and elevations of the original structure at via dei Sediari with legibility of the aggregation of rooms also recognizable in the extension project (3), 1995.

Borromini was employed as the architect of Sapienza in 1632, and designed the library (Biblioteca Alessandrina) at the North part of the complex; the chapel in the center. Before Borromini got involved in the project of the chapel, it had already remained without its dome for nearly thirty years (Fig.8). In fact, Della Porta had previously designed a dome for the chapel, but it had never been built. Some scholars did the reconstruction hypothesis based on Della Porta's design, which represents an idea of how it might have looked like (Fig.10). The language used by Della Porta referenced the Renaissance style, while Borromini applied a strong symbolic language with the convex drum, concave lantern and convex spiral. The spiral is believed to be associated with a tiara, "for spirality is inherent to the symbolic essence of the papal triple crown" (Scott, 1982). Comparing Della Porta's proposal with the built project by Borromini, it is possible to recognize that Borromini's design has been successful in adding a new layer of urban significance to the chapel. The spiral transmits a strong recognizability among the other domes in Rome, becoming a landmark in the city's landscape, helping observers to situate themselves in the urban area, as well as identify the position of other buildings taking the Borromini's spiral as a visual reference (Fig.12).

Figure 8. Maggi, 1625, after Giacomo della Porta's project and before Borromini's intervention.

Figure 9. Giuseppe Vasi, Pianta di Roma del 1781, after Borromini's project.

Figure 10. Giacomo della Porta's dome.

Figure 11. Borromini's dome.

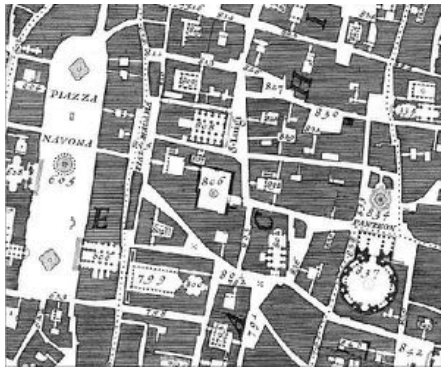


Figure 12. Sant'Ivo alla Sapienza seen from far away, Pedro Senna, 2021.

Figure 13. Nolli Map, 1748.

The urban significance of Borromini's spiral can be seen from many etchings produced in the 17th and 18th centuries. There are some famous etchings that represent the Western façade of the complex as if it could be completely seen from Piazza Sant'Eustachio. In reality, such a perspective has never existed in the urban configuration of the area - an example is Falda's etching of 1665 (Fig.14). Curiously, on the left side of Falda's etching, Palazzo Maccarani (former Palazzo Stati Cenci) is represented with its the three floors high, which was constructed from 1519 to 1524, even before Della Porta's plan for Sant'Ivo alla Sapienza. In reality, Palazzo Maccarani hides almost half of the Eastern façade of the Sant'Ivo alla Sapienza complex, as well represented in Nolli's map (Fig.13) and Vasi's etching of the 18th century (Fig. 15). In conclusion, since the Eastern façade of Sant'Ivo alla Sapienza can only be partially seen from the street, Borromini's lantern for the chapel has, in a way, placed the complex into the urban space, giving it visual significance, being then perceived by the observers, always guided by the spiral, as if it were a lighthouse.

Figure 14. Falda, 1665.

Figure 15. Vasi, 1747-1761.

CHURCH AND MONASTERY OF SAN CARLO ALLE QUATTRO FONTANE (1634-1641)

The church and monastery of San Carlo alle Quattro Fontane is Borromini's first independent commission. His affection to this small project can be seen from the fact that Borromini himself wanted to be buried inside this church, which was not achieved at the end.

San Carlo alle Quattro Fontane located at the boundary of two of the most important districts of Rome: The Monti rione and the Trevi rione. Since ancient times, these areas have hosted important residential, public and cult buildings. The intersection of Via delle Quattro Fontane and Via del Quirinale became a new nodal point in the city based on Sixtus V' s urban plan for Rome (Fig.16). The Quattro Fontane, four fountains representing rivers and goddesses, was installed at this intersection during 1588 to 1593 and designed by Domenico Fontana and Pietro da Corta. Via delle Quattro Fontane in front of church of San Carlo alle Quattro Fontane is part of the former over two-kilometer long Strada Felice that named after Sixtus V. With these four beautiful fountains full of decoration and detail, this crossing was transformed with new urban role.

Via delle Quattro Fontane connects Santa Maria Maggiore and Piazza della Trinita dei Monti and Via del Quirinale connects Piazza del Quirinale to the north, like Porta Pia. In addition, the land also is at a high geographical location because it is at the ridge of Quirinal hill (Fig.17). When one stands on the crossing in front of the church of San Carlo alle Quattro Fontane, each direction has a monument and the axis is visible. At west is obelisk Sallustiano at Trinita dei Monti, at east is obelisk Esquilino at Santa Maria Maggiore, at south is obelisk of Quirinale, and at north is Michelangelo's façade of Porta Pia.

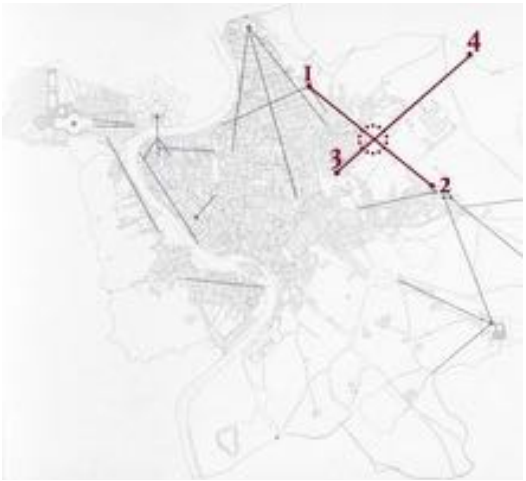
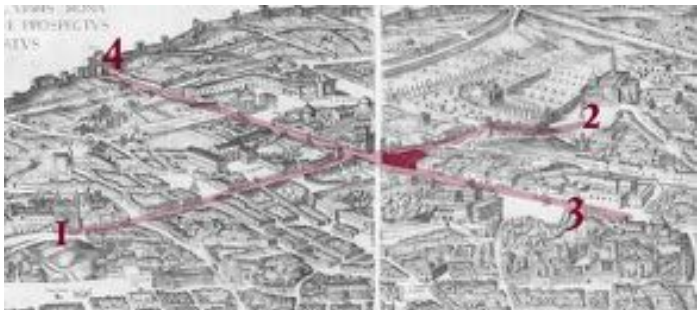


Figure 16. Sixtus Plan for Rome. 1: Obelisk Sallustiano at Trinita dei Monti. 2: Oblesik Esquilino at Santa Maria Maggiore. 3: Obelisk of Quirinale. 4: Michelangelo's faced of Porta Pia.

Figure 17. Hydrogeological map of Rome.



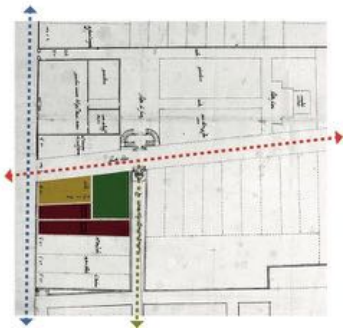


Figure 18. Tempesta 1593. 1: Obelisk Sallustiano at Trinita dei Monti. 2: Oblesik Esquilino at Santa Maria Maggiore. 3: Obelisk of Quirinale. 4: Michelangelo's faced of Porta Pia.

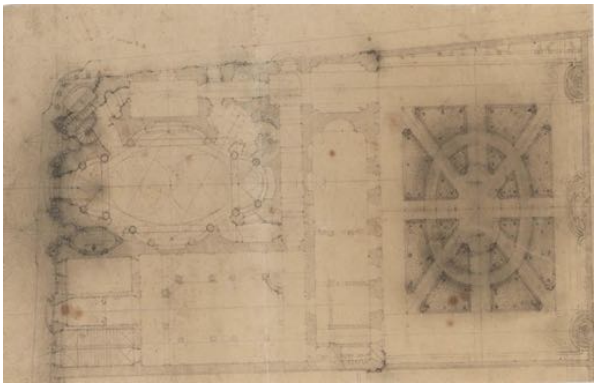
Figure 19. The land plan. Yellow:old house bought in September, 1611. Green: Garden provided by Cardinal Ottavio Bandini in June 1612. Red: No.2 and No.3 house of Juan Bautista Sergiusto Lucchese bought in October 1614. From Fernández 2017

Borromini got his mission in the year of 1634 for the new headquarter of the Spanish Discalced Trinitarians Order. This Spanish order arrived in Rome in May 1609 and acquired a house at the corner of the Quattro Fontane crossing in 1611(Gau Fernández, 2017). The small available space was enlarged later with the garden donated by Cardinal Ottavio Bandini and two other properties next to it (Fig.19). The land is at the corner, with a trapezoidal shape. "It had 92 spans of main facade, 127,75 spans of rear facade and 198,83 spans of depth, equivalent to a total of 1.092,25 square meters" (Gau Fernández, 2017).

Borromini has to deal with the given land within this urban context and give it a new composition. The size and shape of the land have many limitations for the new design. The width at the Via del Qurinale was only twenty-four meters long, and the corner is not a right angle and with a fountain wasn't allowed to be removed. The existing structures were decided to be kept due to economic reasons, only when necessary the former structure will be demolished and the material was reused in the construction. Therefore, some of the walls of Borromini's project overlapped on the old ones. However, Borromini came up with a great plan that totally changed the dynamic of this land. The plan consists of three parts, that are "Quarto del dormitorio" (built from July 1634 to August 1635), the cloister (built from February 1635 to June 1636) and the church (built from February 1638 to May 1641) with the façade completed by his nephew Bernardo in October 1676 after Borromini's death. The Trinitarians made an enlargement plan of the convent later in 1710, with main changes in the garden part and the functioning of Quatro del dormitorio by Borromini (Hill, 2013).

Figure 20. Giovanni Battista Falda, 1676.

The plan for the church is based on simple geometry but resulting in rich complexity with oval-centeredness. The ingenuity of the church plan caused very strong debate at that time. Borromini to be thought of as both neo-medieval and protomodern (Hill, 2013). Because he abandoned the Renaissance architecture language of column-based proportionality in his design, and shows a great connection with new science of Kepler and Galileo.



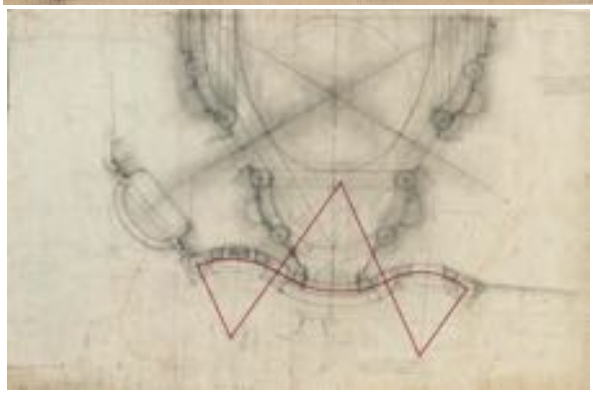


Figure 21. Francesco Borromini, plan of San Carlo alle Quattro Fontane, Rome, early 1660s (Albertina Museum, Vienna, Graphische Sammlung, Az. Rom. 173)

Figure 22. Detail of the façade, Francesco Borromini, plan of San Carlo alle Quattro Fontane, Rome, early 1660s (Albertina Museum, Vienna, Graphische Sammlung, Az. Rom. 175)

As can be seen from the drawing (Fig.20), this elaborate was achieved through very simple geometry that can be achieved through the use of compass and ruler. As a result, the undulating façade of church San Carlo alle Quattro Fontane strengthened the nodality of this intersection, adding a new layer to this urban nodal point (Fig21-23).

Figure 23.Giovanni Battista Falda 1665(looking to the south), Il nuovo teatro delle fabriche, et edificii, in prospettiva di Roma moderna, sotto il felice pontificato di N.S. papa Alessandro VII

Figure 24. Piazza delle quattro Fontane, looking to the east

ORATORIO DEI FILIPPINI (1637-CA.1650)

The Oratory of Saint Philip Neri is part of a larger complex composed by the church of Santa Maria in Vallicella and the House of the Filippini (or Oratorians), with apartments, common spaces, kitchen, refectory and library organized around courtyards and a garden. Philip Neri (1515-1596) and his followers were given custody of the old medieval church in 1575, by Pope Gregory XIII, and soon idealized a radical renovation project for the area. The new church was designed by Matteo da Castello between 1575 and 1593, and the façade completed by Fausto Rughesi between 1594-1606, but the Oratorians still lived in an old building East to the church, facing narrow alleys, with no possibility of expansion. For this reason, the construction of a new residential complex, the House for the Oratorians, has been carried out from 1620 to 1650 through the demolition of entire blocks to the West of the church. In 1622, canonization year of Saint Philip Neri, the noble man Virgilio Spada (1596-1662) joined the congregation and, due to some experience with construction and architectural knowledge, became the main mediator between the Oratorians and the architects. After preliminary proposals, a definitive project for the new House and Oratory has been elaborated by Paolo Maruscelli (1596-1649) between 1624 and 1627, and approved by the Oratorians.

Francesco Borromini joined the execution works of the complex in 1636, contributing to some detail-drawings based on Maruscelli's design. By the time Borromini was relatively unknown, having just completed the residential wing (1634-1635) and the cloyster (1635-1636) of the San Carlo alle Quattro Fontane complex. The church of San Carlino itself would only be built between 1637 and 1641. Recently part of the team force, in 1637 Borromini noticed successive problems in Maruscelli's design for the Oratory, and presented alternative solutions, which precision and effectiveness qualified him as the "second architect" of the works. Maruscelli's uncomfortable position led him to resign, but his ten-year-old project remained the one to be followed and executed by Borromini, whose job would include solving eventual technical and constructive issues. Therefore, the Oratorians were not receptive to radical changes in the approved project, and any small modification or innovation proposed had to be carefully discussed. In this sense, the role of Virgilio Spada became fundamental for the interpretation and transmission of Borromini's persistent alteration proposals to his Oratorian confreres. As Superintendent of the congregation from 1638 to 1664, Spada expressed a brilliant analytical thinking whenever managed assemblies, contracts, price lists and the archives of the church. Having a holistic comprehension of the daily life of the Oratorias, their basic and special needs, the activities and rituals frequently performed, as well as number of residents and eventual guests, Spada was able to advise with mastery the design decisions regarding the organization and function of rooms and external spaces. With Spada's support, Borromini entirely redesigned the Oratory building, which construction, including façade, religious hall and library, were completed by 1644. The building activities of the Vallicella complex were paused between 1644 and 1647, period in which Spada had been required as an accountant for the new Pope Innocent X Pamphilj, allowing him to conceive together with Borromini the *Piena relatione della fabbrica*, manuscript of the book *Opus Architectonicum* regarding the works in the Oratory and House of the Filippini, only published in 1725. The works were retaken in 1647, when the Western wing of the complex was still unbuilt and a clock-tower had been added to the project. Due to a sequence of disagreements with the Oratorians, Borromini was removed from his position as the architect of the congregation in ca.1652, and then substituted by Camillo Artucci.

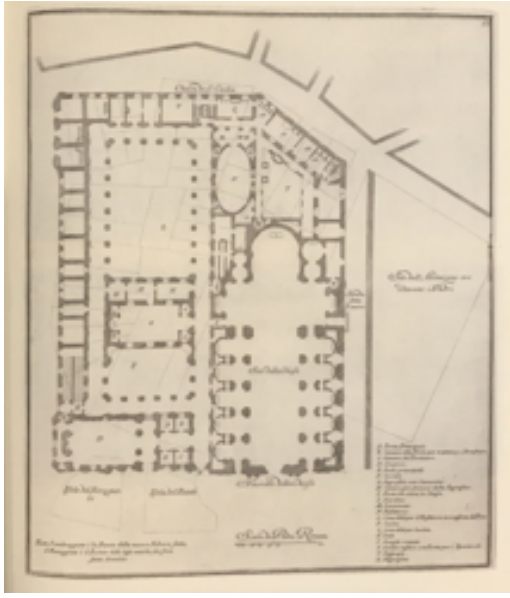


Figure 25. Sebastiano Giannini, plan of the House of the Filippini and the church of Santa Maria in Vallicella, from tav. 7 of the Opus ms.,, 1725, in Opus, II.

Figure 26. Sebastiano Giannini, façade of the Oratorio dei Filippini, 1725, in Opus, II.

Considering the constructive context of the Vallicella complex and Borromini's role in it, the façade of the Oratory deserves a more careful analysis, since it is the most visible contribution of the architect to the appearance of the new urban configuration of that area. The Oratorians were a relatively new order in the Roman religious panorama, therefore, they lacked the artistic and architectural expression of their identity. In fact, Maruscelli's design sought to find the Order an adequate image, following primarily-established conditions and principles related to ornamental issues, use of materials and proportional respect for the church of Santa Maria in Vallicella's façade. With their artistic personality in evolution, the Oratorians were aware of their position in the hierarchy of the Church. When commissioning a new House and Oratory, the Order balanced the fact that, in one hand its members were not monks and so could own material goods and then had a minimal decorative standard; on the other hand were not princes or cardinals, what set a limit beyond which their architects were not allowed to advance. Nonetheless, when Borromini assumed control of the site, he proposed a complete redesign for the Oratory's façade, denying Maruscelli's proposal, previously approved by the congregation. Contrary to the civil character of Maruscelli's façade, Borromini insisted in an Ecclesiastic aspect, considering the Oratory an architectural descendant of the Santa Maria in Vallicella's façade beside. At first, Borromini conceived the Oratory as an independent entity with a façade subdivided into five spans at the first order of pilasters (ground and first floors) and only three spans at the second order (second and third floors), surmounted by a tripartite tympanum. Referencing the antiquity, Borromini conceived a brick curtain-wall for the Oratory's façade, directly inspired by a no-longer existing tower outside of Porta del Popolo. A register of this first conception (ca.1637) can be read in a passage in the *Opus*, in which Borromini-Spada present an analogy between the five-span façade and a human torso with chest and both arms and forearms open as if embracing those who enter the Oratory in prayer. In 1638, due to a mandatory change in the position of the library (*Biblioteca Vallicelliana*) from the back to the front of the complex - more specifically, to the floor above the oratory - the proportions of the Oratory's façade were constrained to change. For this reason, the Western wing of the complex had to be extended and measures had to be taken in order to solve the visual imbalance generated in the main façade of the complex. Borromini's alternative for such an issue appealed to an optical illusion trick that aimed to slightly influence the perception of the external observer without introducing radical changes in the already partially built façade. The solution consisted of: the inevitable enlargement of the structure to the west in approximately three more spans; and the delimitation of the two spans that flanked the central five-span body by the addition of a vertical quoin emulating a rusticated frame (bugnato rustico), a way to incorporate the independent entrance of the House on the right and simultaneously provide a more balanced

and natural perception of the overall aspect of the Southern façade. Consequently, the lateral spans are considered transition zones, as an attempt to integrate the central body into an unpredicted extended context. For this reason, the façade of the Oratory itself is the only segment that follows a concave geometry with a slightly convex "chest", appealing to artifices of optical illusion to - according to his own words - "trick the walker's view", encouraging the engagement of the people passing by, as well as triggering dynamics and a new urban dialogue (Borromini, 1998, p. xxvii).

The construction of the Vallicella complex, first idealized by Saint Philip Neri and his followers, had great urban impact on the area due to its monumental dimensions. Extensive old residential blocks to the East and West side of the church of Santa Maria in Vallicella have been demolished, together with the small church of Santa Cecilia along the current Via del Governo Vecchio, the extinction of Piazza di Pizzomerlo in the South and appearance of Piazza dell'Orologio in the Northwest side of the complex - which importance is clearly enhanced by Borromini's clock-tower. Two new restructuring roads were opened beside the monumental structure to connect the back street to the new Piazza della Chiesa Nuova, a rectangular space that contributed to the good legibility of the new Southern façade, then composed by two main, yet hierarchized, focal elements: the Church and the Oratory. Such a new urban presence imposed new urban relationships to the surroundings and created interesting perspective views towards the complex, such as the one from Via dei Cartari to the Oratory, and the one from Via Larga to the Church, stimulating certain irradiation as well as concentration of attention in the Vallicella as an urban node. In 1924, however, the opening of the axis Corso Vittorio Emanuele II, connecting Piazza Venezia (center of the political power) to the Vatican (center of the religious power), ended up cutting a long stretch as well as demolishing great portions of the urban fabric in one of the oldest building areas in the city of Rome. It was in this period that the Fontana della Terrina (Fountain of Turren), designed by Giacomo della Porta between 1581 and 1595, has been relocated from its original position in Piazza de' Fiori to Piazza della Chiesa Nuova.

Although the overall settlement of the Vallicella complex cannot be attributed to Borromini, through his design for the Oratory's façade and clock-tower - both urban and landscape marks - he has unquestionably influenced in the exaltation of Piazza della Chiesa Nuova as an important urban node in Rome, specially considering the pilgrimage paths that, for centuries, have been leading crowds to the Vatican.

CHURCH OF SANT'ANDREA DELLE FRATTE (1653-1662)

The old church of Sant'Andrea delle Fratte dates back to 1192 AD, located in a suburban area near the Aurelian walls, as an *infra Hortis* church. In fact, the area in which the religious complex was built was previously occupied in Roman times by the Gardens of Sallust (*Horti Sallustiani*), a wealthy rural property within the walls, near the axis of the old and the new Via Salaria, two important Roman roads that entered the city through the gates: Porta Salaria (3rd c. AD) and Porta Pinciana (5th c. AD). The term "Fratte" derives from the Roman *fracta*: the borders between properties with low building density, such as the *Horti*. In Medieval times, "fratta" was the old Romanesque word for hedge, and the church was built in such an area, then devoid of any economic or representation value, called "a capo le case", which essentially meant where the city's built area ended.

Scotish National Church until 1575, the building was abandoned and then transferred to the Italian Minimal Friars of the order of San Francesco di Paola by the Pope Sixtus V, in 1585. Due to structural problems, the architect Gaspare Guerra (1560-1622) became responsible for the design project of a new church and convent, carried out between ca.1605 and 1617. Despite long interruptions, the period from 1617 to 1652 consisted of the partial demolition of the old medieval church and the beginning of construction of the new one, as well as the enlargement of the convent to install a Theology School for a few resident students. Guerra's plan for the new Sant'Andrea delle Fratte can be studied as being one of the several affiliations of the architectural model implemented by the Counter-Reformation Movement.

The construction of the new Sant'Andrea delle Fratte received great patronage from the Del Bufalo family, being Paolo Del Bufalo (1608-1665) a fundamental character whose ambitions for the church were then considered

anachronistic in relation to the pontifical thinking regarding the representation of religious architecture. Having acknowledged Borromini's architectural literature for his works in San Carlino and Sant'Ivo, Del Bufalo found in the architect a personality who had made sublime art out of anachronism and irrationality. After decades of operative difficulties, the works were then consistently restarted in 1653 by Francesco Borromini, who was in charge of the construction of the church's bell-tower (complete by Paolo's death in 1665), apse, drum, *tiburium* and dome. After Borromini's tragic death in 1667, leaving an open *tiburium* with no dome, the completion works were later carried out by the architect Mattia de' Rossi (1637-1695) and the artist Pasquale Andrea Marini (ca.1650-1712). The lantern supposed to crown the *tiburium* and protect the dome was never constructed, and the church would finally be consecrated in 1728.

Figure 27. 1: Porta Pinciana; 2: S.Salaria.

Figure 28. Giuseppe Vasi, 18th c. Porta Pinciana.

Figure 29. Falda, 1683. Ludovisi Gardens.

Coming from the north along the ancient roads of the old and new via Salaria, 17th century travellers would enter the city of Rome through the accesses of Porta Salaria and Porta Pinciana, cross the suburban property of the Villa dei Ludovisi (ancient Horti Sallustiani), pass by the church of San Giuseppe a Capo le Case, and then turn right to go down the axis of the Via di Capo le Case, along which the observer directly perceives and recognizes the *tiburium* and bell tower of the church Sant'Andrea delle Fratte. By understanding the Via di Capo le Case as the first urban tract derived from important access roads to the city, the religious fraternity of the Santissimo Sacramento that took custody of the church after 1575 instituted a very popular religious procession

that had the axis of that street as its main path. For this reason, the symbolic role of that street was interpreted by Borromini as being similar to that of the ancient Roman roads, flanked by sepulchers and other funerary memorials according to the idea of immortality associated with the memory of the living.

Such approach guides Borromini to position the bell tower of Sant'Andrea delle Fratte by the extremity of the transept, beside the *tiburium* and towards the Via di Capo le Case, consequently away from the frontal façade of the church. In this way the architect is successful in exploring the urban perspective of access to the city in favor of the church, which presence is perceived by the observer regardless of its frontal façade facing the west. Thus, the symbolic and architectural treatment of the bell tower and the *tiburium* is conceived according to ancient funerary references. The idea of a concave façade framed by double columns topped by a cusp is widely explored by Borromini, and can be found in funerary projects present in the Roman cathedral of San Giovanni in Laterano and in others of his own works, such as the façade and bell towers of the church Sant'Agnese in Agone, at Piazza Navona. In the case of the bell tower in Sant'Andrea delle Fratte, for instance, the double columns that frame the concave façades are represented as funerary figurative herms.

Figures 30, 31. Hypothetical lantern designed by the authors of this paper, based on Borromini's design.

Figure 32. Giuseppe Vasi, Plate 146. Monastery and church of San Giuseppe at the center; church of Sant'Andrea delle Fratte on the right, with Borromini's bell tower in evidence.

Regarding the façade of the transept towards Via di Capo le Case, Borromini decides on a solid surface, reducing the openings in order to concentrate the entrance of light through one big window (*finestrone*) at the level of the major tribune. Ancient sepulchers were generally associated with memorials for victorious warriors, and the *tiburium*'s design could also mean an opportunity to reference the Del Bufalo family's military history. The mentioned *finestrone* was conceived to look like the main portal of a temple, which level corresponds, in fact, to the mausoleum of the Del Bufalo family imagined for the interior. The ancient mausoleums are typically solid masonry or concrete elements with eventual small cells at the base, having a sculptural character rather than an architectural one. Thus, the choice for the simplification of the transept's façade may be related to the necessity of emphasizing the solidity of the drum and *tiburium*, that act as a pedestal to something of greater importance above, such as the never built lantern. The *tiburium*'s appearance, in fact, recalls the mixtilinear mausoleums from Southern Italy Campania region, such as the imperial mausoleum called *la Conocchia*, in Santa Maria di Capua Vetere. In the case of the church, naturally, Borromini had to decrease the load of the *tiburium* that would have encapsulated the dome, creating a hollow structure shaped by concave and convex surfaces, ornate by four windows.

More subtle than the ancient references, the main Christian element expressed in the overall design of the tiburium, as well as in the bell tower, is the "X" shaped cross of Saint Andrew (Sant'Andrea), initial letter in Greek for "God's Anointed". This paleochristian symbolism could not be fully represented in Borromini's design for the lantern, since it has never been executed. However, it can be recognized in the geometry of the tiburium's plan, which is reflected in the conformation of today's roof. Regarding the internal space of the church, the intersection node between the nave and the transept is defined by a squared crossing topped by a dome. From the outside, however, Borromini encapsulates the dome as well as denies to the observer the perceptibility of a cylindrical *tiburium*. From all that has been considered, it is possible to infer that Borromini is antiquing in his intentions, but modern in spirit and technique. The architect constantly deceives (or defies) the observer,

dissolving the Classicist tradition of correspondence between internal and external shapes and spaces, always being aware of the urban role of his architecture on the dynamics of the surroundings.

CONCLUSION

Developed in the context of the Counter-Reformation Movement of the Catholic Church, the Baroque style had a very important role in expressing the intentions of the Church in keeping and being supported by faithful believers in the so called four corners of the world (Europe, Africa, Asia and America). The Baroque style spread through the visual arts in order to be emotionally understood, not rationally, being characterized by plastic shapes and non-realistic spaces “where the daily rules of life are suspended and deformed”.

Therefore Rome, as capital of the Papal States, constituted a rich ground to cultivate interventions through which old paradigms were transformed, establishing a modern conception for multi-scalar relationships between men, building and the city, as well as creating genuine bonds between Architecture and Urban Planning.

Francesco Borromini’s constructive virtuosity, iconological thinking and a good taste for plasticity and dynamics of shapes honored the Baroque period with impressive illusionistic effects and manipulation of space perceptions and feelings. The urban perspective within Baroque architecture is prominent but not fully discussed. This paper declares that the study of these architecture and urban features can contribute to a better understanding of how different urban contexts are enriched or impoverished, and then guide the conception of contemporary projects in a historical environment as suitable synthesis of fundamentals.

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CITTASLOW MOVEMENT IN THE CONTEXT OF SUSTAINABLE ARCHITECTURE: THE CASE OF TARAKLI

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Abstract

Within the scope of this paper, the concept of sustainability is examined; its historical development, origins, dimesions and principles are given. Sustainable architecture is described and principles of sustainable architecture are presented. In this context, the areas of intersection of sustainable architecture concept and Cittaslow (Slow City) movement are determined.

Cittaslow movement is an organization that has emerged in Italy in 1999 in order to prevent cities from losing their original textures, to prevent local food cultures and traditions from getting out of hand, and to improve the quality of life. The movement, which has more than 270 members by 2021, is a kind of local development model.

The purpose of this study is to investigate the potential of the Cittaslow Organization to build sustainable cities. The positive and negative aspects of the organisation were reported through the example of the city of Taraklı. It is aimed to examine the relation between the characteristics of the Cittaslow movement and sustainable architecture.

While examining the current practices in Tarakli; interviews with municipal and Cittaslow representatives were made and Cittaslow Assessment Forms were examined. On-site inspections at Tarakli and negotiations with the authorities are the focus of the study.

Keywords: Sustainable Architecture, Cittaslow, Slow City, Tarakli

Sustainability and Sustainable Architecture

The concept of sustainability, which has become widespread since the 1980s, became a widely accepted principle in 1987 as defined in the *Our Common Future Report* by Gro Harlem Brundlandt, President of the World Commission on Environment and Development (WCED). In the report; the concept of sustainable development defined as "meeting the needs and aspirations of the present without compromising the ability to meet those of the future". It proposes a holistic approach to environmental problems that threaten future generations. In the report, in which the effective definition of Brundtland was put forward, sustainability stands out as a three-tiered process that includes environment, economy and social sustainability. In order to build sustainability these three dimensions must be realized all together (Haştemoğlu, 2006).

As a result of rapidly increasing population, unplanned urbanization, increasing pressure on natural and historical environment and deterioration on human settlements and cultures, sustainable cities have become one of the priority issues of today (Türk & Kuzu, 2009).

The amount of materials used, the amount of energy consumed, the environmental design decisions that determine the properties of the building such as flexibility, durability and service life and pollution caused by resource use constitutes the total environmental impact of buildings. In addition, the land use and the requirements for mechanical systems during the production and use phases of the building are parameters that determine the environmental impact (Kayhan, 2006). Essentially, according to Stuart Cowan, the environmental crisis is a design crisis based on the way we carry out our productions, how buildings are built, and the construction processes. When designing a building, it should be recognized that this has serious ecological consequences and buildings should be designed accordingly (Cowan & Ryn, 1996).

The goal of sustainable design and building is to put forth solutions that will guarantee the survival of the global ecosystem consisting of humans, living organisms and inorganic elements. For this purpose, there have been many designers who have classified the principles of sustainable architecture in order to create a conceptual framework that can be used by designers and producers. In this paper, the approaches of two designers who schematized the principles of sustainable architecture with different perspectives are examined. The first of these design strategies is titled *Sustainable Architecture Module: Introduction to Sustainable Design*, which Jong-Jin Kim put forward at the University of Michigan in 1998. The second design strategy we will focus on is the theoretical and practical information that Architect Paolo Sassi included in her book called *Strategies for Sustainable Architecture* in 2006 to make more informed decisions about sustainable architecture.

SUSTAINABLE DESIGN PRINCIPLES		
Economy of Resources	Life Cycle Design	Humane Design
Energy Conservation	Pre-Building Phase	Preservation of Natural Conditions
Water Conservation	Building Phase	Urban Design Site Planning
Material Conservation	Post-Building Phase	Design for Human Confort

Table 1. Sustainable Design Principles (Kim & Rigdon, 1998).

SUSTAINABLE DESIGN STRATEGIES					
Site and Land Use	Community	Health and Well-being	Materials	Energy	Water
Select the development site with care	Recognising and enhancing the social capital	Physical comfort	Minimising the need for materials	Reduce energy requirements	Minimising the need for water
Use land efficiently	Providing basic needs	Keeping the living environment pollution free	Use existing materials	Use energy efficiently	Use water efficiently
Minimise impact of development	Enhancing the quality of life	Independence and identity	Design to enable material reuse and recycling	Use 'green' energy sources	Recyle used water
	Promoting sustainability	Restorative environments	Select new materials with care		Recyle rainwater
			Material disposal and waste minimisation		Reduce the use of mains drains

Table 2. Sustainable Design Strategies (Sassi, 2006).

Kim describes the three basic principles of sustainable architecture as Economy of Resources, Life Cycle Design and Humane Design. Economy of Resources based on the reduction, recycling and reuse of resources used in a

building. Life Cycle Design is a method that examines the construction process and the envrionmental impacts of it. Lastly Humane Desing focuses on the interaction between human and natural environment. When these three basic principles are examined, it can be said that the focus of Jong-Jin-Kim's sustainable architecture approach is limited only for the built environment and its wide variety effects of it. In this sense, it is an approach that emphasizes rather the environmental and technical aspects of sustainability.

On the other hand Sassi defended the need for a more comprehensive approach to sustainable architecture. The first chapter of her book called Site and Land Use. In this chapter problems of land use, construction site and interactions with physical and social environment are evaluated. The second chapter, Community, describes social impacts of architecture, how buildings can help create living communities and improve the quality of life. Third Chapter, Health, is written on both mental and physical health. The last three sections titled Energy, Water and Materials are about the resources used in construct and operate the buildings. In Paola Sassi's approach to sustainable architecture; design for human and society, social and mental effects of architecture are at the forefront. In this sense, it is an approach that emphasizes rather the social aspects of sustainability.

CITTASLOW ORGANISATION IN THE CONTEXT OF SUSTAINABLE ARCHITECTURE

Sustainability in settlements is a critically important issue that will shape the future. There are many planning approaches and sustainable settlement models, that have emerged at different times to affect the urban typology. Even though they have some differences, the goal of all these models is to create more environmentally friendly and sustainable settlements (Çetinkaya & Ciravoğlu, 2016). Starting with New Urbanism in the early 1990s, the planning and design approaches developed under the names of Smart Growth, Compact City, Ecocity, Eco-Village, Cittaslow, etc. They all offer diversifying solutions with similar concerns (Sınmaz, 2013).

Cittaslow movement, which is the subject of this article, is named after a combination of the words “slow” and “citta”, the Italian word for city. In 1999, it emerged from the idea of the Mayor of Greve in Chianti, a small town of Tuscany in Italy, Paolo Saturnini, to evaluate the cities themselves and put forward a different development model in order to improve the quality of life. The philosophy of the Cittaslow movement can be summarized as spreading the adoption of a life style that is sensitive to the environment, more humane and respectful to future generations in contrast to today's fast production-consumption culture. They outlined this approach in their manifesto as follows: “Towns animated by people ‘curious about time reclaimed’, rich in squares, theatres, workshops, cafes, restaurants, spiritual places, unspoilt landscapes and fascinating craftsmen, where we still appreciate the slow, benevolent succession of the seasons, with their rhythm of authentic products, respecting fine flavours and health, the spontaneity of their rituals, the fascination of living traditions. This is the joy of a slow, quiet, reflective way of life.” (Cittaslow Manifesto, 2021). The Cittaslow Organization, which started in 1999, is today carried out with the participation of more than 270 cities in 30 countries. Emphasizing that these cities are not always perfect, the organization brings together administrators and city dwellers who want to take a step towards implementing this approach, which is seen as more of a utopian experiment today. The settlements that participate the organization seek realistic solutions to today's problems without compromising the identity of the city.

The Cittaslow Association, whose organizing center is Italy, consists of national networks. These national networks manage the candidacy process and provide communication between Headquarters and the Cittaslows in their home countries. The organization holds meetings at least twice a year in the international center Orvieto or in a different Cittaslow to arrange annual goals, projects and budgets. At these meetings, ideas to improve the quality of life at cittaslows are discussed and a report is prepared as a result.

Cities with a population of less than 50,000 and who are in line with the Cittaslow philosophy initiate the process by sending an application letter to their national network explaining their intention and rationale for the membership. The National Network Coordinator notifies the applicant city of evaluation results with the reasons. If the result of the evaluation is positive, the National Cittaslow Coordinator and the Scientific Committee make

a visit to the city in order to evaluate and then the Candidacy Evaluation Report is prepared as a result of this visit. In conclusion the report of the city is sent to the Italy and the Cittaslow membership is approved after the last evaluation of the Headquarters.

The criteria in the certification process consist of 72 items under seven main headings: The main headings are as follows:

1) Energy and environmental policies: Parks and green areas, renewable energy, transport, recycling, etc.

2) Infrastructure policies: Alternative mobility, cycle paths, street furniture, etc.

3) Quality of urban life policies: Requalification and reuse of marginal areas, cable network city (fibre optics, wireless), etc.

4) Agricultural, touristic and artisan policies: Prohibiting the use of GMO in agriculture, increasing the value of working techniques and traditional crafts, etc.

5) Policies for hospitality, awareness and training: Good welcome, increasing awareness of operators and traders (transparency of offers and practised prices, clear visibility of tariffs), etc.

6) Social cohension: Integration of disable people, poverty, minorities discriminated, etc.

7) Partnerships: Collaboration with other organizations promoting natural and traditional food, etc.

As a result of the scoring made on the predetermined criteria, settlements that score above 50 are eligible to be a Cittaslow. In addition to this process, with a newly launched application, national networks have been given the authority to add new criteria specific to their local conditions, provided that they do not exceed twenty percent of the main heading they are in (Cittaslow International, 2021).

As can be seen from the evalution criteria the Cittaslow movement, which adopts an approach establishing economic development, environmental protection and social equality, built its urban development model on physical, social and cultural values specific to the location. The movement proceeding on sustainable foundations constitutes an alternative model for existing urban developments with these aspects. The Cittaslow development model is thought to offer important opportunities to many settlements, which has not lost its original values yet and has different potentials in sustaining their own natural and cultural values (Dalgakıran, 2009). Sustainable architecture, which should not be evaluated only on the scale of building design, seems more likely to be applied in settlements integrated into an urban model that adopts the concept of sustainability.

Principles of sustainable architecture and *Sustainable Architecture Strategies* which put forward by Kim and Sassi in order to create the conceptual framework of sustainable architecture and to provide convenience to designers, were examined. The approaches and principles in these two sources were brought together and compared with the Cittaslow criteria. Common principles and approaches of the Cittaslow movement and sustainable architecture have been determined (Table 3).

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Table 3. Common Principles of Cittaslow Movement and Sustainable Architecture

Energy, environment and infrastructure policies among the Cittaslow criteria show parallels with the understanding of sustainable architecture's resource management and life cycle principles. These approaches place the environment at the center as an important element in the establishment of sustainable cities. We can aslo say that policies on urban life quality emphasized cittaslow movement show resemblences with the topics such as flexible design, long-lasting structures, use of renewable resources and support of social infrastructure which are the important fot sustainable architecture. In additionaly, the Cittaslow criteria such as agricultural, touristic, tradesmen and craftsmen porlitics and social cohesion correspond to the social dimension of sustainability. It includes common approaches with the topics of design for human, respect for individuality and differences, integration of the disabled, social housing production, which are among the principles of sustainable architecture. When the 72 criteria are evaluated together, it is seen that the Cittaslow Association has an approach that adopts the understanding of sustainable development and sustainable architecture.

THE CASE OF TARAKLI

Tarakli, is a city in Turkey in the east of the Marmara Region within the borders of Sakarya. It is located on the old Istanbul-Ankara highway and the historical silk road. The town ares is 334 square kilometers. 20% of this area is agricultural, 60% is forest, 10% is meadows and pasture and 10% is non-agricultural area. There are the city of Goynuk in the east, Geyve in the west, Golpazari in the south and Akyazi in the North (Figure 1). Tarakli, surrounded by mountains and hills, has a forested land and was established in a narrow valley (Tarakli Municipality, 2021).

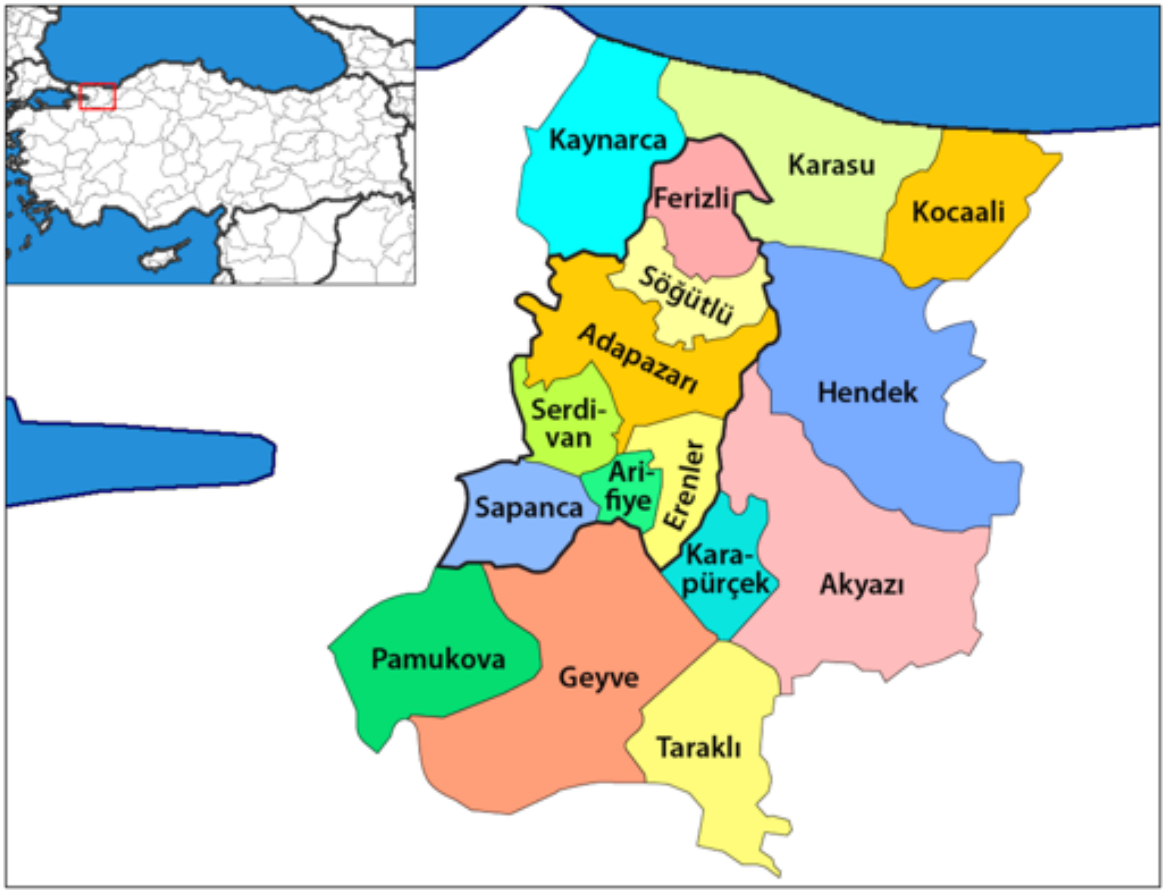

Figure 1. Location of Tarakli

The economic structure of the city of Tarakli was based on fruit growing, spoon making, comb making and small tradesmen groups in the Ottoman period. Until the second half of the 20th century, silkworm breeding was

carried out in Tarakli. Crafts such as making wooden tools, saddlery, weaving, shoe making, spoon making and comb making had an important role in the economy (Filiz et al., 2003).

By the 1950's trade overly developed in Tarakli and gradually city became the trade center of the region. All products produced by the villages, especially walnuts, were collected by the Tarakli's local merchants and marketed to Istanbul. After 1965 the economy of the district experienced a great decline due to the changes of the Istanbul-Ankara route. Since then the livelihood of the people mostly depends on agriculture, livestock and fruit growing. In addition, beekeeping and trout production are also carried out in the region (Seymen, 2008).

URBAN FABRIC

The oldest area of the city of Tarakli is Ulucamii neighbourhood which is established on the slopes of the Hisar Hill, the center of Tarakli (Figure 2). Houses on this neighbourhood have seen little changes since they were built. Most of the commercial, administrative, educational, accommodation centers are located here and most of the registered buildings in Tarakli are in this area as well. Ulucamii is located in the south of Ankara Street, which is the center of Tarakli and in the north of Stream of Goynuk. The shops along the Ankara street serve both the settlement and the passengers passing through the road daily. Streets parallel to Ankara Street are straight while perpendicular streets are steep. There is a historical bazaar consisting of two or three storey buildings in the flat street on the south parallel of the street. Hisar Mosque, Yunuspaşa Mosque, Asagi Mosque and City Park, which takes its name from the castle on Hisar Hill, are also in this neighborhood. The walls of the Hisar Castle have been completely destroyed.

Figure 2. Hisar Hill, Tarakli.

The residential area is reached through the radial streets from the market area, which is also the center of the city. Street intersections formed little squares. There are two or three-storey houses on both sides of the streets. These are houses with plaster facades, wooden frames between storeys, wooden moldings on the corners, low foundation walls, gable or hipped roofs. In the parts close to the center, the building covers the entire plot. The buildings are located on the street without a forecourt or a courtyard. As you move away from the center, the size of the building plots increase, and the building is freely settled in the area (Öztaş, 2006).

Figure 3. Ulucamii Neighbourhood and Ankara Street, Tarakli.

CERTIFICATION PROCESS FOR CITTASLOW ASSOCIATION

The city of Tarakli, as a protected area, is a member of the Historical Cities Association which is a part of European Cities Union and envisions the development of cooperation in the field of cultural heritage between historical cities. In addition to this, Tarakli is a member of the Silk Road Municipalities Union whose aim is to carry out all kinds of studies for the social, cultural and economic aspects of sustainable development of the settlements in the region. Beside being member of these associations supporting sustainability, Tarakli has been awarded by the European Commission in Brussels in 2013 within the scope of European Destinations of Excellence Competition whose theme was Accessible Tourism.

Tarakli Municipality, which is a member of local unions working in order to ensure sustainable development among historical cities, conducted a research on the Cittaslow Association which set out with similar purposes on an international scale. Afterwards Cittaslow promotion meetings were held in Sakarya with the municipality of first Cittaslow in Turkey, Seferihisar. Then the Tarakli administration started to work to provide the criteria for the application. After the preparations based on the criteria of Cittaslow are completed, Tarakli became the second Cittaslow in Turkey together with Akyaka and Gokceada in 2011 with the result of the General Assembly held in Poland. Within the scope of this article, studies carried out through the Cittaslow application process and the fulfillment of the membership criteria were compiled and examined based on the interviews and meetings with the experts in Taraklı Municipality and on-site observations.

LIST OF PLANNED AND COMPLETED ACTIVITIES WITHIN THE SCOPE OF CITTASLOW MEMBERSHIP PROCESS

Containers have been placed for the collection of domestic waste.

The construction of biological treatment facilities is at the project planning phase.

Solar energy systems are used for water heating, as well as power generation and lighting. These systems are generally installed on the roofs of houses (Figure 4).

Figure 4. Solar energy systems

Geothermal energy is used for spa treatments, preparing domestic hot water and heating. Power generation is planned by using the water in Kayaboğazı pond.

The use of energy-saving light bulbs in homes are supported. Such lighting systems are also used by the municipality in urban lighting.

Roadside billboards are almost non-existent in Taraklı. There are not so many traffic signs to create any visual pollution. Taraklı Municipality makes sure that the traffic signs are in sufficient number and order.

All electrical wiring have been moved underground in order to prevent visual pollution and create a safer environment throughout the city (Figure 5).

Figure 5. Before and after photos of electrical wiring moving undergroud

Throughout Taraklı, disabled people have access to all points. City was awarded Accessible Tourism award in 2013 (Figure 6).

Figure 6. Ramps fort he disabled throughout the Tarakli

The municipality is planning to design safe and convenient bicylcle commuting and walking. One of these routes will be arranged between the area located at the beginning of Ankara Street and the area reserved for thermal tourism in the Tarakli center. In addition, a bicycle rental project is being prepared for the Global Environment Fund (GEF) in order to travel comfortably and climb the hills. The aim of the project is to increase the use of bicycles and thus reduce carbon dioxide emissions.

There are two ambulances in Tarakli. A special mobile team provides check-up services three times a year with these vehicles. Check-up services are carried out free of charge for city residents.

The city of Tarakli has many historical sites. Since 1992 conservation and restoration plans have been prepared and implemented within the scope of the Conservation Development Plan. There are 112 registered civil architecture buildings and eight natural-cultural assets in Tarakli. Within the framework of a protocol signed between Tarakli Municipality, Sakarya Governorship and the Turkish Federation Foundation in Germany, a restoration workshop was established in Tarakli where local craftsmen would work and use local materials (Figure 7). The survey and restoration projects of 45 buildings were carried out. All of the restored buildings are wooden carcasses, and attention is paid to the use of local and original materials such as adobe and mud plaster. The reconstruction of Hisar Mansion was awarded by the Historical Cities Association the Restoration Award in the category of Traditional Materials Use (Figure 8). The reconstruction of Hacı Atif Inn was also awarded with an Achievement Award in 2015 by the Historical Cities Association (Figure 9).

Figure 7. Restoration workshop in Tarakli.

Figure 8. The reconstruction of Hisar Mansion

Figure 9. The reconstruction of Hacı Atif Inn

Many mansions have been restored and converted into boutique hotels. Facades of 30 shops were restored within the scope of the Yunuspasa Bazaar Street arrangement Project (Figure 10). Facades of 35 shops were restored within the scope of the Orhangazi Çarsisi Street Project (Figure 11). A building belonging to the municipality has been restored to improve the urban texture. Mimar Sinan Street and Turbe Street rehabilitation projects have been completed and restoration applications will be started after the approval of the relevant conservation board.

Figure 10. Yunuspasa Bazaar Street Project

Figure 11. Orhangazi Carsisi Street Project

To provide a long term participatory approach, the City Council has been established through the Municipality. It is planned to establish additional councils for women, youth and children.

The square in the center of Tarakli which is a part of historical fabric was quite neglected. Concrete walls surrounding the square, floor applications made with different materials in various periods, unplanned buffets, restaurants, teahouses, tents, waterfall, bridges and unplanned planted trees created a chaotic image in the area. The walls surrounding the park, the location of the buildings in the park, the stairs and the elevation differences made the park relatively closed and inaccessible. The relation between square and the market place was interrupted. All of these have created the need for an arrangement in the town, which attracts tourists with its historical identity. These arrangements realized by Koop Architecture in cooperation with Sakarya Metropolitan Municipality in 2014. The design decisions taken primarily were to see the square as an opening, to take references from the historical environment and to use natural slopes in the park grading. The concepts accessibility and transparency were effective in order to build new relations between historical roads and market place which can serve as a common place for visitors and local people can meet. In this context, the natural slope, cleared from the retaining walls, used to connect the lowest and highest level of the park via view terraces and ramps. Existing trees were protected (Figure 12). The new city park, which has the traces of the history, has emerged as a square where the visitors can learn about the history of the city and the residents can refresh their urban memories (Figure 13). Although its design is new, it is not new in terms of common use of the park. Because traces of the old market place of the town emphasized in this area via the plan projections. The old-ruined shops are depicted linearly on the hard floor using different colors and materials from the rest of the park. On the granite floor showing the traces of historical buildings, the names of the tradesmen and shops that were found at that point in the past are engraved. In addition, information desk and walls are places at the several spots. (Koop Architects, 2021).

Figure 12. New city park project

Figure 13. New city park Project with transparent information boxes and walls

Tarakli has organizations in the fields of entertainment, sports, nature, culture, arts, elderly assistance and general service. The local government attaches great importance to local activities. In addition, financial support is also provided. There is an intense interest especially for the youth. For this purpose, a turf football field and an indoor sports hall were built in Tarakli. And also, there is a kindergarten for in the city center.

Vocational training is provided at the public education center especially on traditional handicrafts.

The municipality organizes events in schools including basketball, volleyball, football and taekwondo in throughout the year. In addition, a tournament is organized every summer.

In the place used as a Culture House in Tarakli, the traditional handicrafts of cloth weaving and wooden spoon making are presented to the visitors by the masters of this work.

The city of Tarakli has a library and an internet access center.

CONCLUSION

In this article, the concept of sustainability, which has been widely used since the 1980s as a result of attempts to find a holistic solution to environmental problems that threaten future generations, and sustainable architecture as a subtitle of the concept of sustainability are examined. In this context, in addition to the principles put forward by Jong-Jin-Kim, which emphasizes the environmental dimension and technical aspects of sustainable architecture, the sustainable architecture features classified by Paola Sassi, who emphasizes the social and social dimensions of sustainability, in her book, *Stragesies for Sustainable Architecture*, are presented as two different approaches.

The Cittaslow movement, which emerged in Italy in 1998 and gained an international character, is the focus of the paper. Within this scope, common principles and approaches of sustainable architecture are compared with the Cittaslow criteria. When the philosophy of Cittaslow is examined, it is seen that it aims to create an environment where environmental, economic and social dimensions are built together, which is a prerequisite

for sustainable urbanization and the realization of sustainable architecture. In this sense, the Cittaslow criteria provides an important motivation for sustainable urban development and architecture. The understanding of sustainable architecture, which should not only be seen as a design method of a single building, seems more likely to be applied in settlements integrated into a city model that adopts the concept of sustainability, such as the Cittaslow movement.

In Taraklı; policies regarding agricultural production, craftsmaking and regulations within the scope of the tourism sector are at the forefront. Approaches to sustainable architecture is limited to restoration work, street arrangements, recycling and creating pedestrian-bicycle routes. Regulations on energy and environmental policies, infrastructure policies, social cohesion and partnerships are almost nonexistent.

It has been observed that the projects planned by establishing partnerships with various institutions and universities are realized faster. Within the scope of sustainable architecture in Tarakli, a successful restoration process using local materials has been completed. Arrangements have been made to ensure the uninterrupted circulation of the disabled within the settlement. In addition, the New City Square project, completed with the support of Sakarya Municipality, is in line with the Cittaslow criteria and sustainable architecture concepts. These regulations can be listed as the positive effects of the awareness provided by the Cittaslow membership on Tarakli District.

For cities that want to be a sustainable settlement and protect their history, culture and nature, Cittaslow Association creates awareness on many issues, draws a road map and increases the international visibility of these cities. In the case of Taraklı, Cittaslow movement mainly seen as a factor that contribute to tourism. This approach makes difficult to apply the whole criteria. With this point of view, the cities focus only on regulations regarding criteria that are thought to contribute to tourism, and sustainable architectural approaches remain in the background. It should not be overlooked that the quality of life of the settlement will increase by organizing informative activities for sustainable architecture, encouraging the users, and making decisions for sustainable development at the local level and implementing them decisively.

Another factor that makes the applications difficult is the lack of participation of city dwellers in the decision-making regarding the settlement and in the studies regarding the Cittaslow criteria. Cittaslow membership only perceived as an attempt depends on the municipality. When the municipal government changes, regulations are interrupted. It would be a positive start to establish local Cittaslow Associations that can make decisions independently of municipalities in order to ensure the continuity of Cittaslow regulations and increase public participation. Cittaslow movement should be regarded as a holistic approach that respects nature, adopts sustainable architectural criteria, preserves local culture, aims to increase the quality of urban life, and should not be limited to a one-sided perspective.

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HOUSING THE EXTREME INCOME-POOR: DECODING DELHI'S TRIALS WITH METHODS AND FAILURES

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Abstract

Only 23.7% of Delhi's population live in decently liveable planned colonies. The spatio-economically marginalised, 'Jhuggi Jhonpri Clusters' ('slums' of Delhi), have seen repetitive top-heavy measures of rehabilitation since the past three decades. However, the total disregard of such population as primary contributor to the 'city as a system', has made those efforts insensitive and myopic. As seen in first in-situ rehabilitation that began in 1986, with no real progress to date, its 14000 residents don't hold much hope (Banda et al, 2013). The paper discusses the three methods of housing provision; Resettlement Colonies (Flats), Resettlement Colonies (Plots), and In-situ Rehabilitation and critically shows the reasons of failure objectively in diagrams and timelines. It concludes that the radical and consistent flaw is that the mechanisms do not put livelihood ahead of housing and views the populations as an unwanted homogenous 2D image. Therefore, it proposes a newer set of guidelines, 'Shelter Guidelines' that can enable housing to be as per the number of livelihood opportunities, in a neighbourhood, such that Delhi can project itself to house the 3 million slum population which is further expected to rise at 75,000 annually. The implementations are localised and augments housing and infrastructure to elevate the liveability conditions of the neighbourhood as a whole.

Keywords: Informal Settlements, Slum Rehabilitation, Shelter and Livelihood, Inclusive Neighbourhood

DEFINING THE JJ CLUSTERS

Like any other urban centres, Delhi's slums, as called the JJ clusters, are borne when rural-urban migrants come to the city in search of work. A JJ Cluster comes about if, any two or all conditions (listed below) are satisfied

- A functional city resource in the precinct
- A residential neighbourhood as immediate adjacency
- Low-Cost Self-built Houses
- Presence of government land.

In other words, such living is a chosen strategy which shifts geographically based only on livelihood opportunities and the low cost housing is just what is the most available and affordable (Bhan, 2014). The two-floor high houses/hutments, about 10-12 sq. m., are mostly on rental systems and made of RCC, Tarpaulin, tin, plastic sheets etc. The settlements are characterised with narrow lanes, no drainage system, a few religious spaces and one community toilet complex. However, narrow or small, the lanes are always active with children playing and women working. Certain clustering of people according to ethnicity is also seen within the settlements. Such social ties strengthens a 'migrants' place in the city and keeps up the continuity of migration generation by generation. Livelihood option are more daily wage-based than fixed monthly-income and ranges within car cleaners, drivers, vendors, domestic help, salesmen etc. Fig. 1 shows how these settlements have come up more around industrial area predominantly and then around commercial centres and then residential areas. It is notable that when available, women work doubly as both industrial worker and domestic help.

Sanitation is highly inadequate with a complex of 20 WCs serving a population of 5000 approximately. The discussion around insufficient basic-sanitation is gendered, in addition to being a health risk. Women are in charge of making the family accessible to drinking water. However, their access to washrooms is limited to hours when there aren't many men at the Public Toilet. They tend to go in groups and hence their body metabolism is impacted by a social limitation triggered by access to sanitation. The ignorance of a housing system that allows dwellings to be created out of tiniest sheds is the problem. Therefore, this method of provisioning should be attacked and not the group of people who are forced to live in such conditions due to affordability. So, when one takes housing as a temporary but constant process led by household surplus and adequate infrastructure as a basic need, the focus shifts from a 'house' to a 'liveable space'. No urban house should exist without a toilet.

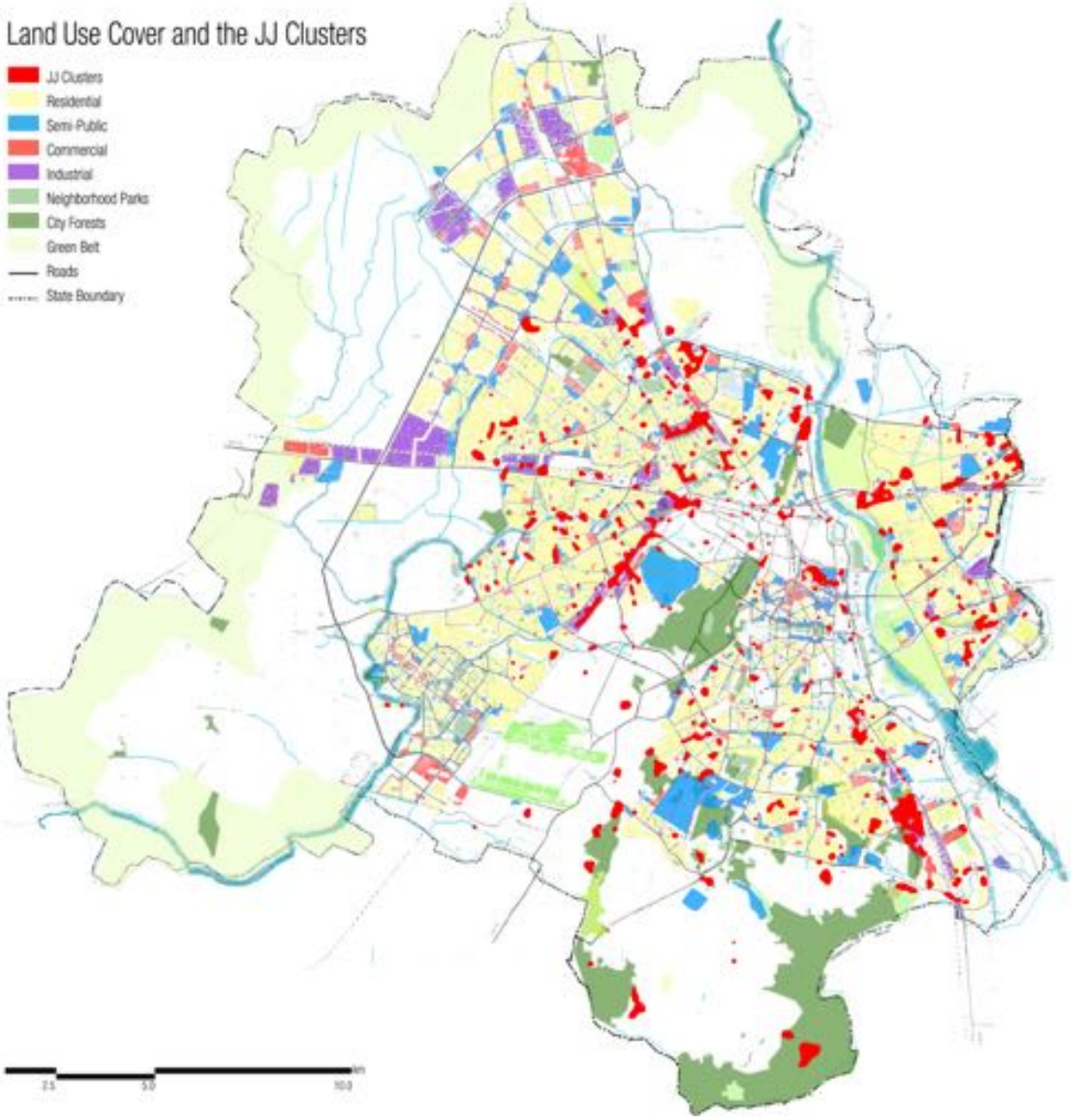

Figure 1: The Master Plan Land uses and distribution of JJCs across Delhi. Source: Author

Figure 2: Photographs of Madrasi Camp, a JJC in Central Delhi. Source: Author

POPULATION DYNAMICS

These clusters tend to have a mostly steady overall population of working adults who return to their native places after 30-40 years often allowing someone in their familial or village network to take their place in the livelihood opportunity they leave behind. These strong bonds with their native places are an important bridge **for a cycle of rural-urban migration**. Ethnicity binds the people and each individual associates with the place through the people that speak the same dialect. The population stays steady because the number of hutments does not change, but are under constant occupation since their construction.

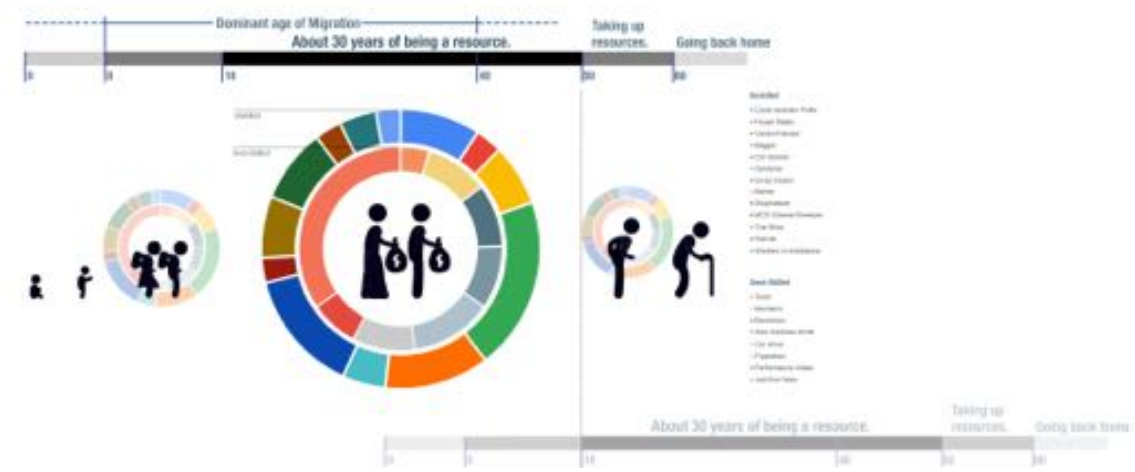

Figure 3: The cycle of Migration. Source: Author

The JJ clusters are perceived as a two-dimensional image that is fragile, dirty, temporary and illegal. It is not 'planned' and is considered 'unliveable' by the standards of modern living. But, is not living subjective? Is not 'living' a verb, rather than a noun (Davis, 2006)? Does not 'state of living' modify as according to economic surpluses? Then why is Delhi, again and again, planning housing schemes in the form house ownership and not in increasing livelihood opportunities?

DELHI'S UNIQUE CASE: IMPLEMENTATION-OWNERSHIP-FRAMEWORK: THE FRAGMENTATION OF REHABILITATION

Delhi has a unique governance system, as it is divided between the central and the state government that has exclusive agencies and policies on respective assets and parcels. The Delhi Development Authority (DDA), Central Public Works Department (CPWD), Railways, Land and Development Office (L&DO) are autonomous central agencies while Municipal Corporation of Delhi (MCD), Delhi Urban Shelter Improvement Board (DUSIB), Delhi Jal Board (DJB), Delhi Electricity Regulatory Commission (DERC) are state-government regulated. For example, DUSIB surveys these settlements, gives each hutment a code to grant legitimacy to the existing and stops new construction but the land might belong to DDA or Railways while sanitation is to be provided by DJB. Hence, to get any project going on the ground needs prior clearance from multiple of these authorities. Such multiplicity of agencies and authorities (See fig. 4) means not only delayed implementation but also mismanagement due to diplomatic blame-game between them. The method of top-down financing, often means trickling down of funds to meagre levels that can barely afford a quality solution (Banerjee, 2012). The developmental authorities look for the easiest, profitable and diplomatic way of getting around an urban issue (Bhan, "This is no longer the city I once knew". Evictions, the urban poor and the right to the city in millenial Delhi, 2009). Rise of 'slums', bounding land parcels, and restricted city parks are the result of the same exclusionary failing developmental policies. Unproductive green and excessive paving are the facial makeovers to the worsening liveability quotient even for the plant kingdom, in the most polluted city of the world. Such deceptiveness is exercised in all aspects of development in Delhi, which is why there isn't enough affordable

housing or sufficient infrastructure within even the central area of the city, leading to unchecked market-based housing solutions: the JJ Clusters.

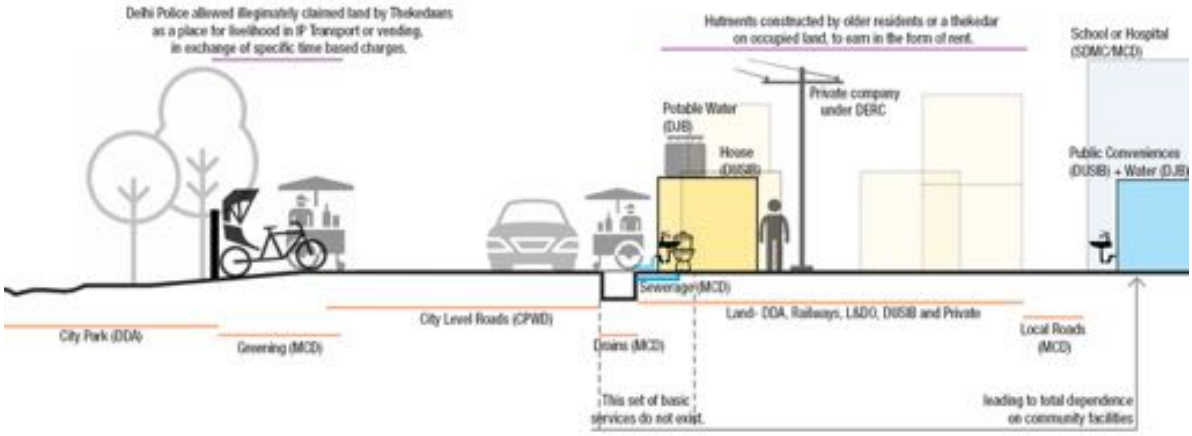

Figure 4: Ownership and Maintenance authorities for a generic cross section of the city. Source: Author

The modernistic area and policy-based logic of categorising land into residential, commercial, parks, district parks, city parks, no development zone etc. has made Delhi, a place where economic ability is the only way to access resources, be it in the form of a purchase or donations. The income-richer classes consider themselves entitled to a pastured green, instead of income-poor population making a life out of it, around their houses. The land area of the 'slum' is preferred to be converted into a recreational or a privileged possession. This often leads to contestation against the 'illegal dwellers' stating that the city's lands are polluted by them solely and had they not been there, the city would have been beautiful (Baviskar, 2006). Such rhetoric make evictions the easiest solution to the woes of the middle and higher income groups, even with umpteen agencies involved, something that Baviskar rightly calls 'bourgeoisie environmentalism'.

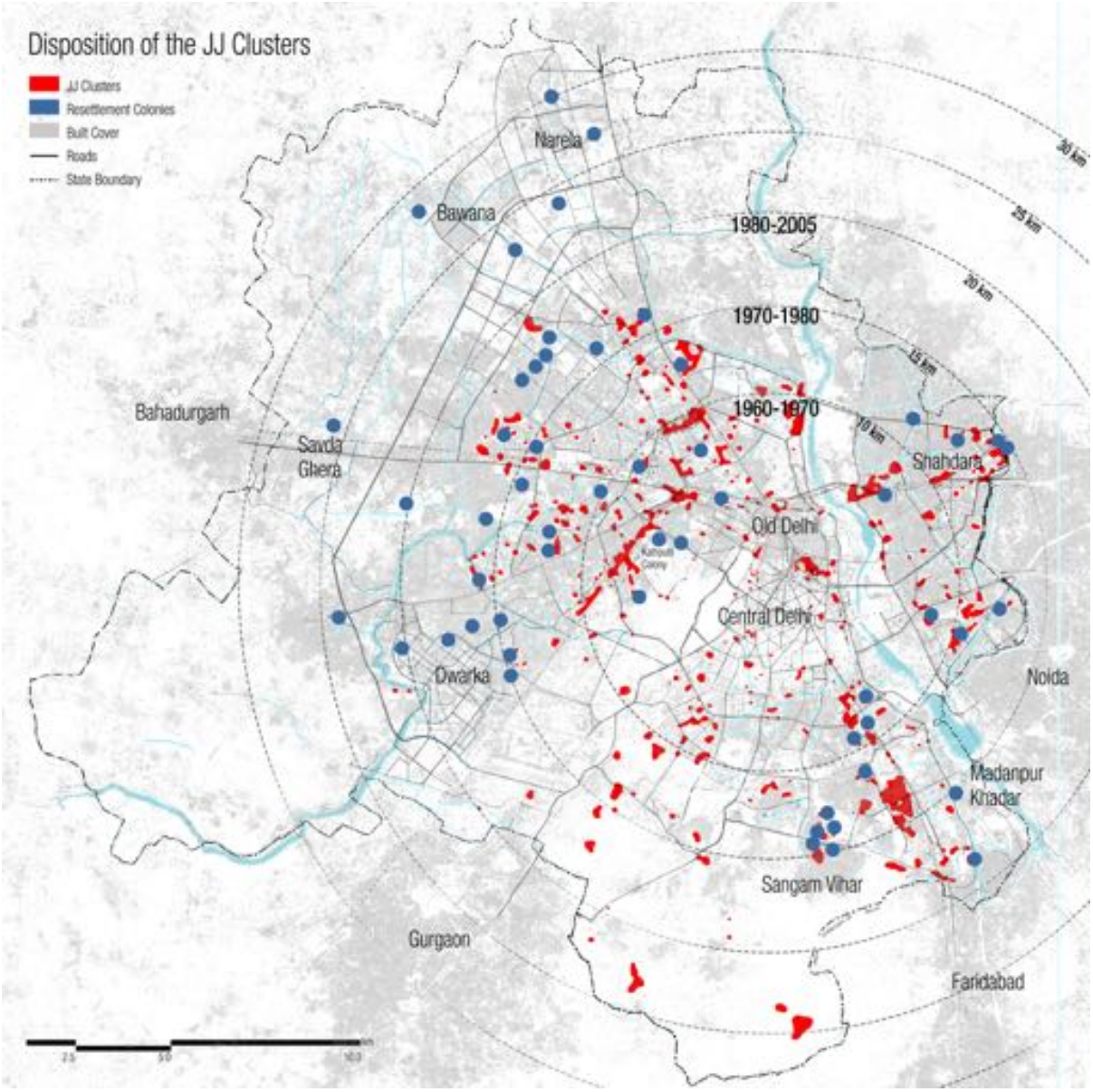

Figure 5: Location of existing JJCs and the resettlement colonies till date (DUSIB). Source: Author

Since the independence, both the central and the state government were devising new plans and granting various schemes that were legalising or legitimising numerous forms of habitation that had already sprung up. Setting up authorities like the DDA, MCD were done to take ahead such effort. Such branching of development at the hands of various authorities and recurrent financing schemes as legalised by the master and zonal plans led to actions that were top-heavy. Fig. 6 shows a timeline of landmarks policies and plans that impacted the city's relationship with JJ clusters and eventually shaped up shelter-livelihood-liveability situation of the JJ clusters within the site (Bhan, 2009; CPR, 2014; DDA, 2010; Dupont & T. Saharan, 2013; Dupont V. , 2008). It is alarming to note that the first community toilet complex was built in 1995 and it was not until 2015 that a primary healthcare clinic was built. Yamuna Pushta, settled when labourers for Asian Games 1982 construction work were not given accommodation, was uprooted when Delhi was again needed to be 'beautified' for Commonwealth Games 2010. The three Master Plans, 1962. 2001, and 2021, along with a few policies orchestrated three waves of relocation and rehabilitation reduced from 25 sqm to 12.5 sqm of land plots and eventually to a flat of 25 sqm. The 2021 Master Plan mandated to not relocate any JJC beyond 5 km from the original location. Broadly, the analogy that the city is spreading to areas by first shifting the income-poor out of the dense locations to desolate ones, which eventually get uprooted when the income-richer move there, is true.

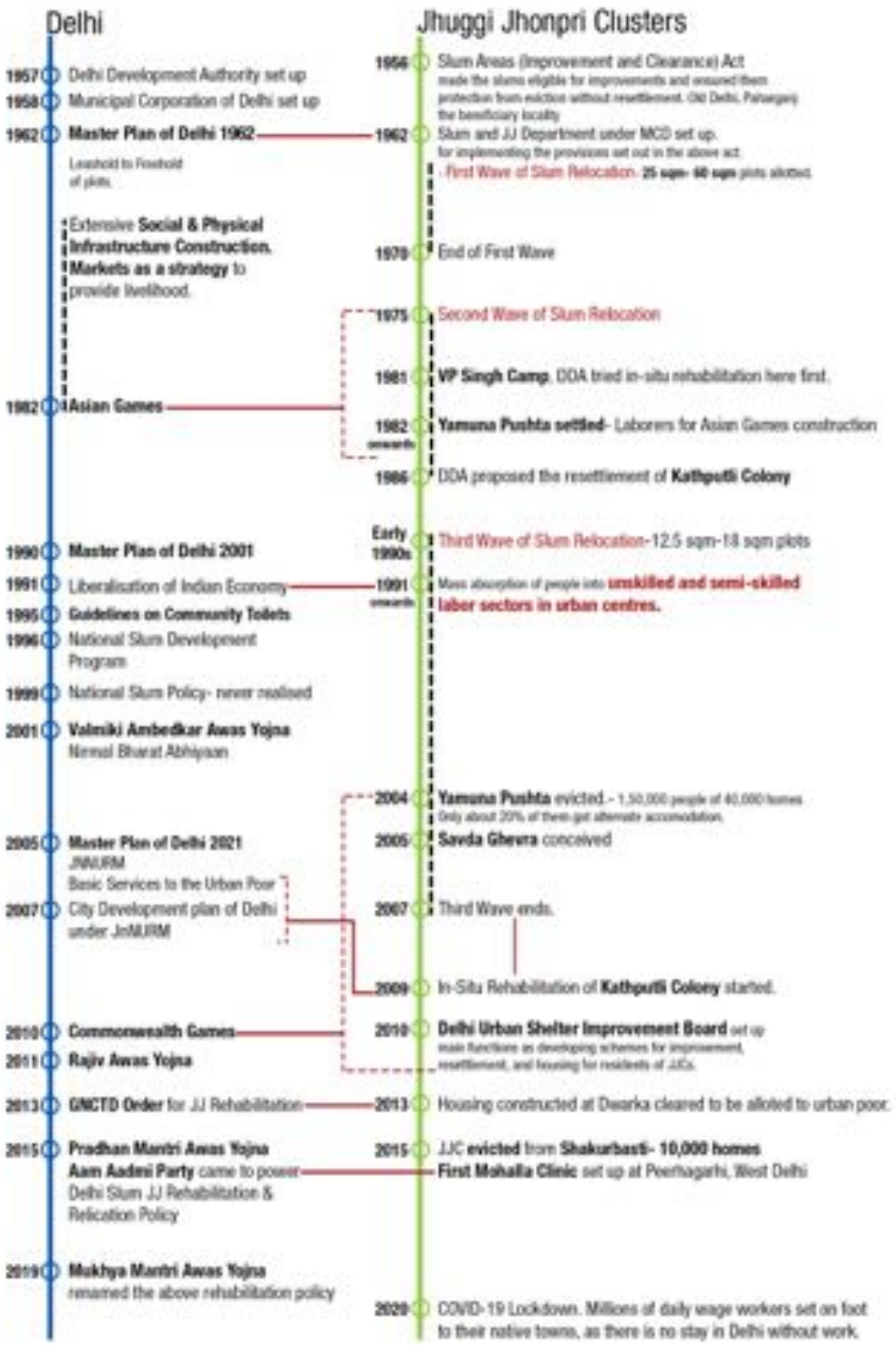

Figure 6: Timeline of landmark policies and initiatives and the repercussions on the JJ Clusters. Source: Author

Discussed below are three notable projects addressing the JJC clusters in Delhi, each of the them were selected to depict the three methods of slum rehabilitation in Delhi; namely In-situ Rehabilitation, Resettlement Colonies (Plots) and Resettlement Colonies (Flats).

THE THREE METHODS

In-Situ Rehabilitation: Kathputli Colony

At the national level the new policy for "slum-free city planning", reflected in Delhi by the recently adopted strategy of in-situ slum rehabilitation, meant to replace site and service relocation programme: thus, V.P. Singh Camp and Kathputli Colony were the selected sites for the two pioneer DDA projects of that kind. The Master Plan of Delhi 2021 introduced the approach of 'in-situ rehabilitation' which mandates any rehabilitation effort to not evict the people beyond 5 km of distance from the original location. A three step rehabilitation where the residents are moved into a transit camp, while the DDA with a private developer constructs new housing through public-private partnership using the land as a resource, for the private enterprise to utilise a part of the land for commercial gains. When the affordable housing is built, the people are re-shifted to 25 sq. m. flats, which is when the commercial component of the project in the form of malls, luxury housing etc. can start. It also states that 40% of Delhi's housing deficiency can be solved by this method as most of the JJCs are on public land occupying prime real estate locations (DDA, 2019). Kathputli Colony was the first to be taken up to implement this approach.

Despite the Master Plan's attempt to move toward a more inclusive approach to slum redevelopment, the DDA is struggling in its efforts to develop an infrastructure capable of facilitating an informed involvement by the community or civil society organizations in the region. As the primary predicament to initiate any project is that the government cannot go into deficit, it also has to show profits by the end of the year and that it has to show completed works legally in paper. The developer also has to earn a good profit. So, when the project was launched all news reporting happened in the form of showcasing the 'noble' work that both the stakeholders were doing to uplift the dwellers of their shanty into new apartments in fifteen storey high buildings. The developer had Delhi's first luxury skyscraper as 44 storey high 'Raheja Phoenix' and the DDA had Delhi's first in-situ rehabilitation project. The developer invested in the project with monetary capital and the DDA invested with its land as capital. Both aiming to gain a financial profit out of it in the form of taxes, selling prices and portfolio upgrade.

Figure 7: The Kathputli Colony in-situ rehabilitation timeline. Source: Author

The third stakeholder, who are the target of it all, were barely a part of the process that was to affect their life from the root. It is, as if, the only way the slum dwellers could be provided access to the city rights is through legal ownership of a tangible property while denying them of the other human rights that should have come in the form of community consultations, effective space design as needed by a puppetry community or recognising their daily contribution as both human and economic parts of the city. It has been 13 years since the current project started and 3 years since the residents were forcefully moved to the transit camps, 5 km away (Banda, 2013). The project is yet to see the light of the day in physical concrete foundation on the site as it still wanders across various offices and institutions (See fig.4), in a fight to satisfy all their interests while deciding the fate and the rights of the displaced citizens who have been stripped of their voice.

34 years of policies, plans, public interest and community recognition, the future still appears hazy (Banda, 2013). The people had themselves generated a socio-spatial fabric that might be transient or temporary but the most suitable to their socio-economic conditions. To initiate a upgrading that slowly provided better housing on the same piece of land, block by block would have been easier to implement. That would have been an 'in-situ' development with the people and the local stakeholders involved who know what works for a community of such cultural foothold. The involvement of a private enterprise would not have been the central component of the project either as slow upgradation could have alternate funding mechanisms that are locally available.

Figure 8: (i) The Colony as it was (Fanari, 2017) (ii)The Demolition (Shrangi, 2017) (iii) The proposed project- luxury housing next to social housing (Dupont V. , 2015)

Resettlement Colonies (Plots): Savda Ghera

Savda Ghera is the newest and the most extreme example of peripheralisation of the urban poor for the city of Delhi. Households were relocated from distances ranging between 20-40 km. Plots of 12.5 sq. m. to 18 sq. m. were allotted upon verification of necessary documents for a period of 7 years and on payment of Rs.7000 (Sheikh, 2014). As the people were stripped from their livelihoods when relocated, many of them 'sold' their land for a good profit and went back to where they had come from. Though the allotment does not allow to sell or rent the plot, 'illegal' transactions for prices from 50,000 to 60,000 per plot had started within a year (Sheikh, 2014). Rent prices ranged from Rs.500 to Rs.1000 per room. When set up in 2006, the settlement did not have any water supply nor sewerage network. The nearest hospital is 13 km away with no public transport available, until 7 years ago. NGOs, local mobilisation have helped in securing resources for daily living. (Sheikh, 2014; King, 2014) The present population of 46,000 (Sheikh, 2014) do not wait for the government to employ them or give them a house. Many of them still travel 20-40 km every day to their older places of work, women cannot access work because it is not nearby (HLRN, 2014).

Figure 9: Savda Ghera (HLRN, 2014) & Satellite Imagery'20 (Google Earth)

In 14 years of coming into being, the people led development, without harping on the point of it being legal or illegal, has been similar to how JJ clusters come up in the inner city (Dupont & T. Saharan, 2013). The population is transient, the housing is incremental and there are makeshift arrangements for infrastructure. The rehabilitation policy that assumed that all the urban poor needs is land tenure, is faulty. It gave the land, and made way for another 'slum' to come up in the city's periphery, in a much worse infrastructural situation and rather complicated its own methods of housing provision and urban poor upliftment. Savda Ghera has been repeatedly termed as a method in 'planning a slum' by scholars.

It is alarming for a global city like Delhi to make a settlement like Savda Ghera, a reality. It reduced the living quotient of the income poor population, to securing a 12.5 sq. m. plot on lease, with no financial assistance for house construction or for accessing infrastructure (King, 2014; Verma, 2003). Whereas, securing a plot is far ahead in the list of aspirations of such population. Securing three meals, clothes, amenities, education for children come as immediate requirements and shifting the families to such an isolated location specifically deprives them of the same, which is why such plots were readily sold for a sum of 50,000 rupees. This is an exercise in futility which will never solve the issues of the marginal nor will it make the city look any more 'beautiful'.

Figure 10: View of the main street of Savda Ghera. (HLRN, 2014) & Entire site of Savda Ghera (Google Earth)

Resettlement Colonies (Flats): Adarsh EWS Colonies, Dwarka

These 'EWS (economically weaker sections) flats' are 1BHK flats that get allotted to residents who were displaced from other JJCs on a 10 year lease, which they cannot sublet or sell. At the time of allotment, residents had to pay Rs.1,12,000 or Rs.1, 000, depending on caste based categorisation. Additionally, all allottees had to pay Rs.30,000 as maintenance fee for a period of 5 years. A mutually accepted method of selling the power of attorney happens frequently, that enables legitimate re-selling. The new occupants lack property rights. The

most pressing concern that the residents raise about this method are loss of their self-built homes and livelihood. Being displaced to ends of the city, the people lack sense of community and employment opportunities which is why only 1000 odd families live here.

Figure 11: Layout (Google Earth) and View of the Adarsh EWS Colony, Dwarka (DUSIB, 2019)

With a neatly-tarred road, parks, piped-water, and drains the apartment complex appeared to have basic amenities. Each flat has a ventilated living room, kitchen, bathroom-cum-toilet, and one bedroom. 3 years since first occupied, the complex still in desolate from within. The households have found work as mechanic and domestic help in nearby houses, while a few still travel to their old workplace. Income has been meagre since the relocation, but people have found resilience by forming new associations in communities around.

SUMMING UP

Current rehabilitation and welfare policies or moves by the governance structure primarily looks at the physical condition of the slum as the flaw and neglects the socio-cultural diversity of living that has resulted out of an economic give and take mechanism between the 'slum' and the 'better' slice of the city nearby. Hence, all the rehabilitation practices have failed, partially or fully, as it did not put livelihood ahead of housing. It readily reduced the people's acceptance by the city as a resultant of ownership of a formal space of living. It did not recognise that the slums are an indispensable part of the functioning of the neighbourhood too, that the neighbourhood does not function well if it does not have the semi-skilled or unskilled labour that this population had serviced in.

The projects also violated its own master plan of not relocating the residents beyond 5 km (CPR, 2014). The two resettlement colonies prioritised the mega events in the city over the lives of the poor and the in-situ rehabilitation was programmed for such utopian results that not only failed to address the existing living condition and but also failed in securing for itself a footing, across the umpteen authorities involved, to materialise itself as of yet. Delhi needs to think beyond large plot-huge development practice as it is too complicated a process to get across the umpteen authorities and the legal court hearings that come up readily. Lengthening of the project timeline allows all stakeholders to politicise the issue into a gimmick of continuous 'who, when, why, how, what' questions that often diverts from the primary issue (Verma, 2003). Eventually, the project gets side-lined, marked a 'failure' by bureaucrats and scholars, while the slum residents continue to suffer in a worse condition than before.

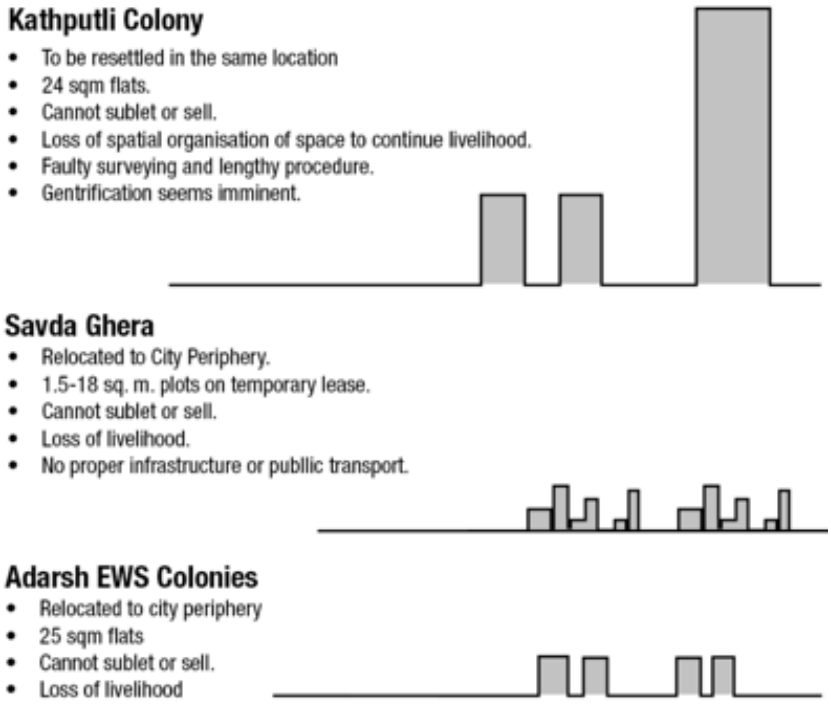

Figure 12: Comparing the three methods. Source: Author

Alternatively, what Delhi needs are more local, long-term, and sustained development trajectories for each of the JJCs. One needs to look at slum upgrading as part of respective neighborhood upgradation, because first the live-work scenario needs strengthening and then 'the house' comes in 'legal' form. Social cohesion between the economic classes have to be encouraged through development initiatives. Such localised initiatives could together then project Delhi into an ever-developing liveable city.

PROPOSALS AND POLICY RECOMMENDATIONS

Shelter Guidelines

It is not only the income-poor who need the livelihood and shelter, but it is the wider society that creates critically necessary economic opportunities for its own functioning which makes the migrants come to a location. So, it is in everybody's interest that everybody's needs are taken care of. The housing policy makes any house without a toilet illegal, and not because it is constructed on unused government land. Alongside, it envisions that with adequate livelihood, the migrants will themselves move out of the settlement whenever they have enough surplus- a window of 5-10 years. As the settlements have been on the land for more than 30 years, an added 10 years of 'illegal' occupation has to be agreed upon by the land-owning authorities. Then the other authorities and agencies take forward bottom-up capacity building led development. It also states that if any employer can provide a livelihood, then it must provide a house under the employers' association, corresponding to the livelihood in exchange of rent. Any demolition must ensure another house in the same precinct before it.

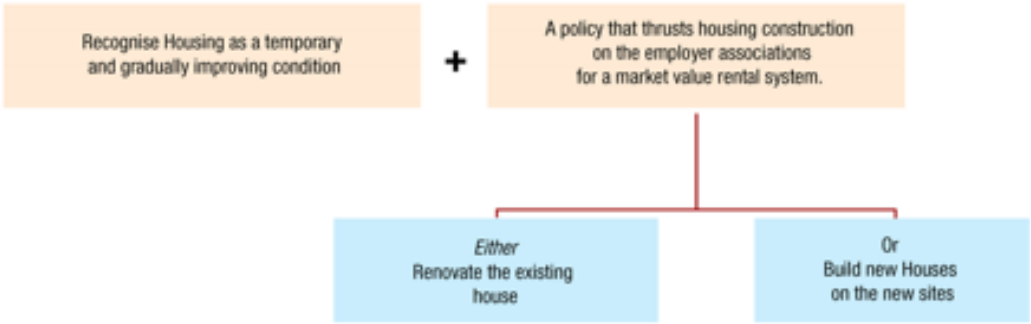

Figure 13: Shelter Guidelines Diagram. Source: Author

Thus, this enables the quantity of housing to be per the number of livelihood opportunities, by making housing as a local strategy at the hands of the employers, as financed by various housing schemes from state and nation. Space Organisation of such housing should be modular and should provide the opportunity to deduct or add spaces as per the need. Construction type should be versatile and can be rethought with different materials as per availability, ranging from RCC, wood, upcycled plastic members etc. Two-3 floor should be possible with this style of construction.

Urban Greening Guidelines

Figure 14: Urban Greening Guidelines Diagram. Source: Author

Till date, the plight of city greens as bounded recreational asset that is more a maintenance issue than a self-sustaining greenery, is concerning. Possibility lies in bringing all the un-utilized and underutilized lands under a community-led organisation that leases out certain parcels to JJC residents to make their livelihood out of it, in turn those parcels are made into productive parcels of land. Such act puts them at the centre of how a neighbourhood is perceived by the other residents making the marginalized the new agents of green. The produce is sold at the markets through which the people can earn an extra living. In this proposal, the JJ residents get an added livelihood opportunity and the other residents get recharged parks, pathways and less polluted air and water for all. The next step is coming together of both the economic classes for urban green terraces, balconies too. As the population knows practices in rural farming, transition to urban farming might need effective training. Additionally, alternate livelihood could also be generated out of handicraft skills to upcycle materials that would otherwise be dumped in landfills.

CONCLUSION

Both the guidelines, put together, envision to solve shelter and livelihood woes simultaneously. They are general as specific alterations needs to be arrived at from one neighborhood to another. As in Fig. 15, a neighborhood of Delhi, Lajpat Nagar, is mapped for its JJCs, green land parcels and unutilised government land. To redevelop the vacant land into housing complexes with certain commercial element could prove beneficial for the land owner too, as it elevates the lands value from unutilised to ‘extensively used’. Such smaller development does not need any private developer and can be financed by authorities, in phases, as the project moves forward. Provision of skill centres, schools, weekly markets, recreation spaces come additive to efficient housing type and

decentralised treatment system for the JJC's self-sufficiency. A possibility where the need for better shelter, open spaces and sanitation facilities are combined, along with purposeful community seams for future resilience (Fig.16).

Housing the Income-Poor in Delhi is thus a problem in implementation that needs local, sensitive, bottom-up execution as the solution. One just has to understand, identify, strategize, implement and then make it into a policy for other locations to follow.

Figure 15: Mapping the possibilities in a neighborhood of Delhi. Source: Author

Figure 16: The Future Projection. Source: Author

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USING ANALYTICAL HIERARCHY PROCESS IN LIGHT RAIL TRANSIT (LRT) ROUTE SELECTION: CASE OF GEBZE-DARICA ROUTE

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Abstract

Light Rail Transit (LRT) is one of the most innovative public transportation system of the 21st century. Because of its relatively low cost and higher capacity than other rail systems, most of the local governments plan to implement LRT in developing countries' cities. LRT can significantly increase mobility in both the city center and the suburbs, helping to reduce congestion, revitalize neighborhoods and reduce carbon emissions.

Route planning, design and implementation stages of LRT require a Multi Criteria Decision Making (MCDM) process.

Previous studies in the literature on LRT route mostly mention main criteria such as; Opportunity to Share Roads, Highway Traffic Congestion, Proximity to Public and Educational Institutions, Proximity to Industrial and Commercial Areas, Proximity to Mass Housing Areas, Integration with Other Transportation Modes, Level of Travel Demand, Property Rights, Topography, Geological- Geotechnical and Seismological Suitability, Distance to Drainage Basin Protection Zones, Distance to Protected Areas.

The aim of our study is to determine the criteria weights for the route selection of a planned LRT between Gebze and Darıca which are two districts of Kocaeli city that is one of the most developed industrialised city in Turkey.

The methodology on criteria weighting leans on Analytical Hierarchy Process (AHP) as one of the MCDM methods. The weighting of the criteria mentioned above will be determined with the help of AHP. The 12 criteria determined by the literature review in LRT route selection were placed in the order of their importance by 15 experts on various disciplines. We prepared a Pairwise Comparison Matrices, which is part of AHP to help experts to easily score their answers. Result of the pairwise comparisons analyzed in Expert Choice software and final weights of these criteria were calculated.

Spatial data of these 12 criteria were obtained from official institutions. From this data source, new data generation and data transformation operations were carried out with the help of the Geographic Information Systems (GIS) computer application ArcGIS. Spatial data which are recalculated, weighted, and transformed into same spatial scale were also mapped in ArcMAP and compared with the actual route.

Keywords: Light Rail Transit, Multi Criteria Decision Making, Analytical Hierarchy Process, Route Selection

INTRODUCTION

The importance of public transportation planning and decisions for cities is increasing day by day. The main reason for this increase is the necessity of evaluating transportation plans from various perspectives for decision makers. It is crucial to take the views of actors in plan preparation phase. because of the theseplans affect cities, city administrations, people, all local and foreign actors directly or indirectly.

The prepared plans can decide the direction in which cities will expand, where they will make a profit, which regions will gain importance and which regions will decrease their attractiveness. The planning decisions on urban transportation should be prepared with detailed studies with great effort and should be long term.

In Colin Buchanan's (1963) book *"Traffic in Towns"*, it was emphasized that the vicious circle of individual car-oriented transportation in modern cities should be overcome. Buchanan explained that the automobile is a costly and problematic solution for transportation, therefore it is necessary to develop different systems in cities with a population of more than 100 thousand (Buchanan, 1963). One of the important suggestions to eliminate that vicious circle is based on rail systems.

The LRT was unknown in most of the world until 1972, but the concept was introduced ten years before that date. In 1962, the *Traffic Quarterly Magazine* published a study by H. Dean Quinby describing this concept (Quinby, 1962).

Its high capacity and high speed characteristics gave birth to the LRT concept and led to the rapid spread of LRT in many countries with country specific criteria. The institution that determines and publishes these criteria in Turkey is the Ministry of Transport and Infrastructure.

The importance of LRT is emphasized in national policy and planning documents in Turkey. Tenth and Eleventh Development Plan (T.R. Ministry of Development, 2013; T.R. Presidency of Strategy and Budget, 2019), Turkey Habitat III National Report (Ministry of Environment and Urbanization, 2014) and 11th Maritime Transport and Communications Council Report and Final Declaration (Ministry of Transport, Maritime Affairs and Communications, 2013a; 2013b); have targets for rail transportation system in the future of Turkey on topics such as production, export, localization, line length, passenger share in transportation and financing.

For the solution of traffic problems in built environment, it is necessary to consider many variables together in the planning and implementation stages of LRT. For this purpose, multi-criteria decision-making processes should be operated. Since that decision is about the urban space, the spatial decision-making process needs to be described. At this point, the basic tools of geographic information systems make a significant contribution. On the other hand, each variable that takes place on the space does not have an equal weight in determining the LRT route. It is needed to specify the weights of these criteria and to reveal their variability on the urban space. Only as a result of these processes the optimal application of LRT, which is a costly investment, in the built environment can be performed.

The aim of this study is to determine the alternatives of the planned LRT route between Gebze-Darıca districts in Kocaeli by analytical methods and to check the suitability of these alternatives to the planned route. To achieve this goal, it is aimed to operate a method that handles MCDM and GIS together in the selection of the LRT route and to compare the results with the current route selection.

LITERATURE REVIEW

The literature of this study leans on the criteria and methods on determination of LRT route alternatives on urban space. The most of these studies emphases the criteria such as population density, proximity to the working areas, the cost of the project, the connectivity of the route and intersections with other transportation systems, ownership of land and land values, distance to the protected areas, travel demand, noise pollution, land uses, proximity to various land uses, proximity to fault lines, suitability to the geological, lithological structure and soil, the possibility to share existing roads with other systems, the existing parking lots and their capacities, the current state of traffic, proximity to mass housing areas, topography, ecological structure, public

income, maximum efficiency, the length of the route, the total travel time, the aesthetics of the route, the Transit Oriented Development (TOD) potential, the rate of vacant plots on the route, suitability to the hydrological structure, and suitability to engineering characteristics.

According to Banai's (2006) LRT route selection in American city of Memphis mobility to business centers, mobility of the public, mobility of low-income people, operating costs, Transit Oriented Development (TOD), cost of capital, use of shared road rights, traffic congestion, impact on sensitive areas were evaluated as a criteria (Banai, 2006), (MATA, 1997).

Ludin and Latip (2006) argues how to integrate spatial and non-spatial data within the framework of a multi-criteria decision to identify and evaluate the land use development corridor to determine the appropriate route for LRT. The area of study is the Kuala Lumpur. Determined factors in this study are maximizing the route to work areas, minimizing disturbance, maximizing mobility, linking strategic locations, maximizing network, minimizing expropriation, constructability, maximizing efficiency (Ludin & Latip, 2006).

Rosenberg and Esnard (2008) chose Fort Lauderdale as their study area and evaluated six alternative train stations. Location selection criteria include the following three main headings: proximity, developability, and visual quality. Scores normalized according to these three umbrella scales (Rosenberg & Esnard, 2008).

According to Farkas (2009), route / station location selection is the process of determining the places that meet the expected conditions according to the selection criteria. The Farkas workspace is Cochabamba. The aim of the study is to reveal the optimum route and station selection for rail systems. To achieve this goal, it has made more detailed targets by determining engineering, economic, institutional, social, and environmental sub-goals and creating special goals for each of these sub-goals (Farkas, 2009).

As stated by Ahmed and Asmael (2009), route selection is an important start in the design and construction process. It also has a potential to significantly affect the structure and environment of the area. Effective route selection process is crucial to minimize the cost. Planners planning the appropriate network should consider criteria such as topography, usable land, soil type and public welfare (Ahmed & Asmael, 2009).

Verma, Upadhyay, and Goel (2011) proposed an integrated approach to determine the railway route by choosing Thane City as a study area. The focus of the integrated approach when planning the rail transportation system is to try to minimize the travel time between the starting-destination points of the passengers and also minimize the costs of the operator. It has been determined that the maximum number of passengers per hour obtained on the determined route is optimum to recommend LRT (Verma, Upadhyay, & Goel, 2011).

Brunner et al. (2011) combined AHP and GIS technologies to support decision making in determining the best transportation system between Salt Lake and Airport routes in Honolulu. The aim of AHP in this study is to determine the location of the optimum rail system corridor. This process was done with alternatives of technical, social, economic, and environmental criteria and suitability levels (Brunner et al., 2011).

Choosing Istanbul as his field of study, Kırlangıçoğlu (2016) use 12 criteria (travel demand, integration to other transport, population density, distance to protected areas, need for expropriation, proximity to industrial and commercial areas, Proximity to public and educational areas, proximity to public housing, slope, geological structure, distance to faults and distance to water areas) and combined them by Overlay Analysis of ArcGIS (Kırlangıçoğlu, 2016).

El-Hallaq and El-Yazory (2017) conducted a case study to determine the metro route in Gaza City. Fifty major intersections in Gaza, areas within 500 m radius of each intersection point have been determined as candidate areas for rail system stations. The criteria used to determine the optimum stations of metro lines are population density, important centers, suitable parking areas, intersection areas, traffic at intersections and land use (El-Hallaq and El-Yazory, 2017).

METHODOLOGY

With this study it is aimed to test a MCDM and GIS supported model for the route selection step, for light rail systems, which gain importance in highest level strategy documents for Turkeys future vision. The outputs planned to be achieved will provide decision makers an objective base for the rail system investments that are seen to increase in Turkey. In this context, the desired result is to determine the alternatives of the planned LRT route between Gebze-Darıca districts in Kocaeli and to test the suitability of the method by evaluating the integration of these alternatives with the planned route. It is aimed to test a method that evaluates MCDM and GIS together in determining the LRT routes and to compare the results with the current route selection.

Multi Criteria Decision Making (MCDM) is a system that generates efficient outputs for decision problems. It is a branch of a class of general operations research models that deal with decision problems under various decision criteria. The most used MCDM methods are ELECTRE, TOPSIS, PROMETHEE, SAW, Analytical Network Process, Analytical Hierarchy Process. Various applications are possible with combinations of MCDM methods (Gal et al., 2013).

Analytical Hierarchy Process is one of the most frequently used one among all methods. AHP enables participants to evaluate key criteria using the Pairwise Comprasion method (Saaty, 1990). With this approach, the participant specifically compares only two criteria at a time. It makes its decision with this method and determines the preference weights of all criteria one by one. Comparisons are made using objective measurements or subjective evaluations. Expert groups or community participants are also able to discuss and evaluate for the criteria they have chosen during this comparison phase (Brunner et al., 2011). The relationship between the AHP and the main goal, criteria, qualifications, sub-criteria, and options related to the problem is constructed in a hierarchical order. One of the most important characteristics of this process is that objective and subjective preferences are included in the decision-making process at the same time. At AHP, knowledge, experience, subjective thoughts, and predictions of the individual are brought together within a certain logic (Akad and Gedizlioğlu, 2007). With AHP, researcher aimed to discover own decision-making mechanisms and make more efficient decisions in this way, instead of forcing people to use a method about how they should make decisions (Kırlangıçoğlu, 2016).

Another axis in this study's methodology is the spatialization step of the criteria weights determined by experts in AHP.

Geographic Information System (GIS) is a framework that give the capability to capture and analyze spatial information. GIS applications are computer-based tools that qualify the user to create interactive searches, store and edit spatial and non-spatial data, analyze spatial data output, and visually share the outcomes of these processes by give them as maps (Clarke, 1986; Maliene et. al, 2011). One of the most commonly used GIS computer applications is ArcGIS. In this study, ArcGIS 'ArcMAP interface is used in all data operations.

Weighted Sum, one of the ArcMAP's Overlay tools, is the effective tool for spatial MCDM. This tool Overlays a number of raster, multiplying each by their given weight and summing them all (Miller and Shaw, 2001). With multiple raster inputs, representing multiple criteria, can be easily combined, incorporating weights or relative importance (Zeiler, 1999). Weighted Sum tool is parallel to the Weighted Overlay tool. In Weighted Overlay, all criteria sub-weights must be expressed with the same numerical values (e.g.: 1 to 5 or 1 to 10). Since the system is much simpler in Weighted Sum, there is no such requirement (Mitchell, 1999). Weighted Overlay requires that the expert weights be written to a total of 100. However, this tool does not accept weights with commas (such as 14,4 or 12,9). It requires all weights to be written in integer form. Integer weights are never expected to occur as the output of the Expert Pairwise Comparison Forms. Weighted Sum allows comma weight entries. These differences prove that the Weighted Sum tool is more effective than the Weighted Overlay tool for the spatial MCDM (Pucha-Cofrep et. al, 2018).

DATA AND DATA PREPARATION FOR THE ANALYSIS

Following the examination of the route determination criteria of the urban rail system in the literature, the criteria that should be evaluated for Gebze and Darıca districts were determined within the framework of their spatial availability and spatialization potential in Kocaeli. These criteria are: Proximity to Public and Educational Institutions, Proximity to Industrial and Commercial Areas, Proximity to Mass Housing Areas, Distance to Protected Areas (Archaeological, Urban, Historical, Natural and Mixed Protected Areas), Distance to Basin Protection Zones, Topography, Geotechnical-Geological and Seismological Suitability, Level of Travel Demand (Traffic Analysis Zones), Property Rights, Integration with Other Transportation Modes (Parking Lots, Bus Stops, Marmaray and Ferry Docks), Highway Traffic Congestion, Opportunity to Share Roads. These criteria are given in Figure 1. The spatial data needed for the determined study area and the research subject was obtained as raw data from Kocaeli Metropolitan Municipality.

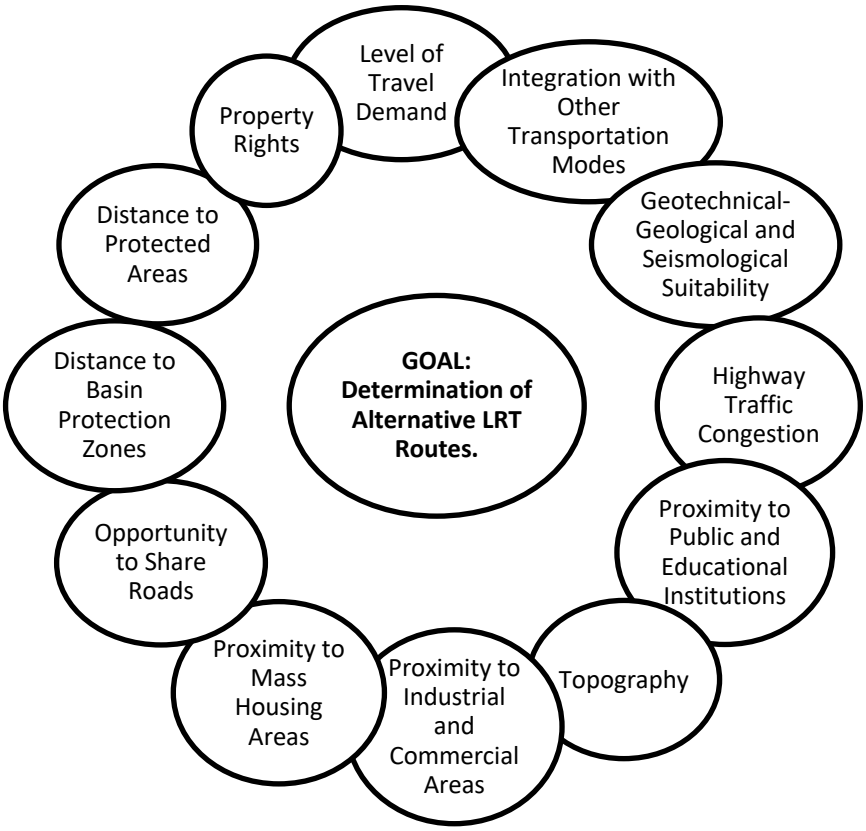


Figure 1: The most suitable LRT route design criteria for Gebze and Darıca region

Before performing appropriate operations on the raw data in ArcGIS, the Multi Criteria Decision Making process was initiated to determine the weights of the selecting criteria in this study.

Analytical Hierarchy Process (AHP) was chosen as the MCDM method and Pairwise Comparison Analysis was applied. The purpose of the Pairwise Comparison Analysis is to create the order of importance of the previously determined criteria. To make this ranking, all these criteria are written as pairwise comparison matrix in the example in Table 1 and sent to the group of fifteen experts in relevant disciplines . People who take this form determine at what level the criteria are weighted relative to each other by using scales digitized with numbers from 1 to 9.

Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Proximity to Industrial and Commercial Areas
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Proximity to Mass Housing Areas
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Distance to Protected Areas
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Distance to Basin Protection Zones
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Topography
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Geological and Seismological Suitability
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Level of Travel Demand
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Property Rights
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Integration with Other Transportation Modes
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Highway Traffic Congestion
Proximity to Public and Educational Institutions	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Opportunity to Share Roads

Table 1. One of the Pairwise Comprasion Form from the study

The Experts in this study are competent in transportation planning and know the requirements of the Gebze-Darıca region. These experts are three urban planner academicians, five civil engineer academicians, a geomatic engineer academic, five municipal employees city planners and a private city planner.

After the importance (weight) ranking phase the evaluation forms received were transformed into "Criteria Weight Levels" with the support of Expert Choice (Ishizaka and Labib, 2009), the AHP software. Apart from this, sub-weights were applied to each criterion within itself by the help of relevant literature and the urban planning norms and standards.

In the next step, data generation and data transformation operations were performed from the data belonging to all criteria to create the result map in the ArcGIS program. The result data processed with ArcMAP tools (Multiple Ring Buffer, Polygon to Raster, Polyline to Raster, Slope Analyst, etc.) is a weighted spatial distribution in pixel format expressed in 25x25 meter cells belonging to all criteria.

STUDY AREA

The fact that Gebze and Darıca act as a bridge between the two cities Istanbul and Kocaeli, which have the largest share of national investments, increases the importance of these two districts day by day (Figure 2). To establish the transportation integration of the districts not only with Kocaeli in the east and Istanbul in the west, but also with each other and with the northern part, an efficient and sufficient capacity rail system is required for the region. Another reason for the need for this system is the transportation problems that arise because of the rising vehicle ownership in these regions.

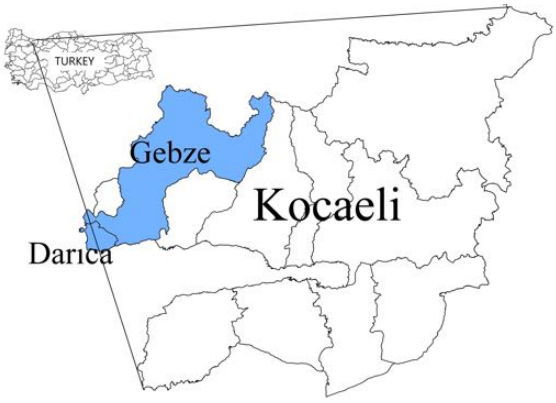


Figure 2: Study Area

With the evaluation of transportation and development plans by Kocaeli Metropolitan Municipality, it was decided to build a rail system between Gebze and Darıca in order to solve transportation problems, to continue development and to increase the quality of life (Kocaeli Metropolitan Municipality, 2018a). As a result of the evaluations, it was decided to plan the line as a LRT. It is planned to be operated driverless on the entire route (Kocaeli Metropolitan Municipality, 2018b). The project, which is still under construction, will be integrated with Marmaray, with the completion of the part between Gebze Organized Industrial Zone (GOIZ) and Gebze at the end of 2022 (Demirören News Agency, 2020a) and it is planned to be fully service at the end of 2023 (Demirören News Agency, 2020b).

RESULTS

Within the scope of AHP's the Pairwise Comparison Questionnaires, which were previously sent to 15 experts, were processed into the Expert Choice software and the Final Criteria Weighting Table given in Table 2 was created by evaluating them together.

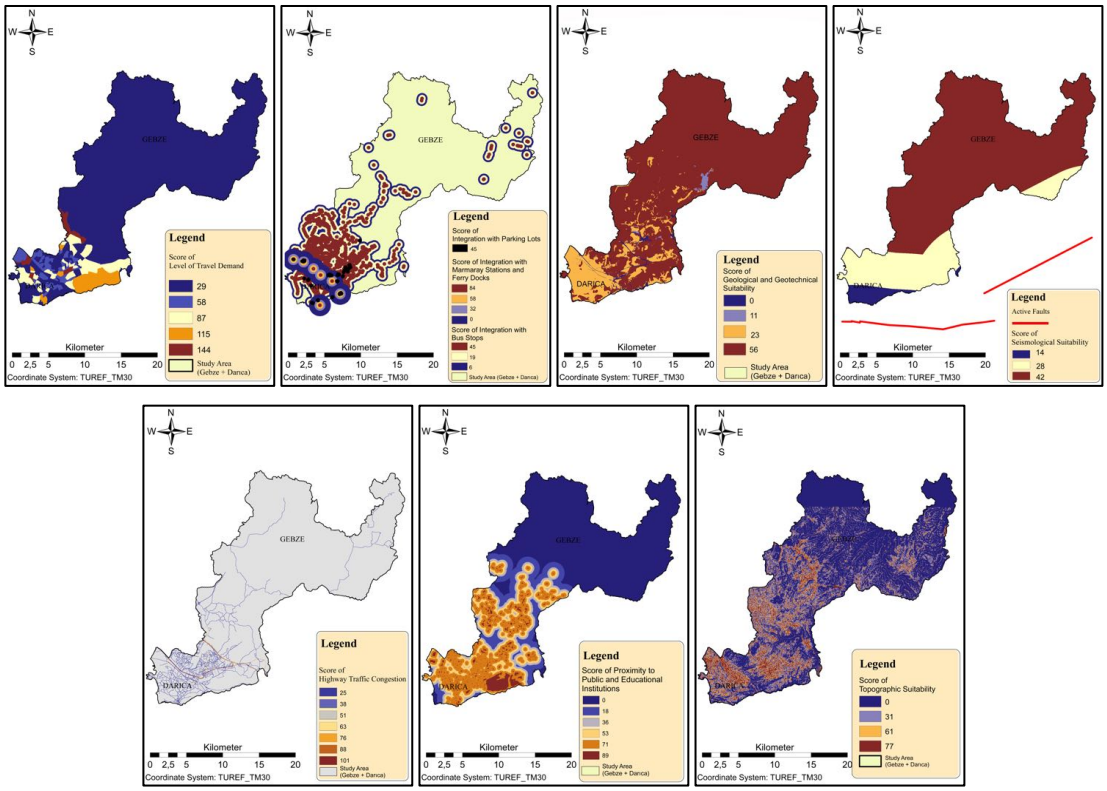
The Most Suitable 12 Criteria for the Region	**Calculated Weights**	**Overall Consistency Ratio (CR)**
Level of Travel Demand	0,144	
Integration with Other Transportation Modes	0,129	
Geotechnical- Geological and Seismological Suitability	0,113	
Highway Traffic Congestion	0,101	
Proximity to Public and Educational Institutions	0,089	
Topography	0,077	
Proximity to Industrial and Commercial Areas	0,075	
Proximity to Mass Housing Areas	0,071	
Opportunity to Share Roads	0,061	
Distance to Basin Protection Zones	0,050	
Distance to Protected Areas	0,048	
Property Rights	0,042	
TOTAL	**1**	**0,02**

Table 2. Final criteria weighting based on questionnaire results from experts

The levels of criteria weighting obtained are largely fit with the frequency of using similar or identical named criteria in the literature. The first three criteria with the highest weight, the Level of Travel Demand, the Possibility of Integration with Other Modes of Transport, and Geotechnical-Geological and Seismological Compatibility with the same or similar names (Population Density, Travel Production, Connectivity and Proximity to Fault Lines, Geological, Lithological Structure and Soil Suitability) also scored higher in other field studies.

After the main criteria weighting was completed, the sub-weighting values for each criterion within itself were made. With the end of all the weighting processes, AHP was paused and the operations within the scope of GIS were initiated with the aim of new data generation by ArcMAP tools using existing data . In the last stage, all the criteria data were converted to **Raster Data** format, which consists of 25x25 meter squares, with the aim of standardizing and combining.

The types and units of the data layers (criteria) included in the study are different from each other. To obtain the Final Map, these layers have been standardized by reclassifying them in the ArcMAP environment, with the help of the Reclassify tool. For the reclassification processes, firstly, the Criteria Sub-Weight value belonging to each criteriion was normalized so that the highest value was 1 and the lowest value was 0. The "Final Sub-Weights" (x. y. 1.000) were obtained by multiplying the sub-normalized values of each criterion (x) by the criterion main weight value (y) and then by the value of 1.000 for ease of calculation. These weights were named as "Suitability Score". These scores of suitability have been processed into the pixel values of ArcMAP with the Reclassify tool. The maps reclassified with the new values of the raster data in the layers are shown in Figure 3. The blue-toned colors (pixels with low values) on the maps indicate areas that are not suitable for the LRT route and the brown-toned colors (pixels with high value) indicate the areas that are suitable for the LRT route.



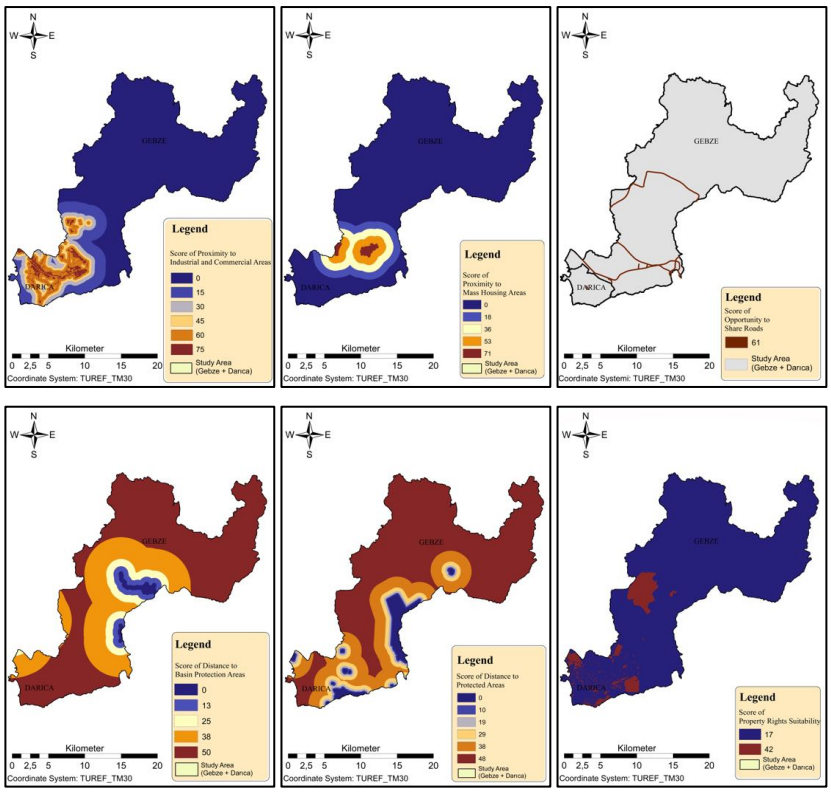


Figure 3. Criteria Mappings (12 Criteria) of data generation and data transformation processes with the ArcMAP

The west of Darica, the south of Gebze and GOIZ are advantageous regions due to the high demand for travel in all these criteria. It discerns that there is a high possibility of integration with other transportation modes along the Marmaray line. It realizes the whole of Darica and the southern part of Gebze are in the seismologically problematic zone and that Gebze is a more suitable region than Darica in geotechnical-geological terms.Almost all Darica and the south of Gebze are advantageous in terms of proximity to public and educational institutions. Except for the northern half of Gebze, the study area seems to be a suitable topographical option. It is understood that the southwestern part of GOIZ and Gebze is superior in terms of proximity to industrial and commercial areas. It is evident that three mass housing areas in the south and west of Gebze make these regions attractive for LRT. The basins around Ballıkayalar Creek, Umur Creek and Denizli Pond and its tributaries and the protected areas on the east of Darica and west of Gebze are areas that should be avoided due to zoning and construction restrictions. Istanbul border of Gebze and the southernmost end are alternative areas for the LRT route, since they are mostly state owned areas.

SUITABILITY MAP

The criteria maps, which are reclassified and units (raster), resolutions (25mx25m), coordinates (TUREF_TM30) and borders (Gebze-Darica) are the same, were combined using the Weighted Sum tool, one of the ArcMAP's Overlay tools, at the last stage. Figure 4 shows the suitability map resulting by combining the pixel values of the criteria maps with the Weighted Sum tool. In this map, the areas with the highest pixel value (780- brown) show the areas with the highest suitability for being the LTR route, and the areas with the lowest pixel value (84- blue) show the areas with the lowest suitability for being the LTR route.

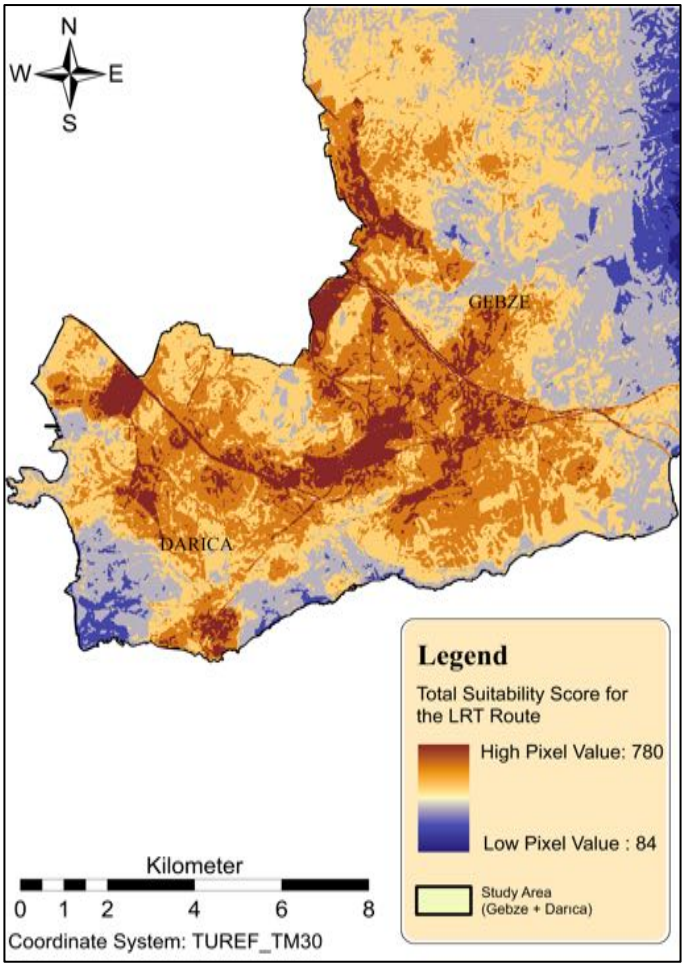


Figure 4: Total Scores of LRT Route Suitability Map

When the Route Suitability Map given in Figure 4 is examined, in Darıca district, which is the southern part of the study area; surroundings of Şehit Cevher Dudayev Park, south and the eastern green areas of Yalı Neighborhood, all areas in the 500 m radius of Darıca Cumhuriyet Square, Darıca Farabi Hospital, vicinity of Nenehatun Cemetery, Nenehatun Neighborhood center and its west, Osmangazi Neighborhood western half, whole of Sırasöğütler Neighborhood, the eastern half of the Emek Neighborhood are areas that can be a suitable alternative for LRT route.

Located in Gebze district, which the middle and northern parts of the study area; surroundings of the ISU Gebze Wastewater Treatment Plant, surroundings of the Turkish Standards Institution Quality Campus, the entire campus of Gebze Technical University (GTÜ) and the vicinity of the Gebze STFA High School, the part of the State road D.100, all of Köşklü Çeşme and Osman Yılmaz Neighborhoods, the northern half of Tatlıkuyu Neighborhood, the northwest section of TÜBİTAK Marmara Research Center, the entire Muallimköy Neighborhood, surroundings of the Yücel Pipe and Joint Corporation factory, the entire Sultan Orhan Neighborhood, the western half of the Kirazpınar Neighborhood, the all areas of Mustafapaşa, Güzeller, Hacıhalil and Arapçeşme Neighborhoods, the northern part of the Mevlana Neighborhood and the southern part of the Gaziler Neighborhood, Gebze Municipality City Cemetery, Yenikent , all of İnönü Neighborhoods and all of GOIZ are areas that have potential forLRT route between Gebze and Darıca.

Following the determination of suitable areas, the Gebze-Darıca LRT route was compared with the result map given above. In Figure 5, the Route Suitability Map, and the Gebze-Darıca LRT route, which is under construction, are presented on the same map.

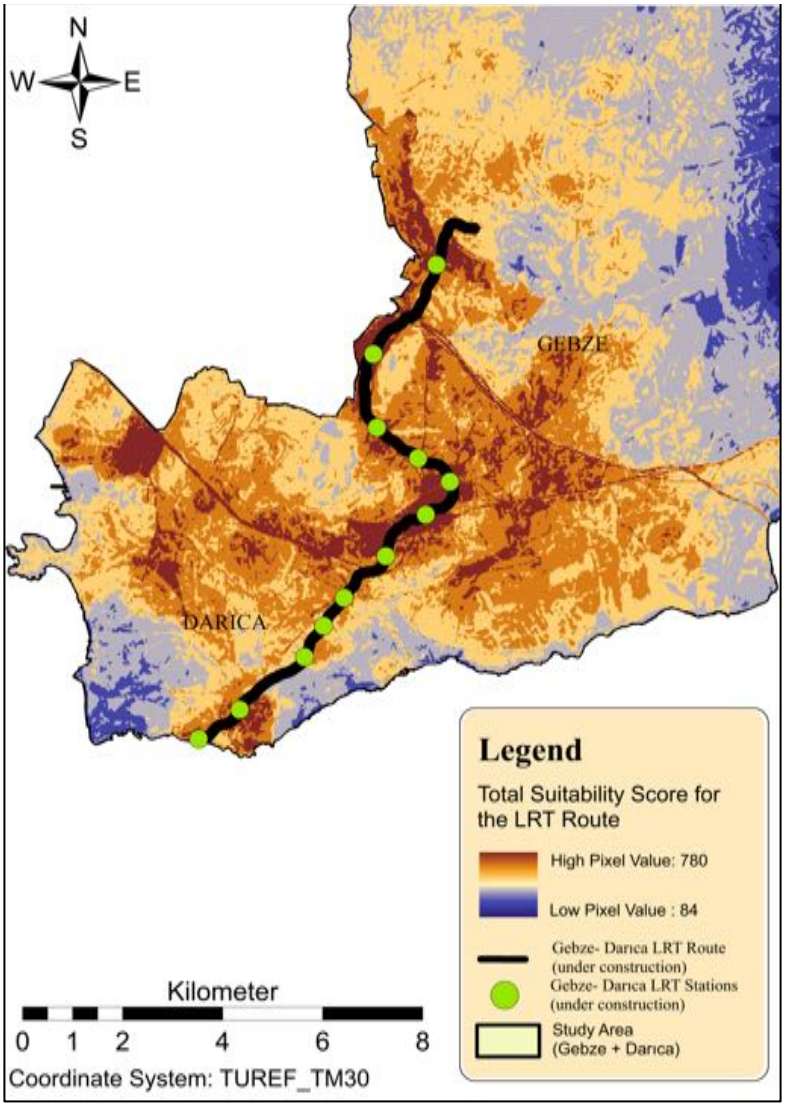


Figure 5: Integration of Gebze-Darıca LRT with route suitability map

The integration map given above shows that; the rail system line being built between Gebze and Darıca fit with the brown areas that received the highest score in this study and the recommended rail system to be built. This shows that the proposed model is integrated and confirmed with actual studies. There are also areas on the map that have brown colors but do not have any rail system projects. For these areas, it will be appropriate to focus to plan rail system projects in the future.

CONCLUSIONS

This study, which can be located at the intersection point of Transportation Engineering and Urban Planning areas, aims to present a model of the optimal implementation of LRT investments ,by evaluating the physical and human geography criteria, has been concluded with high accuracy in the Gebze-Darıca example. Scope of this work; first, the transportation problem of Gebze and Darıca was discussed and LRT, a need of modern urban planning solutions, was examined as a solution. Multi criteria decisions are taken with various techniques to become more rational. AHP-GIS integrated systems, which develop these techniques as spatial decision support tools, have been increasing in recent years. The use of these techniques in transportation planning is still limited.

In this academic work, in which a modern route design model is applied, AHP is used with the contribution of the 15 experts' opinions. The GIS tools used in the spatialization of expert opinions are the biggest supporter of this study to produce verifiable results.

In the study, the levels of criteria weighting created as a result of expert opinions highly comply with the frequency of using similar or identical named criteria in field studies. The route that emerged as a result of the method applied in this study is suitable with the rail system line between Gebze and Darıca and offers an alternative for the additional lines that may be built in the future. This shows that the proposed model is integrated with real applications and has been confirmed.

Although it uses methods that have been widely used in the literature and proven effective on the subject, this study also has some limitations. Better results can be obtained by applying face-to-face pairwise comparison questionnaire, which is the anchor of AHP application. But at this part of the study, due to the COVID-19 (Liu et al., 2020) Pandemic in Turkey, these questionnaires complete with an e-mail environment.

In addition to this study in which AHP is used, other research design processes and different MCDM methods; Analytical Network Process (ANP) method, which evaluates the interactions of criteria with each other (Saaty, 2004) the Fuzzy Logic method ,which gives criteria weights as a range of numbers instead of net numerical values (Liang, 1999) and Best-Worst Method (BWM), which is brand new method (2015) developed against the shortcomings of AHP (Rezaei, 2015), are recommended to construct new researches in the future.

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ASSESSING SPATIAL BEHAVIOR AND PUBLIC TRANSPORTATION CHOICES FOCUSING THE DAY AND THE NIGHT DIFFERENCES USING GIS AND SPATIAL STATISTICS

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Abstract

Nightlife activities of the city indicate a crucial source for urban life. For many years, geographers and urban planners have been concerned with studies about the human behavior of the city at different hours. In recent years location-based check-in services allow seeing users' activity and their locational choices. Previous studies examined the relation between spatial behavior and human activity using location-based social media applications. In addition to spatial behavior, it was aimed to understand preferences for the variety of nightlife of the city. In this study, spatial behavior and how it is affected by accessibility to public transportation are analyzed at different hours in a populous city. As the main data source, Foursquare user's check-in is used to aiming to understand the differences between day-time and night-time within the study area. Three different analyses are conducted in this study to uncover the differences in the day and night of venue distributions. The first is Kernel density, which is used to compare different hours of weekday and weekend and to assess spatial distributions. Furthermore, a quadrat analysis is conducted for weekdays and weekends regarding daytime and nighttime hours to understand whether those points data are significantly different or not. The third analysis is the closest facility technique of network analysis of GIS. The statistically significant results reveal that the patterns observed at different periods are not different. In conclusion, this research demonstrated that the effective use of nightlife venues is favorable for the city and observed the same pattern at different hours and different days**.**

Keywords: Foursquare, Nightlife, Spatial behavior, Closest Facility

INTRODUCTION

Using venues at night is a way to reach peace and happiness for many people. Using nightlife venues contributes to urban activities and the vitality of the city (Pourahmad et al., 2020). Studying nightlife venues find forms of sociability that are not seen by day or explainable related to daytime structures (Farrer, 2008). In recent years, location-based data services have become an important source of participant data. Check-in of a specific place, a café for example, reveals the user's preference (Silva et al., 2013). Foursquare, a location-based application, has been widely used in such studies.

Researchers have investigated human spatial behavior in the city using location-based data. In the past, the lack of geo-computational tools and algorithms made it difficult to improve the model of human spatial behavior. Furthermore, without using GIS-based methods, estimating spatial behavior using accessibility measures was limited. Over time, the increasing development of geo-referenced data has allowed collecting data for human spatial behavior studies. In addition to acquiring the data, the development of spatial analysis tools in the GIS environment has contributed to future studies (Kwan, 2000).

This paper aims to analyze the spatial behavior of people using venues at different hours in a populous city and how it is affected by accessibility to public transportation. A number of spatial statistics techniques are used to understand the differences between the day and the night.

LITERATURE REVIEW

Limonta (2014) examined the negative impact of nightlife businesses in Milan and gathered information about opening hours and business type to create different maps for the day and the night using Kernel Density Estimation as a geostatistical technique and used NKDE (Network version of KDE) to see the distribution of nightlife business link on the street. Another research investigating the preferences for a variety of nightlife and focused on Chicago as a study area and aimed to uncover the preferences which affect the nightlife industry. Nightlife venue data were collected using Yelp API then separated the categories to see the distribution of venues on the map. The model (Constant Elasticity of Substitution) was developed to describe consumer preferences (Cosman, 2017).

On the other hand, there are many studies about outside night venues. The term 'Third Place' was used by Oldenburg (1989) to denote "great, good places" that exception home and work venues for people in daily life. Nowadays, people spend time in venues outside of work and home, hence third places impact the quality of life in the community (Jeffres et al., 2009). To understand human behavior, the Foursquare and Instagram dataset findings are compared. The results show that both are compatible in finding popular regions of cities or regions, but Foursquare is better than Instagram in expressing typical places for people (Silva et al., 2013). Hong (2015) analyzed the spatial distribution of venues in Seoul using Foursquare check-in data and applied Hotspot analysis. The results show that the distribution of social media venues is related to the daytime population. Another study examined the relationship between spatial behavior and human activity. This research used Foursquare check-in data and activities separated into different categories to understand which activity is observed more intensively at different times of the day (Hasan et al., 2013).

Considering that human behavior is associated with public transport data, location-based data contribution to public transport choice constitutes a new perspective. Rybarczyk et al. (2018) examined people's travel behavior using a semantic analysis method for each travel tweet. Accordingly, pedestrian and water travel are associated with positive valences in addition to bicycling travel. In the case of Nanjing Metro Station, the relationship between walking access to the metro and the demographic characteristics of passengers are examined. A number of techniques such as network analysis of routes, K-means cluster analysis, survey with the passenger of the metro station are used. Hereby, this research aims to explore urban demographic characters to impact metro passenger's walking behavior (He et al., 2018).

DATA

In this section, as the main data source, Foursquare user's check-in was used to understand differences between day and night of study area. Kadikoy district in Istanbul, Tukey was chosen as the case study area. The dataset was obtained from Foursquare API between the 28th of June and the 30th of July 2020 using Python and then this dataset converted to a GIS database containing latitude and longitude information. Additionally, public transport data was obtained from open sources such as Open Street Map and QGIS. The measures of accessibility for this study are based on the locations of the bus stations, the streets, venues on Foursquare, and the networks developed using ArcGIS packages.

In total, 1.898 check-in points were obtained from the Foursquare API. In past studies, the data divided into categories and subcategories. Indeed, separated social media data, such as Foursquare, are facilitated for dataset filtering and processes (Martí et al., 2020). First, the dataset was filtered according to the case study and then divided into categories to examine. Foursquare check-in venues separated weekday-weekend and day-night categories according to check-in hours. In Table 1, the total number of Foursquare check-in venues separated into weekday-weekend and day-night categories are presented. The spatial distributions of these points as weekday and weekend are presented in Figure 1.

Check-in Time on Venues	Check-in Numbers on Venues
Weekday Day	896
Weekday Night	92
Weekend Day	843
Weekend Night	785

Table 1. Check-in time and check-in numbers of Foursquare venues

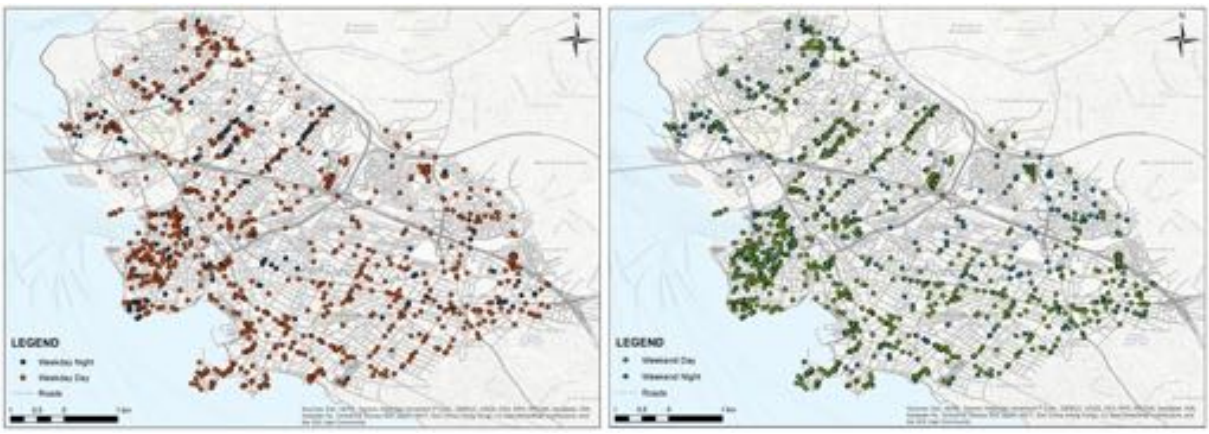

Figure 1. Check-in locations on weekdays and weekends in Kadikoy district Istanbul.

According to the 2019 Istanbul Transportation Report, bus transport has the largest share in public transportation. Therefore, bus stations were selected as transportation data for the study area. It was collected data from the OpenStreetMap database. The variables included in this dataset are bus stops and bus route locations.

ANALYSES

Kernel Density is one of the spatial analyst techniques of spatial analysis. Calculating a magnitude-per-unit area from point features, a kernel function is estimated to fit each point to a smooth surface. GIS-based kernel density estimation is calculated using a radius input through which the various density levels. The radius is either manually or automatically defined (Bonnier et al., 2019).

Kernel density analysis was calculated for weekdays and weekends regarding check-in hours. Check-in hours were classified to the day and night values as a population field. Finally, it was then reclassified from 1 to 10 (Figure 2).

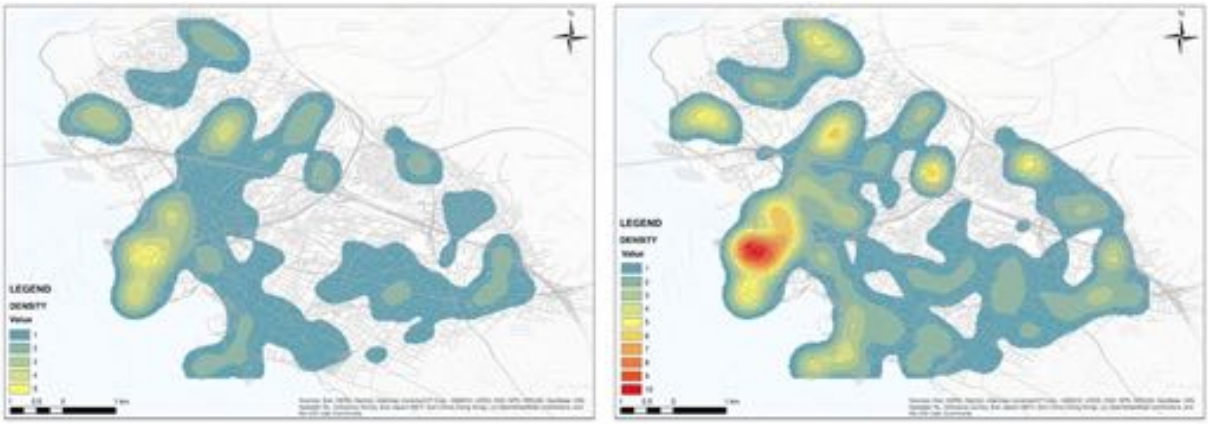

Figure 2. Density maps of weekday and weekend check-in points in Kadilkoy district Istanbul.

Another technique used in this study is the Quadrat Analysis. Quadrat analysis is conducted for weekday and weekend daytime and nighttime hours and aimed to understand whether these spatial distributions of the point data are significantly different or not. Quadrat Analysis is a technique to describe and compare the spatial distributions of point data over space (Figure 3). The study area is divided into equal rectangular quadrats to compare the distribution of the points (Cubukcu, 2021).

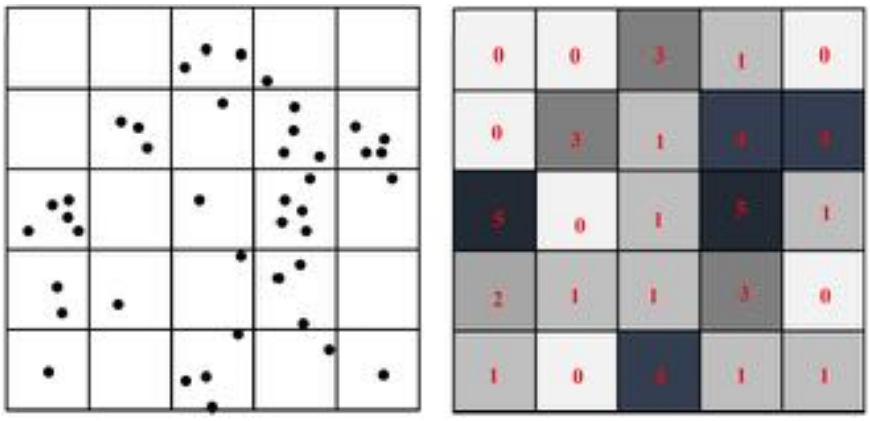

Figure 3. Quadrat distribution and count in each quadrat (Nguemhe Fils et al., 2020)

First the quadrat area is calculated, then one edge of the quadrat square is calculated.

$$K = \frac{2 \times A}{n}$$

$$k = \sqrt{K} = \sqrt{\frac{2 \times A}{n}}$$

Then the width and length of the study area is divided into quadrat edge length to find the numbers of rows (*rk*) and columns(*ck*) and the frequency distribution table is prepared according to the count of points in each quadrat.

$$rk = \frac{lenght\ of\ area}{k}$$

$$ck = \frac{width\ of\ area}{k}$$

The count of quadrat*(m*) is calculated by multiplying the number of rows and columns.

$$m = rk \times ck$$

After finding the number of rows and columns study area is divided into equal-area rectangular quadrats. The counts in each quadrat are recorded as the frequency and these frequencies are transferred to Microsoft Excel to calculate cumulative frequency and cumulative frequency probabilities. Cumulative frequency is found by adding preceding frequencies for the count of points in each quadrat, while cumulative frequency probability is found cumulative frequency divides into total quadrat count and these values were calculated in Excel. Then, following Cubukcu (2021) the cumulative frequency probability for the day (Po) and the night (Ph) are calculated to conduct calculated Kolmogorov- Smirnov z-statistics(K-Sz). The K-Sz is calculated using the absolute maximum value of the differences of the compared day and night cumulative frequency probabilities.

$$K - Sz = \sqrt{\frac{mo \times mh}{mo + mh}} \times max|Po - Ph|$$

mo=quadrat count of the day mh=quadrat count of the night

The statistical significance of the result is tested with the hypothesis test where:

Null hypothesis (H0): The two spatial distributions are the same.

Alternative hypothesis (HA): The two spatial distributions are different.

When α is 0.05, K-Szα is 1.36, and if |K-Sz| ≥K-Szα the null hypothesis can be rejected. The quadrat analysis is applied to points of day and night on weekdays and weekends in the Kadikoy district to see whether they are different. The study area is found as 30 km^2.

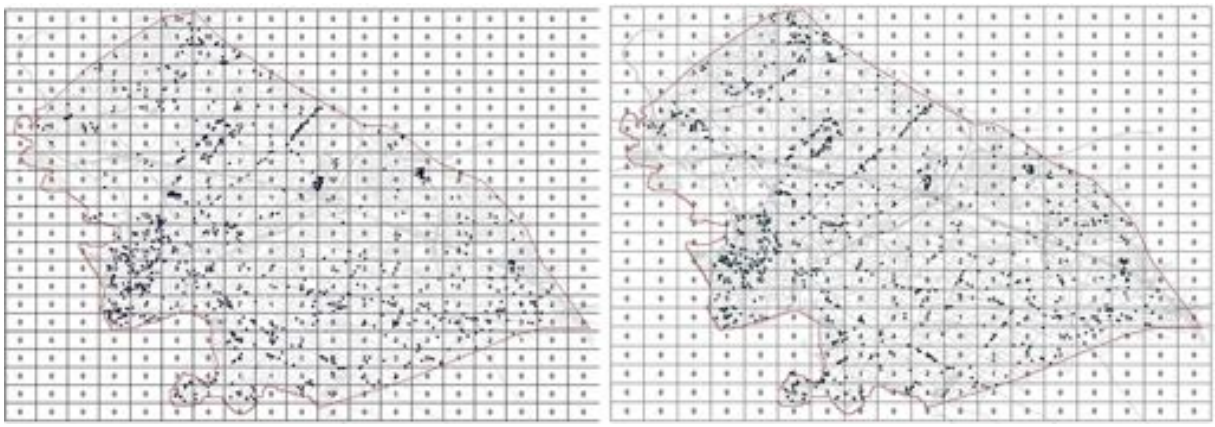

Figure 4. Count in each quadrat on weekend days and weekend nights.

For the weekend day and night, the result of max |Po-Ph| is 0.027 (Table 1).

$$K - Sz = \sqrt{\frac{437 \times 396}{437 + 396}} \times 0.027$$

$$K - Sz = 0.389$$

When α is 0.05 K-Szα is 1.36 and the result is 0.389 then the |K-Sz| ≥K-Szα condition is not fulfilled, the Null Hypothesis can't be rejected. The two spatial distribution examined are the same.

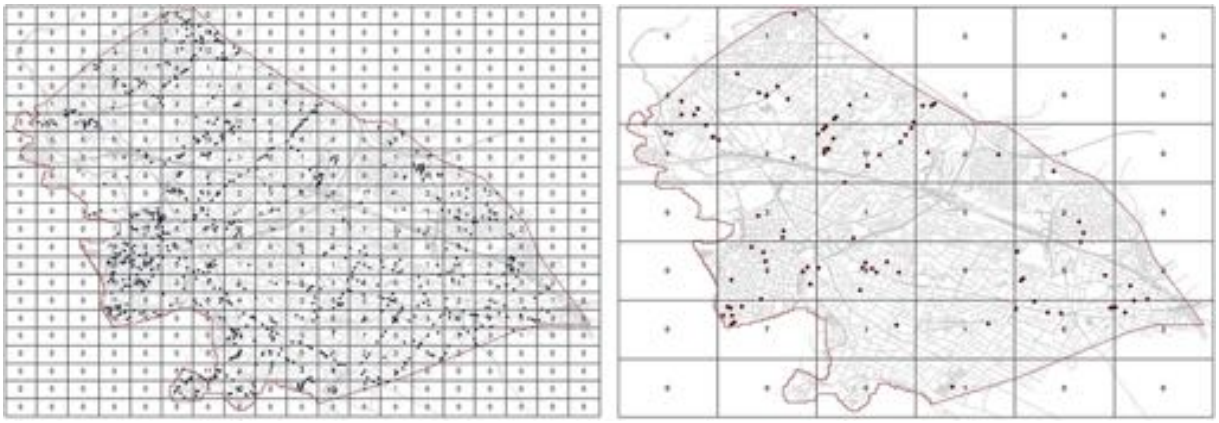

Figure 5. Count in each quadrat on weekday days and weekday nights.

For the weekday day and night, the result of max |Po-Ph| is 0.101 (Table 2).

$$K - Sz = \sqrt{\frac{437 \times 42}{437 + 42}} \times 0.101$$

$$K - Sz = 0.625$$

When α is 0.05 K-Szα is 1.36 and the result is 0.625 then the |K-Sz| ≥K-Szα condition is not fulfilled, the Null Hypothesis can't be rejected. Thus, the two spatial distributions are the same.

Network Analysis techniques are also widely used in such studies. A network system consists of edges (lines) and connecting junctions (points). Furthermore, the road network system consists of these elements as well. Road networks are useful for urban area studies in which urban sprawl in developing and developed areas (Ahmadzai et al., 2019). This paper used the Closest Facility Analysis. The Closest Facility Analysis is one of the Network Analysis methods in ArcGIS software. The closest facility analysis finds the measure of traveling for pedestrians or vehicles between incidents and facilities and determines which are nearest to one other. This network analysis extension makes it easy to set the analysis parameters for the closet facilities analysis, such as travel time, travel cost and the directions of travel (from incident to the facility or from the facility to the incident) (Ahmed et al., 2017).

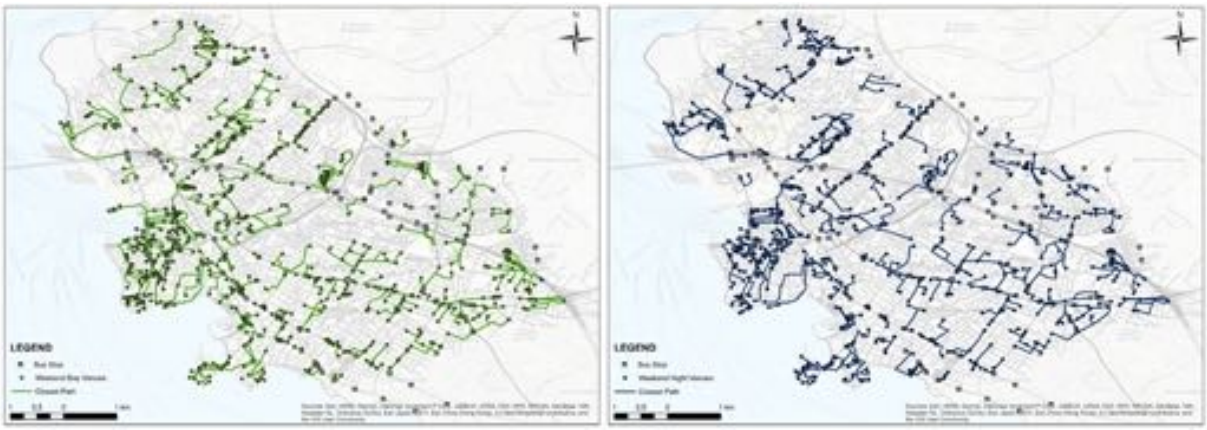

Figure 6. The Closest Path from venues to bus stops on weekend days and weekend nights.

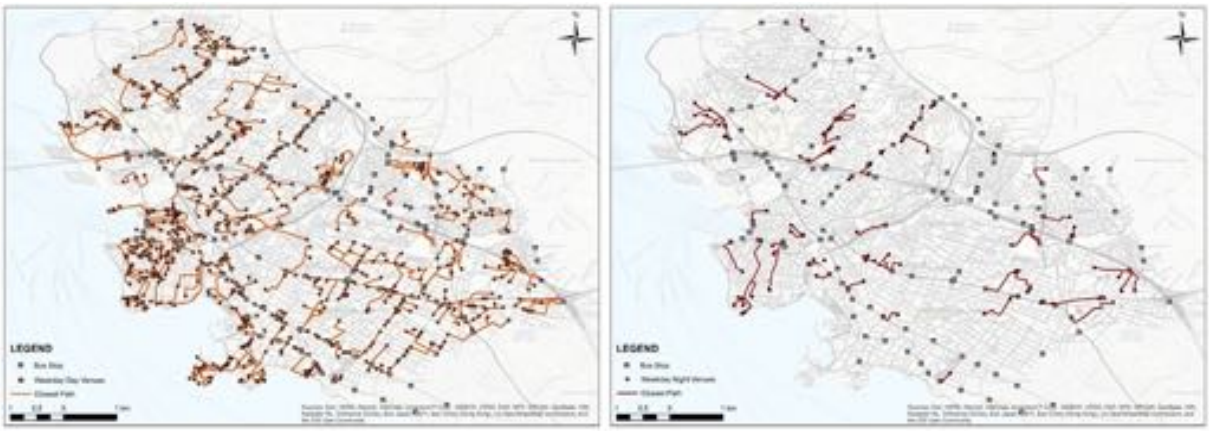

Figure 7. The Closest Path from venues to bus stops on weekday days and weekday nights.

CONCLUSION

This paper examined the relationship between spatial behavior and nightlife for the city. The density of using venues appears to be higher at night on weekends in Kadikoy district, Istanbul. The statistically significant results reveal that the patterns observed at different periods are not different. In conclusion, this research demonstrated that the effective use of nightlife venues is favorable for the city and observed the same pattern at different hours and different days. Additionally, was found that the closest path from the venues to the bus stops varies at the different time in the city. This finding indicates that the nighttime and daytime experience of venue users how a high priority of improving public transport accessibility. Moreover, applying the closest path from these venues contribute to human walking behavior for future studies.

ACKNOWLEDGEMENTS

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Appendix

Point in quadrat (weekend day)	Freq. (weekend day)	Cumultv. Frequency (weekend day)	Cumulative Frequency Probability (weekend day) (Po)	Point in quadrat (weekend night)	Freq. (weekend night)	Cumultv. Frequency (weekend night)	Cumulative Frequency Probability (weekend night) (Ph)	|Po-Ph|
0	259	259	0,5926	0	224	224	0,5656	0,0270
1	36	295	0,6750	1	45	269	0,6792	-0,0042
2	32	327	0,7482	2	27	296	0,7474	0,0008
3	28	355	0,8123	3	21	317	0,8005	0,0118
4	19	374	0,8558	4	16	333	0,8409	0,0149
5	7	381	0,8718	5	14	347	0,8762	-0,0044
6	10	391	0,8947	6	13	360	0,9090	-0,0143
7	8	399	0,9130	7	4	364	0,9191	-0,0061
8	11	410	0,9382	8	9	373	0,9419	-0,0037
9	5	415	0,9496	9	6	379	0,9570	-0,0074
10	5	420	0,9610	10	3	382	0,9646	-0,0035
11	1	421	0,9633	11	1	383	0,9671	-0,0037
12	4	425	0,9725	12	2	385	0,9722	0,0003
13	2	427	0,9771	13	2	387	0,9772	-0,0001
14	2	429	0,9816	14	0	387	0,9772	0,0044
15	4	433	0,9908	15	3	390	0,9848	0,0059
16	2	435	0,9954	16	0	390	0,9848	0,0105
17	0	435	0,9954	17	2	392	0,9898	0,0055
18	0	435	0,9954	18	1	393	0,9924	0,0029
19	0	435	0,9954	19	1	394	0,9949	0,0004
20	0	435	0,9954	20	0	394	0,9949	0,0004
21	1	436	0,9977	21	1	395	0,9974	0,0002
22	0	436	0,9977	22	0	395	0,9974	0,0002
23	0	437	1	23	0	395	0,9974	0,002
24	0	437	1	24	0	395	0,9974	0,002
25	0	437	1	25	0	395	0,9974	0,002
26	0	437	1	26	0	395	0,9974	0,002
27	0	437	1	27	0	395	0,9974	0,002
28	0	437	1	28	0	395	0,9974	0,002
29	0	437	1	29	1	396	1	0
30	0	437	1	30	0	396	1	0
31	0	437	1	31	0	396	1	0
32	0	437	1	32	0	396	1	0
…	…	…	…	…	…	…	…	…
843	0	437	1	785	0	396	1	0
max|P0-Ph|								0.027

Table 1. The result of quadrat analysis for the weekend day and the weekend night

Point in quadrat (weekday day)	Frequency (weekday day)	Cumulative Frequency (weekday day)	Cumulative Frequency Probability (weekday day) (Po)	Point in quadrat (weekday night)	Frequency (weekday night)	Cumulative Frequency (weekday night)	Cumulative Frequency Probability (weekday night) (Ph)	|Po-Ph|
0	242	242	0,5537	0	19	19	0,4523	0,1013
1	44	286	0,6544	1	6	25	0,5952	0,0592
2	32	318	0,7276	2	4	29	0,6904	0,0372
3	28	346	0,7917	3	3	32	0,7619	0,0298
4	20	366	0,8375	4	2	34	0,8095	0,0280
5	12	378	0,8649	5	3	37	0,8809	-0,0159
6	10	388	0,8878	6	1	38	0,9047	-0,0168
7	9	397	0,9084	7	1	39	0,9285	-0,0201
8	13	410	0,9382	8	2	41	0,9761	-0,0379
9	5	415	0,9496	9	0	41	0,9761	-0,0265
10	4	419	0,9588	10	0	41	0,9761	-0,0173
11	3	422	0,9656	11	0	41	0,9761	-0,0105
12	2	424	0,9702	12	0	41	0,9761	-0,0059
13	6	430	0,9839	13	0	41	0,9761	0,0077
14	1	431	0,9862	14	0	41	0,9761	0,0100
15	2	433	0,9908	15	0	41	0,9761	0,0146
16	0	433	0,9908	16	0	41	0,9761	0,0146
17	1	434	0,9931	17	1	42	1	-0,0068
18	2	436	0,9977	18	0	42	1	-0,0022
19	0	436	0,9977	19	0	42	1	-0,0022
20	1	437	1	20	0	42	1	0
21	1	437	1	21	0	42	1	0
22	0	437	1	22	0	42	1	0
23	0	437	1	23	0	42	1	0
24	0	437	1	24	0	42	1	0
25	0	437	1	25	0	42	1	0
26	0	437	1	26	0	42	1	0
27	0	437	1	27	0	42	1	0
28	0	437	1	28	0	42	1	0
29	0	437	1	29	0	42	1	0
30	0	437	1	30	0	42	1	0
31	0	437	1	31	0	42	1	0
32	0	437	1	32	0	42	1	0
…	…	…	…	…	…	…	…	…
896	0	437	1	92	0	42	1	0
max|P0-Ph|								0.101

Table 2. The result of quadrat analysis for the weekday day and the weekday night

INCLUSIVITY AND DIGITAL ACCESSIBILITY: DEVELOPING AN ASSESSMENT FRAMEWORK FOR DIGITAL PARTICIPATORY TOOLS

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Abstract

In the present day, the ease of access to data, open source tools, affordable cloud-based computing, and overall digitization of various aspects of life have introduced possibilities to more efficient ways of solving the problems that our contemporary cities face. This phenomenon applies for participatory planning processes as well. It is easier today to model, visualize, and analyze cities and their complicated interdependent variables. Given the complex network of stakeholders in such processes, many different techniques have been experimented with to make participatory planning more inclusive, accessible, and consequently more democratic. However, in the vast range of available digital tools, it can be a challenge to select the right one for a particular project. Furthermore, most critical assessment frameworks for participatory planning instruments have failed to take the newly emerged digital aspect into consideration. The objective of this research is to design an assessment framework to measure not only conventional participation inclusivity parameters, but also the digital 'accessibility' of a tool. By providing a quick overview of a particular instrument and its application in particular projects, this framework makes it easier to understand the relation between its inclusivity and digital accessibility potentials. By comparing these assessments between different tools it is easier to select more appropriate instruments (or combination of instruments) for a particular need. This paper takes the case of three digital tools, which were developed to facilitate the engagement of citizens in decision-making processes, to demonstrate the working of this assessment framework: a) CityScope, b) Openstad, and c) Maptionnaire. The assessment is conducted in three stages. The first stage is an inventory and classification of existing projects where the tools have been applied. The second stage is a comparative analysis of the benefits and limitations of using the respective instruments. Based on this, the final stage is the assessment of the level of participatory inclusivity and digital accessibility of each tool in each of the selected projects. The result of this two-dimensional assessment framework is illustrated in a cartesian plane, that graphically portrays a) the relation between project inclusivity and digital accessibility according to how they were adapted in different participatory processes, and b) the relationship between different tools to each other on these two axes. This conceptual framework is an interesting starting point to understand the intersection of participatory planning and the potentials and limitations of digital tools. It is envisioned to be extended further to other instruments and projects of digital participatory planning beyond the ones presented on this paper.

Keywords: Urbanism; Participatory Planning; Digital Tools; Assessment Framework; and Smart Cities

1. INTRODUCTION

1.1. Historical Overview of Participatory Planning: from Top-down approaches to Participatory Planning in the 60s.

Taking into consideration the development of modern cities mainly in the western world, the notion of planning and managing urban environments came as a reaction to the problematic conditions in cities after industrialization (Benevolo and Mazza, 2003). It was in this regard that technocratic thinkers such as Ebenezer Howard and Robert Moses took the lead in planning intellectualism in the first half of the 20th century in North America (Towsend, 2004).

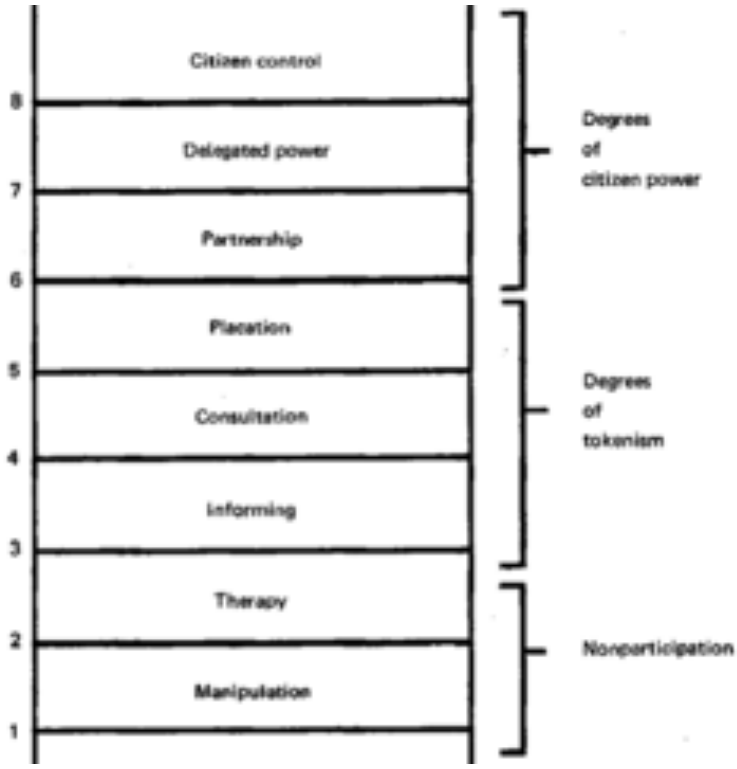

Figure 1. Arnstein's Ladder of Citizen Participation. Source: Arnstein, 1968.

Among others, J. Jacobs (1961) stepped into the planning and governance scene in the 60s to shake these foundations of the urban professions and introduce the new concept of participatory planning in the US. She argued that top-down planning processes were unsuccessful and were destroying the social lives in small neighbourhoods for the sake of development. Her idea was to redistribute power and participation rights to the general population and turn planners from mere technocrats to technical support and expert facilitators (Towsend, 2014, p. 104).

Following that train of thought, S. Arnstein (1969) presented a framework named "ladder of participation" to understand the power dynamics and decision-making distribution in planning processes (Fig. 1). It categorizes a process ranging from extremely non-inclusive and manipulative to fully citizen-led and bottom-up approaches. Since then, many other derived concepts have analysed, refined, and enhanced this framework (Hussey, 2020). However, they all more or less assess the degree of distribution of decision-making power as well as of inclusivity of a planning process.

1.2. The Role of Digitalization in Participatory Planning

Participatory planning is in constant evolution and reflects the changes in urban planning throughout the world in the second half of the 20th Century. Two decades deep into the 21st, we are witnessing another

transformation led by the advent of the internet and digitization trends in cities ("smart cities"). It is in this regard that authors like Zook (2017) argue that they are both potentials and limitations of participatory planning acquiring, at least partly, a digital transformation.

Today, it is the increased access to data, to open-source tools, and to affordable cloud-based computing, that have created opportunities for more efficient, informed, inclusive, and resilience-oriented decision-making processes (Cheng, 2016). Noymann (2020) even mentions how timely these kinds of tools appear when taking into consideration the spread of sanitary restrictions like the ones experienced world-wide because of COVID-19 in 2020 and 2021, and how digital tools could allow participatory processes even in settings where physical proximity is not possible.

Around the efforts towards better understanding of digital participatory planning and its effects on urban resilience, this research is framed by the Urban Resilience Lab, seminar from the Städtebau Institut at the Universität Stuttgart that analyses several different digital participatory tools in planning and resilience theory and practice. This study focuses its attention on three digital tools (CityScope, Maptionnaire, and Openstad) that constitute examples of these digitalization trends on urban planning and research of the 21st century.

1.3. Classification Frameworks for Participatory Planning

Arnstein's (1969) original classification of participatory planning is a well-known framework from which much of the participatory planning theory derives. For this research it is important to highlight that Arnseint's framework is a relevant assessment tool to understand the distribution of decision-making power among participants in a planning process, and that this assessment implies a spectrum. These two concepts contribute to the conceptual framework for this research to approach CityScope, Openstad, and Maptionnaire.

Moreover, this research also reaches for the theoretical framework of Hasler, Chenal, and Soutter (2017), which is also based on a spectrum to classify digital participatory processes, models, or tools. The authors caution that since it is hard to truly measure the decision making role of participants (as proposed by Arnstein), one could focus on assessing the degree of involvement of the citizens through the nature of interactions and the type of urban data collected. As seen in Fig. 2, this framework encompasses the citizen's involvement, role of the citizens, and the type of urban data collected in the participatory planning process.

Figure 2. Hasler, Chenal, and Soutter's classification of citizen's involvement and type of urban data. Source: Hasler, Chenal, and Soutter, 2017.

1.4. Relevance of the Study

As mentioned above, this research is framed along with other studies in a seminar that touches on strengthening resilience discourse about today's urban conditions. This paper falls specifically under the category of planning and decision making support. It is based on the argument that participatory planning, and digital participatory tools, can contribute to today's urban resilience theory and practice.

This research is of relevance to monitor today's digitalization trends, to explore, and to better understand efforts, such as CityScope, Maptionnaire, and Openstad, that emerge from these trends. Based on the idea that digitalization is already playing an important role in urban planning around the world, this kind of research is important to give a qualitative assessment to the development of digital urban planning and research.

1.5. Research Objectives

The main objective of this study is to contribute to the continuous development of assessment frameworks for digital participatory tools. The assessment framework developed in this study measures not only conventional participation inclusivity parameters, but also the digital 'accessibility' of a tool. By providing a quick overview of a particular instrument and its application in particular projects, this framework makes it easier to understand the relation between its inclusivity and digital accessibility potentials. This framework can be developed and extended to tools other than the ones demonstrated here.

1. METHODOLOGY

2.1. The tools

Chapter three is dedicated to a concise explanation of the addressed tools: CityScope, OpenStad, and Maptionnaire. They are presented in terms of its origin, the institution that developed it, and their main purpose. For all three cases, the information was synthesized by desktop research and literature review. The data was acquired from the official sites of the developers, as well as from other entries responding in standard open search engines such as Google Scholar, Research Gate, Directory of Open Access Journals, and ScienceOpen. Specifically for the case of OpenStad, information was retrieved and synthesized from the works of Ortegón and Mohamed (2021) inscribed in the same Urban Resilience Lab seminar from the University of Stuttgart.

2.2. Analysis

The assessment of these three digital tools in relation to the digital participatory planning discourse was developed in three stages. The data sources for this assessment are the same as for the background account of the tools.

Stage 1 - The first stage is a basic inventory of the different applications of each tool in different projects. Literature review and desk research led to a compilation and categorization of previous and current projects of each tool. This categorization was done in terms of themes (e.g., housing, mobility, etc.), main purpose, scale, actors and stakeholders, and project status (academic/theoretical, completed, etc.).

Stage 2 - Due to time constraints, the second stage is a selection of projects, narrowed down to a few based on the findings of the inventory in stage 1. The selected projects were analysed to understand the overall benefits and limitations of the tools, as well as their range of stakeholders involved.

Stage 3 - The third stage is the two-dimensional digital participatory assessment framework that attempts to evaluate each tool on the selected projects from stage 2. It evaluates the degree of inclusivity of the different

selected projects and the accessibility of the digital tools according to two perpendicular indexes (Fig. 3).

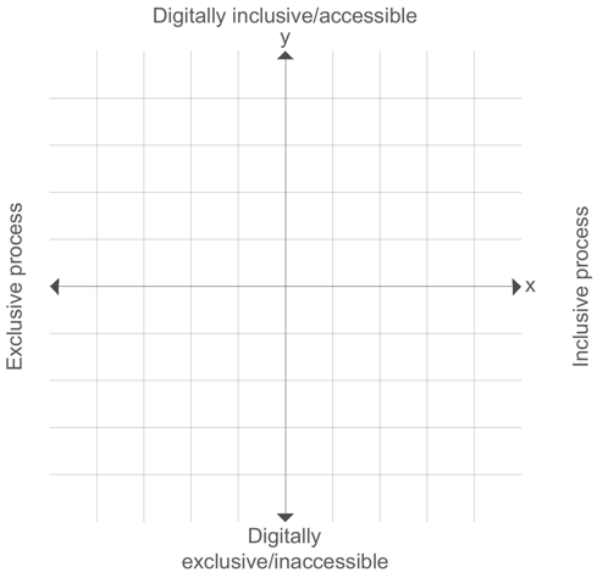

Figure 3. Two-Dimensional inclusivity and digital accessibility assessment framework.

Based on Hasler, Chenal, & Soutter's (2017) spectrum, the X-axis shows the degree to which the project is inclusive of various stakeholders and also their degree of involvement in the project. Basically the degree of participation here equals the range of societal sectors involved, plus their degree and type of involvement. The higher the score, the higher the degree of participation and the project is positioned further right in the X-axis. The scoring system is presented more in detail in the Appendix 01.

The Y-axis addresses the degree to which the digital tool is accessible or replicable for any individual or entity that seeks to apply it (an initiator). Basically, digital accessibility here equals accessibility of the hardware, software, required mediation knowledge, required operational knowledge, required knowledge to analyse results, and an estimate of the financial load it entails. The more digitally accessible a project is, the higher it is located in the Y-axis. This scoring system is presented in more detail in the Appendix 02. These results of the scoring in these indexes can be plotted as coordinates in a cartesian plane (Fig.4). Depending on which quadrant of the map a tool falls into, some assumptions can be stated:

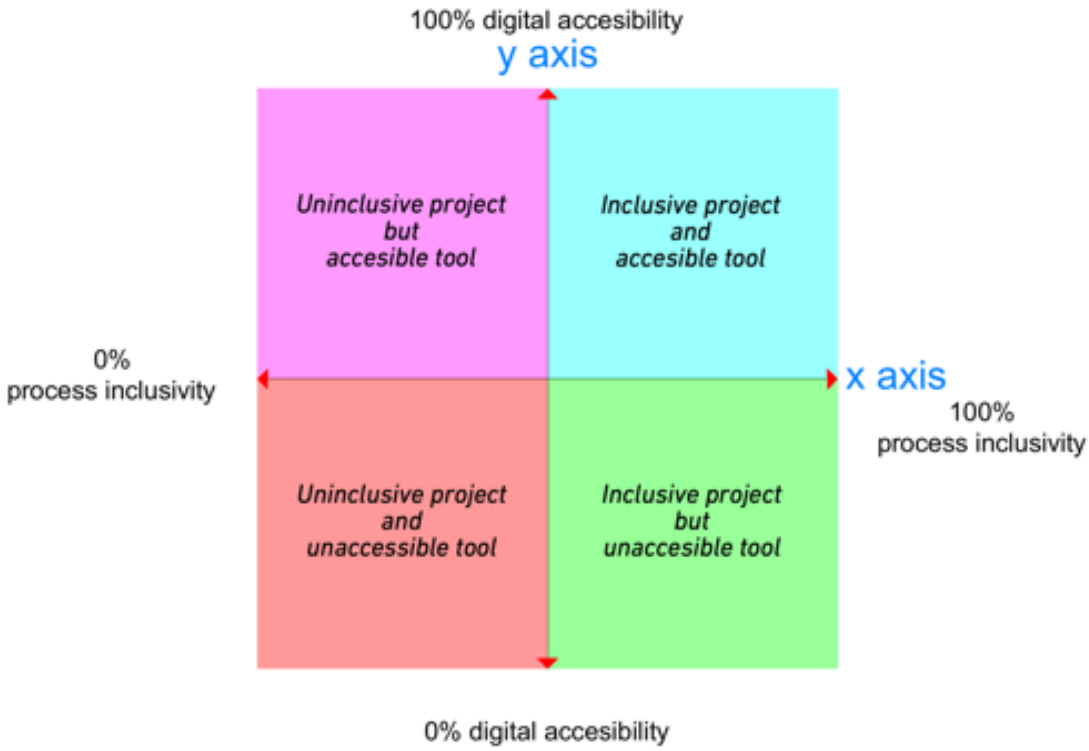

Figure 4. Possible result meaning for each quadrant

2. THE ANALYZED TOOLS

3.1. CityScope

CityScope is a platform developed by the City Science Group of the MIT Media Lab. The development of this platform began in 2013 and, even though it has been applied in over thirty projects around the globe, the platform is still under development. CityScope is a planning tool that supports public participation and decision-making. It enables visualizing complex urban issues with the use of a physical model, projections and augmented reality (Fig. 5). Completely online formats are still under development and the platform's sources are open and are available at https://cityscope.media.mit.edu, however the platform still works at its best on a physical workshop format. This tool has proven highly versatile and able to address a wide range of urban issues; from migration and housing, to mobility, climate change and urban pollution.

Figure 5. CityScope model of the city of Andorra. Source: MIT City Science, 2020.

According to Noyman (2020), the platform is constituted by four main pillars: 1) “Urban Insight” is the possibility of observing urban environments through gathering available current and past urban data (e.g., commuter behaviour); 2)“prediction” is the possibility to draw possible urban scenarios based on the gathered data; 3) “transformation” is the possibility to propose “what if” scenarios through interacting with the physical board and create predictions out of these possible changes; 4) and “consensus” is precisely the dialogue between stakeholders around the board and their decision-making process based on the visualized scenarios.

3.2. OpenStad

OpenStad is a platform developed by the City of Amsterdam in collaboration with other municipalities of the Netherlands. Since its start in 2016, it has been used only within Dutch borders and it has proven itself highly efficient. The main focus of this platform is to facilitate urban participatory planning processes with the help of digital tools. OpenStad is also an open source software, and it's available at https://github.com/Amsterdam/openstad-frontend. It functions entirely online and provides the possibility to the initiator to customize the platform with the use of different “widgets” (eg. voting tools, forums, or interactive maps) (Fig. 6) according to the need of the project.

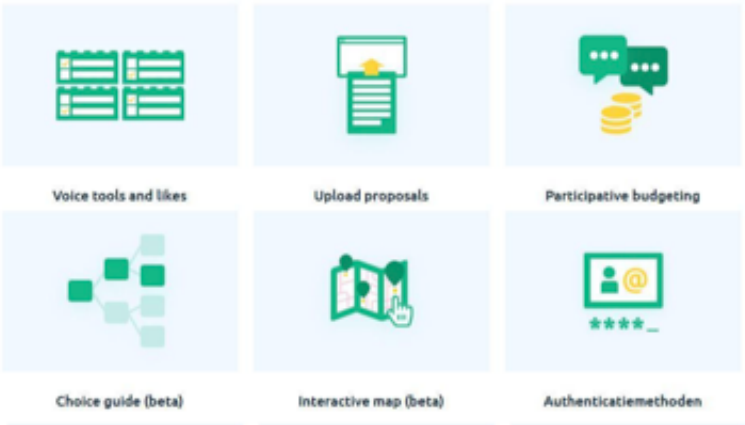

Figure 6. Some of the available widgets in the OpenStad platform. Source: "OpenStad - Hoe het werkt", n.d.

3.3. Maptionnaire

Maptionnaire is a PPGIS (Public Participatory GIS) developed in 2011, that allows the general public to easily create map-based questionnaires and civic participation. The aim of Maptionnaire is to empower residents, to enable communication and reach through digital media and eventually an effective and smooth participatory process. It also makes the analysis and visualizations efficient and easy to use, thus contributing to smarter urban planning. It is versatile in terms of the scales of the projects that have used it- from building scales all the way up to whole city levels. It has also been used in fields other than Urban planning such as for research studies in regards to the environment. It enables the creation of visual questionnaires which makes it attractive and easy to use. In contrast with the other two platforms analyzed in this paper, Maptionnaire is not an open source software and requires payment for licencing.

3. ANALYSIS AND RESULTS

For the purpose of clarity and brevity in this paper, we will present the in-depth results of stage one and stage two only for the tool CityScope. In stage three, we will present the results of the three tools so we can derive a comparative analysis of the different tools in the conclusion.

4.1. Inventory of Applications in Different Project - The example of CityScope

The first step was the compilation and categorization of different projects in which CityScope has been used across the world. The objective of this stage was to understand the types of projects and the purposes for which CityScope was used. This study was able to note repeating themes and varying scales of the projects. The gathered information was limited by the available research time scope and available scientific literature.

Inventory of Application of CityScope Projects in different Cities				
City	**Theme**	**Purpose/ Aim of the Project**	**Scale**	**Status**
Andorra	Tourism / Mobility	Study visitors/tourism behaviour patterns	City	Academic
Boston	Mobility	To understand the societal impacts of individual mobility choices	Street & neighbourhood	CS Lab
Champs Élysées	Urban Revitalisation/Mobility	To improve decision-making related to the revitalization of the Champs Élysées/ explores the future of Paris' most important street.	Avenue	CS Lab
Hamburg	Social	To help allocate refugee accommodation in the City of Hamburg	District scale	CS Labs/ Completed
Hanoi	Water Management	To develop new water management strategies to tackle the problems in agriculture due to climate change and environmental pollution	District scale	Academic
Lyon	Environment	To monitor air quality by simulating mobility patterns and energy consumption.	District scale	Academic
Matsuyama	Urban Life & COVID-19	To suggest measures for the social problems brought about by the Covid-19 and study other urban themes	City	CS Lab
Singapore	Mobility	To study walkability in Singapore district	District	Completed
Toronto	Urban Revitalisation	To develop and simulate urban interventions, such as micro-units for young people, shared work and collaboration spaces, educational facilities, financial services innovations, and new mobility and parking systems	City	CS Lab

"CS Lab": CityScope Lab (Implies that the local stakeholders worked with the MIT media lab to solve urban challenges existing in the city). "Academic" implies that project was mainly for for academic/research purposes, for e.g., to visualize data or start a conversation between stakeholders

Table 1. ***Abbreviated*** *inventory of application of CityScope in different cities*

4.2. Project Selection and Analysis - The Example of CityScope

Based on the inventory, the study identified a few projects with varying themes and purposes with which to work on stage two and stage three. The expectation for this selection was that they would be more diverse and cover a wider range in the cartesian plane in stage three. For stage two, the study understood the projects in further detail and made an analysis of the limitations and benefits of the application of the tool and also a list of stakeholders involved in each project. An **abbreviation** of the results is presented in Table 2.

Assessment of CityScope projects in terms of participatory planning			
City	**Benefits**	**Limitations**	**Stakeholders & Actors**
Andorra	No apparent need for movable board pieces for this project. Only a few necessary input data (agents, streets, and buildings) was needed.	No request for assessments, opinions or ideas; top down info (open data) & real-time data on services (geolocations)	Andorra Telecom provided customer's usage data
			Observatory for the Sustainability of Andorra (OBSA) Private Research
			Chamber of commerce
			Universitá d'Andorra
Champs -Élysées	Tool enabled the "consensus approach" of the project. Almost 50% of the city dwellers made contributions.	A high budget was necessary owing to the number of experts involved (eg. 50 public figures, over 14 cross disciplinary companies, each expert in their field)	Academic Institutes: MIT media Lab, Harvard University
			Architectural & Urban design firm: PCA-Stream
			Private research Institutes: Fabernovel, MFG labs, Artefact etc
			NGO: Comité Champs-Élysées
	Tool enabled data driven process, making it more factual and pragmatic	Coordinating the knowledge of various stakeholders is time-consuming and makes it a long-drawn process.	Real estate companies: Citynove, Groupama, SFL, 52 Capital
	Was able to convert to a completely virtual platform due to the pandemic		50% of the citizens of the city

Table 2. ***Abbreviated*** *assessment of CityScope projects in terms of participatory planning.*

The following is a summary of observations from Table 2:

Hanoi sees the first time application of CityScope in an agricultural context depicting water flows. However, the simulation had to be simplified since the model could not be calibrated with real data in terms of hydrology. The range of stakeholders was also narrower since it was an academic project focusing on creating a common platform of discussion for industrialists and academics.

Andorra was partly academic and partly commercial, since it involved telecom companies and the chamber of commerce to visualize the behaviour patterns of tourists and visitors in terms of mobility.

Lyon was an academic project, led by and for academia. It focused on the study of energy, mobility, and air quality in the city. This board was also not as interactive since the main aim was to visualize data.

The Champs-Élysées in Paris had the 'consensus approach'. CityScope, along with other tools enabled 50% of the city dwellers to make contributions (Rizhlaine, 2020). Due to the pandemic, CityScope was made completely online and was displayed in a virtual exhibition. As for the limitations, the entire process was long drawn and involved a very high number of experts and hence a higher budget.

The Hamburg project had the specific aim of housing refugees. It was done mostly in a workshop format with large models which allowed direct discussion between experts and non-experts. This format restricted the amount of people so only 400 citizens participated. However, it covered a wide range of stakeholders.

4.3. Two-dimensional Digital Participatory Assessment

After scoring the selected projects based on the assessment process explained in Annexes 1 and 2, the study was able to plot them on the cartesian plane (Fig.8).

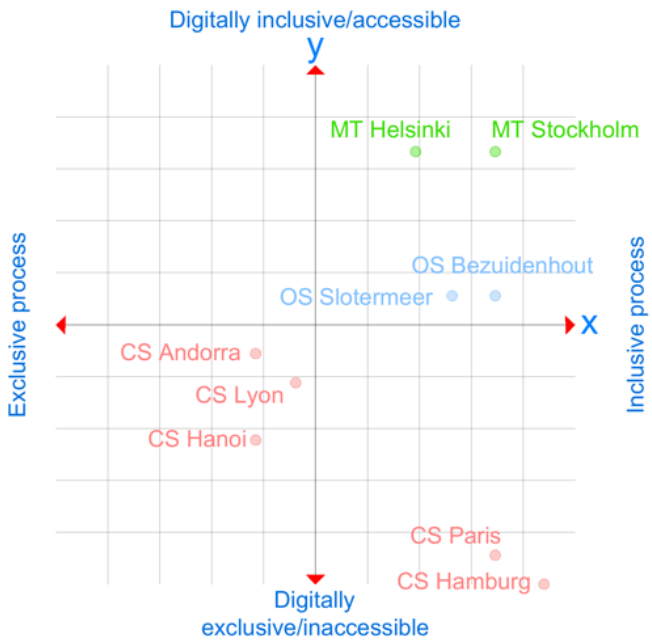

Figure 8. Plotting CityScope (CS), OpenStad (OS), and Maptionnaire (MT) projects in the 2D assessment framework

From the two- dimensional assessment, following represent some of the interpretations that can be made:

1. All CityScope academic projects, that is, Andorra, Lyon and Hanoi, fall close to each other as moderately exclusive processes, which is expected due to the fact that their main purpose was research and not necessarily public participation (even though the platforms would allow it).

2. The need for highly qualified personnel to set, moderate, and analyse the use of CityScope in Champs Elysées (Paris) and Hamburg, as well as the (estimated) high budget necessary made it digitally less accessible.

3. Over all, it can be stated that CityScope is not a very digitally accessible tool. This is the reason all the projects fall in the 3rd or the 4th quadrants, implying a low y-value. In simple terms, this means that criteria such as the requirement of expert knowledge and financial load reduce their digital accessibility.

4. On the other hand, the x-value of the projects vary greatly. This means that the inclusivity of stakeholders in the projects varies greatly, which implies that CityScope itself does not define how 'participatory' the process is. It is only a tool that enables an inclusive process if used effectively.

5. The X and Y ranges for CityScope are larger, which could imply the tool can be used both in an inclusive-accessible way as well as in an non inclusive-inaccessible way. However this could also be simply because more projects of CityScope were plotted in comparison with OpenStad and Maptionnaire.

6. Of the three, Maptionnaire stands out as more digitally inclusive, even though it is the only non open-source software. This could be due to the fact that it is the only platform that is intentionally developed for public use, in contrast with OpenStad and CityScope which were developed to be initiated by municipalities and academia.

5. CONCLUSIONS

To conclude, we elaborate the limitations of the tools. Finally, the paper closes with the limitations of our study and a reflection on the developed framework in the context of participatory planning and its potential to be extended to other digital tools as well.

5.1. Limitations of the Tools

The limitations of the tools are highlighted, to point the direction of required further development and also to imply the necessity to use a multiplicity of tools.

In CityScope:

- Large amounts of data are required. CityScope can take up to a few years to build a customised platform. As it is often the case, especially in the Global South context, that data simply does not exist. CityScope depends entirely on the use of available data to render visualizations and formulate predictions. Thus, heavy workload may be necessary to create or acquire the data. For example, in Hanoi, simplified data was easier to use but a realistic simulation would have required much more research.
- High technical knowledge: CityScope requires expert technical expertise to set the platform, mediate the workshops, and analyse the results. This entails a high financial load, making it harder to replicate.
- Only quantitative feedback: CityScope is focused on quantitative feedback and not qualitative. Measuring qualitative data in participatory planning with this tool remains a challenge.
- Physical presence is important: CityScope works best in a physical workshop format. Though completely online versions are still being developed, they are not as effective yet as it does not allow room for discussion. As seen in the example of Champs Élysées, CityScope can be adapted to a fully online platform. Though this might not automatically overcome systematic socio-economic digital divides, further development may allow the tool to be more digitally accessible.

In Openstad:

- Financial load: one of the main criteria that lower the digital accessibility levels of OpenStad is the price for operation. Even though it is an open source software, the initiator is estimated to expend considerable amounts on moderation and management of the platform. For municipalities in the Global North context, this is not necessarily an issue. However it does restrict the replicability of the tools for institutions in Global South contexts, for community associations, and individuals.
- Expert facilitation: even though the required knowledge for moderation of OpenStad is not as pronounced as in CityScope, it is still not as self-explanatory as Maptionnaire.

In Maptionnaire:

- Used mainly as a diagnostic tool: Mapptionnaire has as an addition to an existing tool box, often as a diagnostic tool/ collection of initial information. This information feed is important for workshops which may later be conducted where decisions are made.
- Licensed tool: Even though Maptionnaire is easy to use and versatile, even for university students, the fact that it is not open-sourced makes it less accessible.

5.2. Limitations of the Study

This two-dimensional assessment framework is intended to graphically illustrate the relationship between a participatory planning project and the digital accessibility and replicability of a tool used. This is still a rudimentary assessment framework and more development is needed to accurately portray information. Also, since we worked with a limited number of projects, it doesn't show the actual range of the tools. However, it is an interesting starting point to understand the intersection of planning processes and the potential of digital tools.

Another limitation of the study is that the assessment of financial load is based on estimates. Real values would be necessary to better evaluate the replicability of the tool. Also, the financial load would have to be equated to local socio-economic circumstances of each project, since a particular price may be affordable in one socio-economic context but not affordable in another.

One observation we make is that these tools are employed at different phases of planning such as diagnostic, development or decision-making. This has a direct impact on the type of data collected and how it is processed. For example, we see Maptionnaire being used more in the diagnostic phase while CityScope and Openstad have been mainly in the decision making phase. Considering this may be important when this assessment framework is further extended.

5.3 Further Potential of the Two-dimensional Digital Participatory Assessment Framework

The conceptual framework developed in this study can be extended to projects that used other digital tools as well. This framework is based on two dimensions: i) how inclusive is the participatory process of the project and ii) how accessible (replicable) is the digital tool to a wider population. This is based on the argument that digital tools appear in the planning scene to maximize the inclusivity of conventional participatory planning methods. However, this framework does not imply that there is a moral or ethical need for every tool to reach 100% inclusivity and accessibility. Understanding that different processes require different degrees of participation and that different projects have varying amounts of resources at their disposal, this framework simply tries to create a systematic evaluation of any tool's participatory potential.

By providing a quick overview of the capacity of a particular tool and how it was used in a particular project, this framework will make it easier in the future to select tools for new projects. It also helps to evaluate whether a tool in development is fulfilling the expected inclusivity and accessibility potentials or not.

This study also shows us that each digital tool has limitations. Therefore, it is helpful to use a multiplicity of tools. A framework like this will help us to decide which combination of tools to use so that the limitation of one tool is made up by using another.

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APPENDIX 01 - SCORING SYSTEM FOR THE X-AXIS OF THE TWO-DIMENSIONAL ASSESSMENT FRAMEWORK

Score standard to plot the inclusivity level in y-axis of the quadrant inclusivity assessment:

A1. This is a multiple selection table to determine the range of societal sectors involved: each stakeholder adds a point.

Stakeholders / Actors	Value
Local government or administration	1
Policy makers	1
Big scale private capital	1
Small scale private capital (SMBs)	1
Scholars, academics, and universities	1
NGOs	1
Social/civic associations	1
Community and individuals	1

Table 3. Multiple selection table showing range of stakeholders in the project.

A2. This is a single selection table to determine the degree of involvement and the type of data collected:

Degree of involvement	Type of urban data	Score
Top-down information	Open data	1
Bottom-up information	Real-time data on services, geolocalisation	2
Consultation	Reporting, assessment, preferences	3
Contribution	Opinions	4
Collaboration	Propositions, ideas	5

Table 3. Single-selection table showing degree of involvement and type of urban data gathered.
Source: Based on Hasler, Chenal, & Soutter (2017)

APPENDIX 02 - SCORING SYSTEM FOR THE Y-AXIS OF THE TWO-DIMENSIONAL ASSESSMENT FRAMEWORK

Score standard to plot the inclusivity level in y-axis of the quadrant inclusivity assessment:

A. Does it require specific hardware?

No ; 0

Yes ;1

B. Does it require mediation from experts?

No ; 0

Yes ;1

B.2. If yes,

Technical level ; 1

Higher level ; 2

Graduate level ; 3

C. Does it require technical knowledge to set up or operate the tool?

No ; 0

Yes ;1

C.2. If yes,

Technical level ; 1

Higher level ; 2

Graduate level ; 3

D. Does it require technical knowledge to analyse the data or results?

No ; 0

Yes ;1

D.2. If yes,

Technical level ; 1

Higher level ; 2

Graduate level ; 3

E. Does it entail a financial load (licenses, private data, hardware cost, etc.)?

No ; 0

Yes ;1

E.2. If yes, (estimations):

<100$; 1

1001$ to 1000$; 2

1001$ to 10 000$; 3

>10001 $; 4

EXPLORING PUBLIC TRANSPORT DRIVEN DEVELOPMENT SCENARIOS: A CASE OF RAIPUR AND NAYA RAIPUR

PARUL SHARMA, BHARGAV ADHVARYU

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Abstract

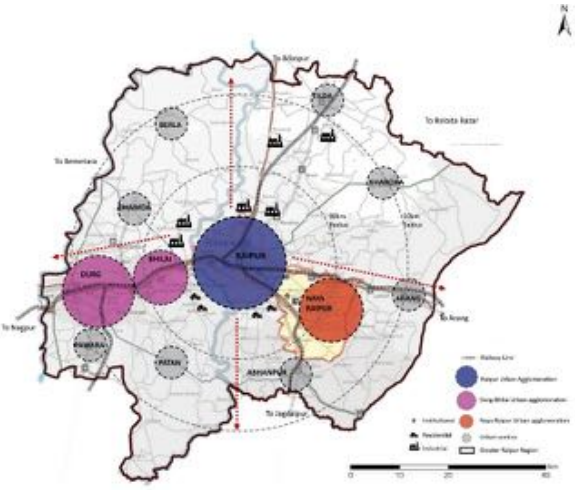
Improvement in public transport accessibility is crucial in better integrating land use and transport systems in spatial planning. Past research has shown that the application of various accessibility measuring tools enhances the plan-making processes in a city by guiding future transport networks and investments, better informing the parking policy, improving the supply of affordable housing locations and integrating land and transport decisions. The study aims to measure the current public transport accessibility levels for the base year 2020, in Raipur and Naya Raipur using Public Transport Accessibility Levels (PTAL) as a tool and extends its application to explore the public transport driven development scenarios in Greater Raipur Region. By analysing the spatial distribution of public transport accessibility offered by the current systems using PTAL, the study guides the future public transport network in Raipur and Naya Raipur that is aligned with urban development. The study compares the possibilities of alternative growth directions in terms of land development scenarios for the horizon year 2034 in Greater Raipur Region. Results of scenario analysis show that the development of Raipur unified urban agglomeration with the polycentric urban structure of neighbouring urban centres is well-supported by the public transport network in the proposed Regional Mobility Plan. The study recommends physical planning considerations at the city level and regional level for decision-makers to avoid the short-sighted approach to urban sprawl. It further recommends strengthening the institutions in making better decisions by incorporating public transport accessibility level as a prerequisite urban planning tool.

Introduction to the Greater Raipur region (GRR)

The Indian state of Chhattisgarh was carved out from the state of Madhya Pradesh in 2000. It is the 10th largest state covering an area of 1,35,190 square kilometer. About 44% of the state is covered by forests. According to Census India, 2011, It is 16th most populated state of India with a population density of 189 persons per square kilometer (State Urban Development Agency, 2013). Of the total population, only 20% resides in urban areas. The state is rich in deposits of iron ore, limestone and coal and is an ideal location for low-cost production. It has one of the largest numbers of steel production industries. Manufacturing industries are the key sectors of the economy in the state (State Urban Development Agency, 2013). Naya Raipur Development Authority (NRDA) has delineated a total area of 5,155.76 sq. km as Greater Raipur Region in Regional Mobility Plan 2034 (LEA Associates South Asia Pvt. Ltd., 2016). The Greater Raipur Region consists of a total of 849 villages including 20 urban centers with a total population of 3.85 million (Naya Raipur DevelopmentAuthority, 2018)There are 20 urban centers in the region including Raipur urban agglomeration, Naya Raipur urban agglomeration, Durg-Bhilai urban agglomeration are the largest urban agglomerations in the region (LEA Associates South Asia Pvt. Ltd., 2016).

PUBLIC TRANSPORT HAS DRIVEN DEVELOPMENT IN THE REGION

Within a 30km radius with Raipur as the center, the growth of the city is limited due to certain physical aspects. As shown in **Error! Reference source not found.**, there are industrial centers and major public utilities in the n orth with a large labour market. Majority of the upcoming town development schemes and residential colonies have occupied the south and south-west of Raipur. The east and south-east of the city have seen the development of new institutional and administrative spaces with the onset of new capital Naya Raipur. The region has urban centers with interdependent urban characteristics and relies on each other for their growth.



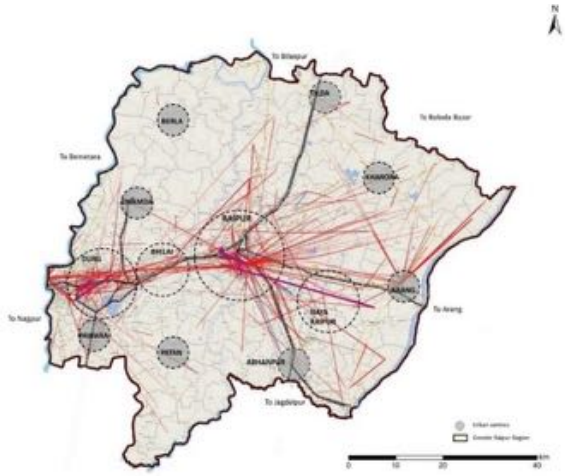


Figure 1. Expected growth due to urban characteristics in Greater Raipur Region

Figure 2. Travel Desire pattern of Bus trips in Greater Raipur Region in Greater Raipur Region

The travel desire pattern of bus trips is interconnected and follows an inter-city connection. The travel desire pattern of bus trips in the region has been prepared with data available from Regional Mobility Plan 2034 (LEA Associates South Asia Pvt. Ltd., 2016) for Greater Raipur region . The commuting pattern between the cities is linked as seen in the origin-destination trips made. The inter-city connection suggests that the public transport service limited to the planning boundaries of the cities cannot serve the growing demands. The past development trends in the region have shown that cities are not growing in isolation and development would follow the public transit networks in the region (Jana & Sinha, 2019) and would require a comprehensive transport framework by the transport planning authorities to investigate regional transport (Naya Raipur Development Authority, n.d.).

ZOOMING TO RAIPUR AND NAYA RAIPUR: SPATIAL GROWTH AND PAST PLANNING EFFORTS

Rapid industrialization and growth towards the fringe areas have majorly changed the land use patterns in the city (Jana & Sinha, 2019). The past years of urban growth in the city have seen urbanization along the major roads in the south and the south-east of the Raipur City (State Urban Development Agency, 2013). Numerous town development schemes in the southern peripheries of the city have forced the development to take place outside the RMC boundaries and grow towards the NRDA planning boundary in the south-east as shown in Figure 3 (Bruno, 2019).

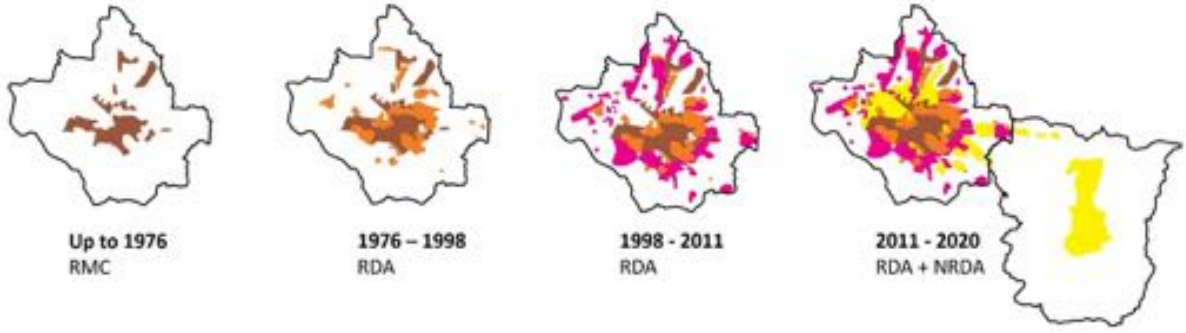


Figure 3. Spatial urban growth in Raipur and Naya Raipur

Raipur and Naya Raipur are the fastest-growing urban centers in the region. The growth of Naya Raipur is expected to be a guiding factor in the future growth of its parent city, Raipur (State Urban Development Agency, 2013). The study aims to focus on the accessibility levels in these two urban agglomerations. The planning area for the study is 425sq.km including Raipur Development Authority Planning Area (188sq.km) and Naya Raipur Development Authority Planning Area (237sq.km). Raipur Municipal Area is also within the study limits. Raipur planning boundary has a total population of 11.23 lakhs (2020) with 2,103 persons/sq.km whereas the Naya Raipur planning boundary has a total population of 0.9lakhs with 350 persons/sq.km (Naya Raipur Development Authority, n.d.).

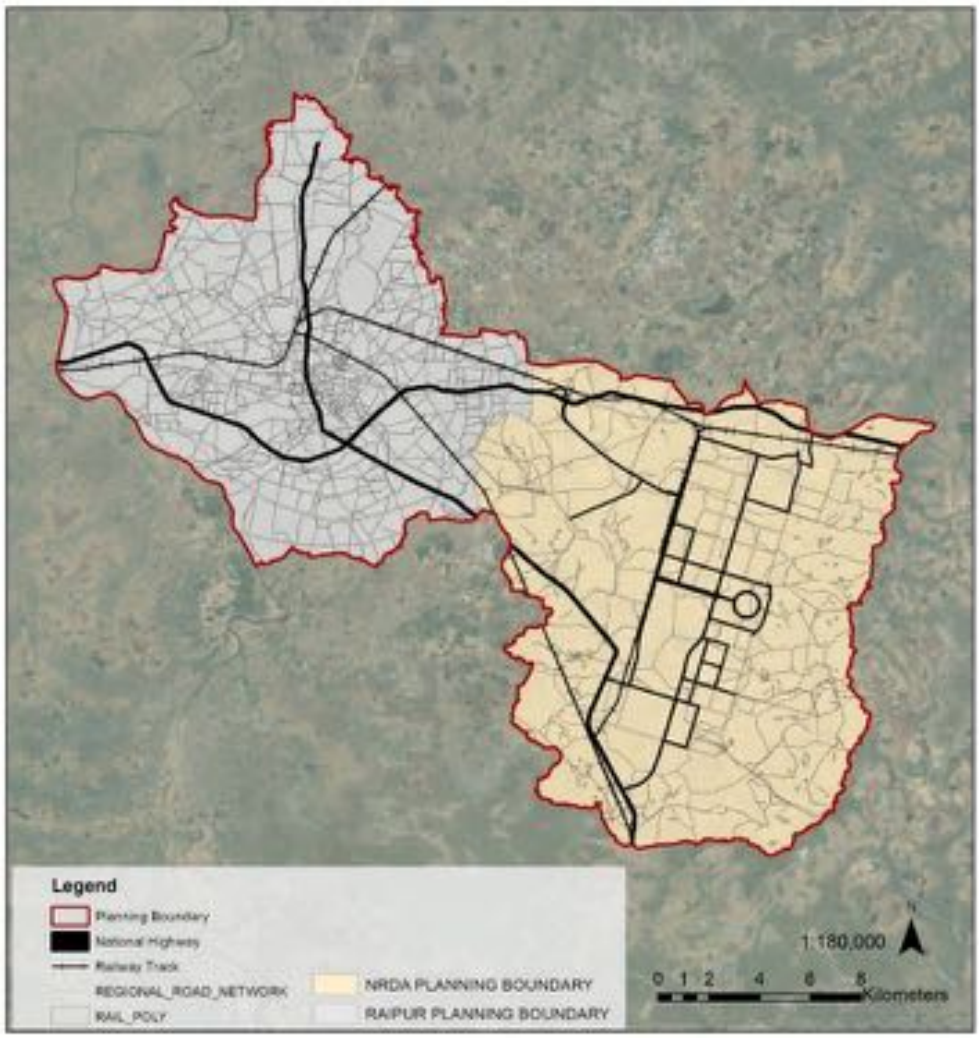


Figure 4. RDA planning boundary (left) and NRDA Planning boundary (right)

CURRENT PUBLIC TRANSPORT SCENARIO: CITY BUS AND BUS RAPID TRANSIT SYSTEM

The Raipur Nagar Nigam Transport Limited (RNNTL) is currently operating 99 buses on the road connecting Naya Raipur, GEC road and other important centers in the city. Raipur Urban Public Transport Society (RUPTS) is currently operating 66 buses on the road which connects Raipur to Naya Raipur. There are 18 routes of the city buses which connects Raipur to Naya Raipur. The Bus rapid transit system aims focuses on high-speed intercity connectivity between Raipur and Naya Raipur. It also caters to the public transport demand within the Naya Raipur area and NRDA is the authority for the implementation of the project (Naya Raipur DevelopmentAuthority, 2018). In phase 1, there are three major corridors which connect Raipur and Naya Raipur. The BRTS is still in its expansion phase and would eventually improve the connectivity with its next phase.

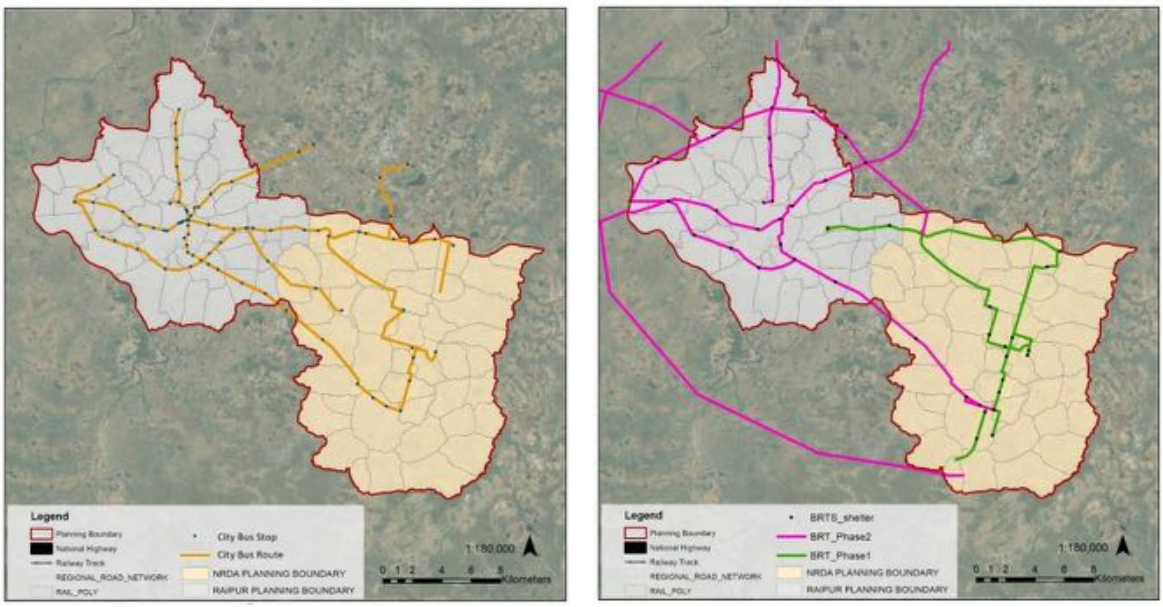


Figure 5. Route network and stops for city buses (left) and BRTS (right)

PUBLIC TRANSPORT ACCESSIBILITY LEVEL ANALYSIS

The primary objective of the research was to map the public transport accessibility levels for Raipur and Naya Raipur. This was done using the PTAL method used extensively by Transport for London (Transport for London, 2010). The method measures the accessibility of a POI (point of interest) from a public transport stop (e.g., bus stop, metro station, etc.). The method was adapted to the Indian context by (Shah & Adhvaryu, 2016) for Ahmedabad, and (Adhvaryu et al., 2019) for Surat. Since plot-wise spatial data was not available (wherein main gate of a property is considered as a point of interest), the study area was divided into 1km square grid with the centroid of each grid acting as a point of interest. The PTAL for each POI was calculated as per the formulae used by (Transport for London, 2010). **Error! Reference source not found.** sums up the parameters and their r espective values which have been considered to calculate PTAL for city bus and BRTS as transport modes in Raipur and Naya Raipur. This has been derived as per the data collected on-site and consultations with various stakeholders.

Parameters	City bus values	BRTS values	Units
Avg Walk speed	60	60	m/min
BRTS walk access time (WT)	15	15	minutes
Reliability factor (k)	2.5	1	minutes
Bus Frequency (f)	6	4	Per Hour
Frequency Hour	8:00 to 10:00	8:00 to 10:00	AM

Table 1. Assumptions for city bus and BRTS to calculate PTAL in Raipur and Naya Raipur

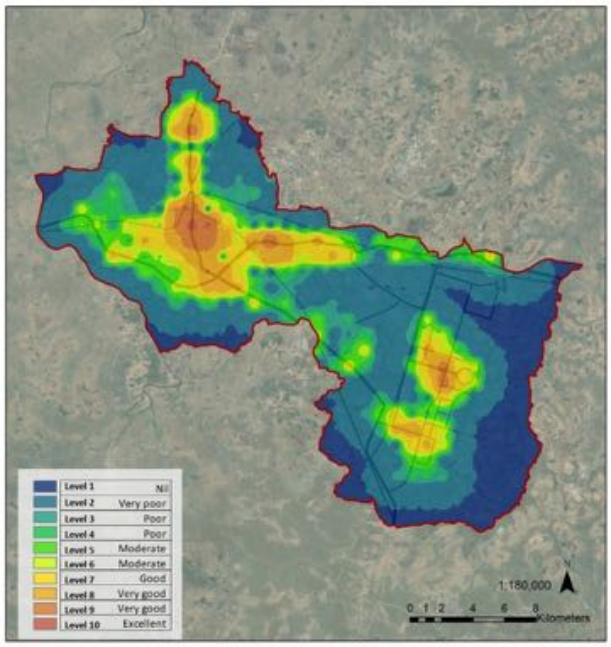


Figure 7. Public transport accessibility levels (PTAL) 2020 Map

High accessibility levels: Excellent accessibility levels are obtained in the Raipur core city areas. This was expected along Greater Eastern (GE) Road which goes along the east-west axis of the city connecting Kolkata-Mumbai Expressway (old NH-6). Similarly, higher accessibility levels are seen along NH-200 in the north which connects Raipur centre to Bilaspur urban agglomeration. Northern Raipur which has the major industrial centers like Urla and Siltara achieve high accessibility levels and would not demand any immediate intervention. In case of Naya Raipur, the core residential sectors in the south-east and institutional sectors in the east are well connected with the other areas in Naya Raipur and to the Raipur city with the help of BRTS service.

Moderate accessibility levels: Much scattered and leapfrogged areas with excellent accessibility levels are surrounded by moderate accessibility levels in the east along NH 53 and in south-east along NH 43 which is the major connection between Raipur to Naya Raipur. Medium accessibility levels are also seen in the western outskirts of the Raipur area. The accessibility level in the western part of the city connecting Raipur to Durg-Bhilai urban agglomeration is obstructed by the South-east Central Railway line and experiences poor accessibility beyond the Raipur Railway station.

Poor accessibility levels**:** Poorest accessibility levels pertain in the outskirts of the Raipur city, beyond Ring Road in the South, along with the peripheral outgrowths of the city. This area is beyond the RMC limits and has seen the numerous land development schemes in recent years. Reconstitution of plots is the land development model which has been adopted for the growth. But so far, the peripheries in the south Raipur have seen unorganized growth and lack of any good PT networks. Similarly, the developable land in between Raipur and Naya Raipur has the poorest accessibility because of lack of any public transport network. Such areas would require an immediate response in terms of network and bus stops if developed.

Code	Accessibility Level	Access Time (minutes)	Equivalent Doorstep frequency (numbers per hour)	Intervention Required
	Level 1	Nil	0	Immediate, if develped
	Level 2	60 mins or more	0 - 1	Immediate, if develped
	Level 3	45 - 60 mins	1 - 1.5	Immediate, if develped
	Level 4	30 - 45 mins	1.51 - 2	Moderate
	Level 5	20 - 30 mins	2.1 - 3	Moderate
	Level 6	15 - 20 mins	3.1 - 4	Moderate
	Level 7	10 - 15 mins	4.1 - 6	Slight
	Level 8	5 - 10 mins	6.1 - 12	Slight, if densely populated
	Level 9	2 - 5 mins	12.1 - 30	Slight, if densely populated
	Level 10	<2	30 and above	None

Table 2. Interventions required for accessibility levels in public transport systems using PTAL 2020

SPATIAL DISTRIBUTION OF PUBLIC TRANSPORT ACCESSIBILITY IN WORK CENTRES

The physical distance between residential land parcels and work centers should be such that the access time is the least. According to the Journal article; Public transport accessibility: A literature review, "higher employment rates can be expected when the time to travel in public transport is shorter" (Saif et al., 2019). Raipur as the state capital and a major industrial center is home to a large labour market where the heavy and light industries in the region are a major pull factor for the people to migrate and settle in the cheap available residential locations.

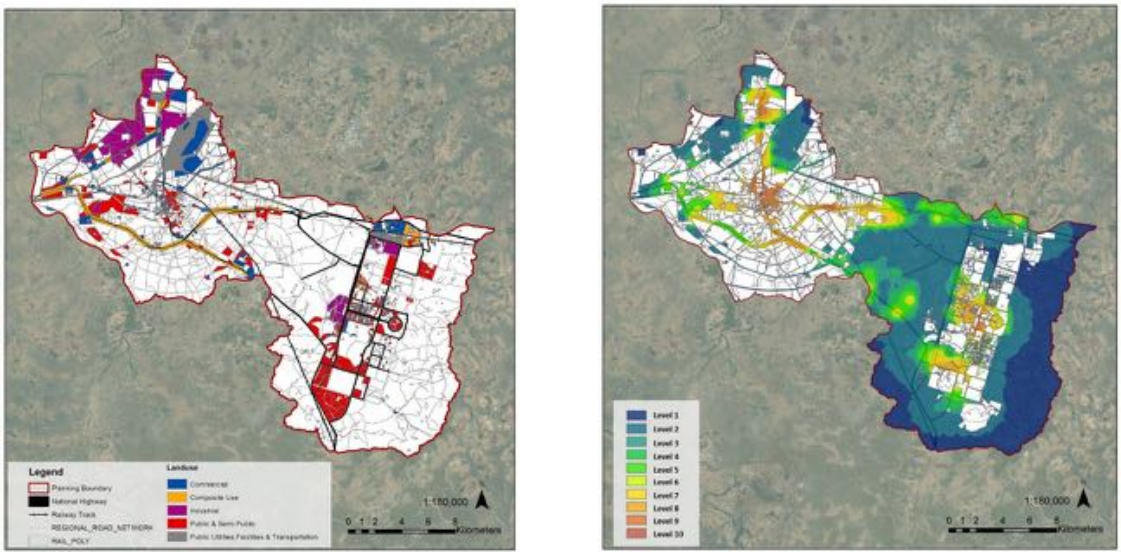


Figure 8. Major work centres (left) and their corresponding public transport accessibility levels

Access work centers is an approach which has been missing from the urban planning perspective. The corresponding accessibility levels in the work centers are mapped using PTAL as shown in Figure 8. Major work centres (left) and their corresponding public transport accessibility levels

Public semi-public areas which include institutions, health care services, and other public spaces share the highest percentage of work centers in both Raipur and Naya Raipur and experience the highest accessibility levels. These areas are accessible within two or less than two minutes of walk time and would require no intervention. This is in complete contrast to working centers with public utilities, transportation facilities and the industrial centers in the north of the city have extremely poor accessibility levels. It is imperative to enhance the accessibility levels in these industrial growth centers to improve the performance of the labour market (Saif et al., 2019).

Work centres and accessibility levels				
Work Centre	Raipur (%)	Naya Raipur (%)	Level	Intervention Required
Commercial	19.81%	7.93%	Level 3 - 5	Moderate
Composite Use	4.90%	4.69%	Level 5 - 8	Moderate
Industrial	22.59%	12.05%	Level 1 - 3	Immediate
Public - Semi Public	22.32%	48.73%	Level 9 - 10	None
Public utilities, facilities, transportation	30.35%	26.54%	Level 1 - 3	Immediate

Table 3. Interventions required in work centres as per their accessibility levels

OUTCOMES OF PUBLIC TRANSPORT ACCESSIBILITY ANALYSIS

The transport network proposal is based on the analysis from the spatial distribution of public transport accessibility. The following section explores the proposals at two levels; short-term and medium-term proposals which can be achieved in the next 10-year span i.e. Horizon year (2034) and long-term proposals which can be targeted beyond the year 2034.

Short and medium-term transport proposals

Proposed PT Routes: Conceptually, the new PT routes are proposed to support the outward growth in the peripheries of the Raipur city to form a ring radial network. The spatial growth is expected outward in the south, south-east, north and western directions of the city. Re-routing of the existing public transport networks is done to make the peripheral areas accessible in the western, northern and southern areas of the city. No new route is proposed in the eastern Raipur which connects Raipur to Naya Raipur.

Proposed PT Stop locations: The PT stops are proposed for major work centers such as industrial and commercial in the north of Raipur where the accessibility levels very poor. Similarly, PT stops are added in Naya Raipur, in the airport zone, industrial and commercial land areas. The stops are also proposed along the new PT routes which are ring radial in-network in the west, which connects Raipur to Durg-Bhilai urban agglomeration and in the south.

Proposed service frequencies: The increment in the services design frequencies is proposed for areas with high population densities like in the core city areas. Higher service frequencies are proposed in the routes which are currently in the low-density areas but are expected to develop in the land development phasing.

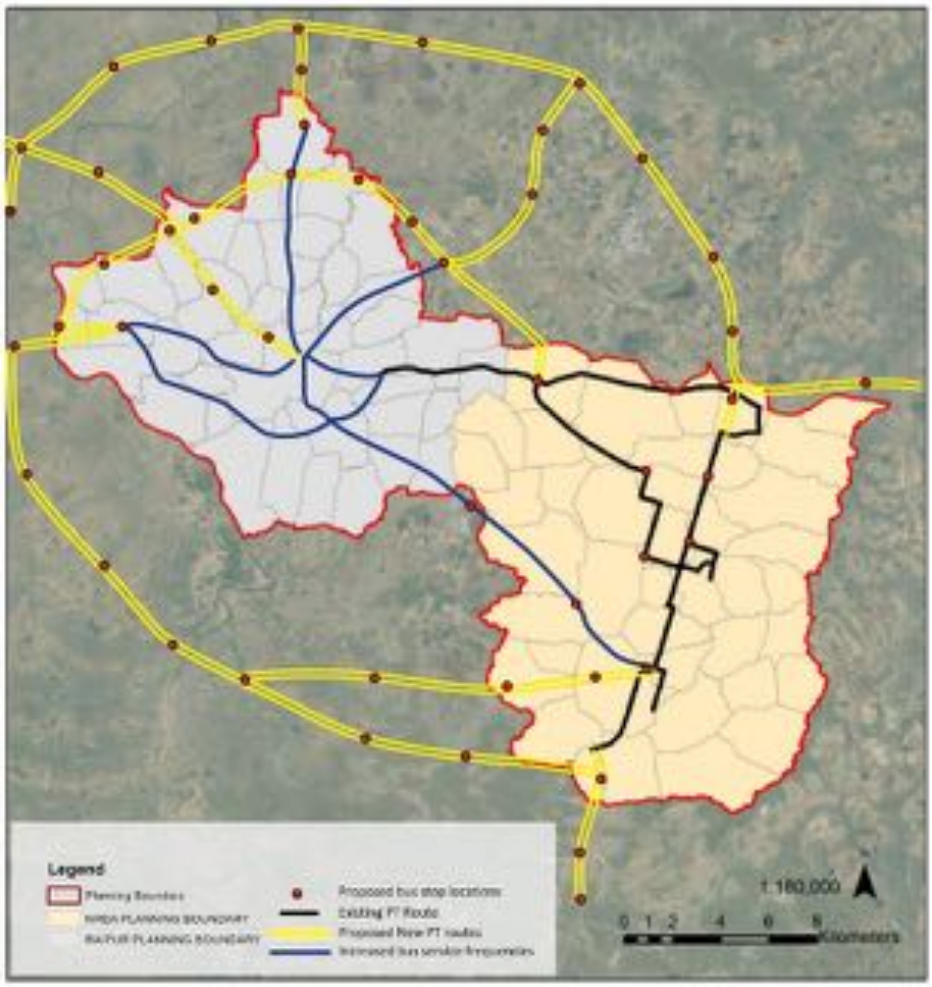


Figure 9. Short-term proposal for Public Transport network 2030

Long term Transport proposals: Alternative growth directions of growth

Spatial growth of Raipur and Naya Raipur is not limited to the planning or administrative boundaries. So, the city level planning considerations are not enough to cater to the growing needs. It is imperative to extend to the regional context to see the growth directions and alternative development scenarios of land and transport to propose long-term transport proposals. A planned and efficient public transport system has the potential to guide future growth in cities. This section explores the possible growth directions and development scenarios in the Greater Raipur Region with the public transport network and concludes the most probable growth direction which should be taken up by the Authorities to support the improved accessibility levels.

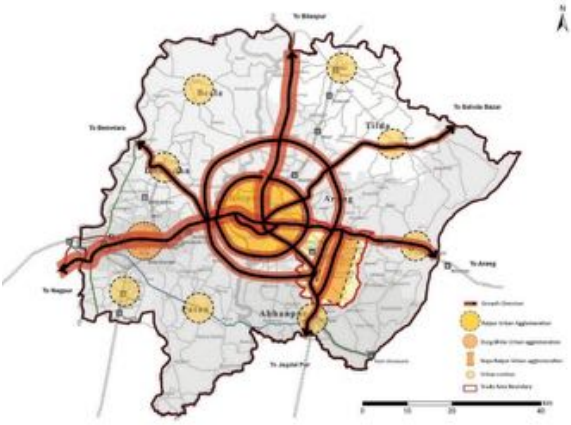
Business as usual development scenario

This scenario envisages the growth of unified urban agglomeration with two or more agglomerations combining to form a central node as shown in Figure 10. This is a case of centralized development with physical corridors of growth. Raipur has the potential of catalyzing the development in other directions across the region. Also, the past physical development trend in the Region has suggested ribbon development along various linear corridors of movement. With the onset of development along the corridors, the corresponding population densities are expected to increase. Eventually, physical development can take shape in a manner where the expansion of two urban agglomerations becomes one. This concept of unified urban agglomeration is an expected case with Raipur being the parent urban center to most other urban and rural centers. This physical development scenario has the strength to centrally drive the social and economic growth in the region. But

certain rural settlements in the north-east and north-west of the region like Kharora and Berla respectively can be left out due to lack of presence of any linear corridor connecting to Raipur urban agglomeration.

Urban node-based development scenario

This scenario focuses on decentralized development with urban centers growing individually as shown in Figure 11. In this case, each urban center can grow to develop as a regional center where the municipal councils, nagar panchayats, and rural settlements can develop as sub-regional centers. This scenario does not let a single urban agglomeration to grow exponentially rather decentralizes the growth to nucleated centers of growth in both urban and rural settlements. For example, Raipur can develop as a Regional center for the trade, commerce market for the region and neighbouring cities in the state. Durg-Bhilai urban agglomeration has the potential of developing into a key manufacturing and steel production center with its heavy steel and iron ore-based industries. Similarly, Naya Raipur can become the regional center for institutional and state administrative functions. The rural settlements can act as market centers with a focus on agricultural produce to Regional centers. This scenario is easier for the already growing urban centres which are equipped with resources but could be difficult for rural settlements to grow on their own.



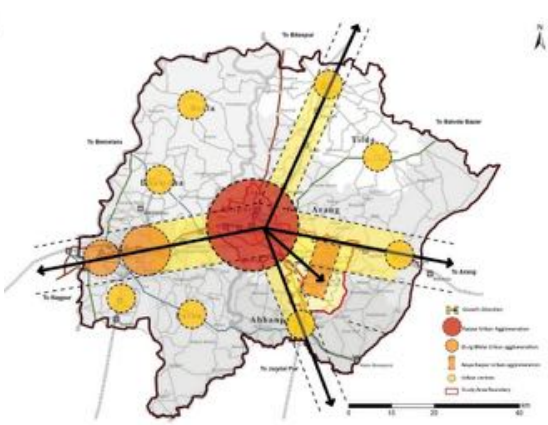


Figure 10. Business as usual development scenario in Greater Raipur region

Figure 11. Urban nodes-based development scenario in Greater Raipur region

Higher growth in Naya Raipur development scenario

The third development scenario for the region could be rapid urban growth in Naya Raipur as shown in Figure 12. Naya Raipur is a green-field project, where the state government has made heavy investments in the capital for urban development including transportation, housing, smart infrastructural services, educational and health care services. This case can take the bulk of growth for the region and the new capital could take the growing residential demand of the old city of Raipur and decongest old slum and informal settlements. This scenario would relieve the pressure on the city of Raipur to utilize heavy and medium investments as shown in Figure 12.

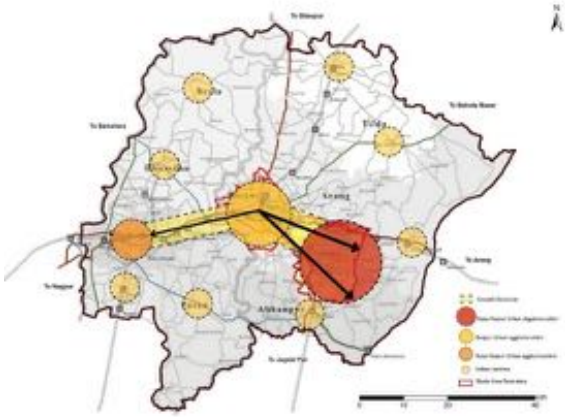


Figure 12. Higher growth towards Naya Raipur in Greater Raipur region

IMPLEMENTATION MECHANISM FOR URBAN DECISION-MAKERS

Making separate plans in physical planning for the two aspects; land and transport is like clapping with one hand. In the context of this study, the recommendations are presented across the city and regional levels separately.

City-level planning considerations

Accessibility improvements in Raipur and Naya Raipur: It is important to use tools to assess the current accessibility levels offered by the public transport systems. The evaluation of the spatial parity of accessibility of public transport can guide the decision-makers to make the changes in service frequencies and add transit stop locations. The densification of the less intensive areas along existing public transport network in Raipur and Naya Raipur will increase the local access to public transport systems. Similarly, the addition of new networks in the core city areas and outskirts with higher population can make public transport more accessible.

Transit in Raipur inner city: The decision-makers need to build strategies for efficient and optimum utilization of existing urban land and transport services in core city areas. Provisions are to be made for the better quality of infrastructural facilities in core areas and neighbouring rural settlements. Redevelopment schemes and Local area plans need to be prepared for the brownfield areas in coordination with the city level planning proposals. Dedensification of low-density areas with mixed land use in core areas of Raipur city is an example of the same.

Complete transport networks and streets for residential neighbourhoods: For transport networks, the pattern of the complete street should be followed for the hierarchy of streets. The availability of alternative routes in the transport plan would make the public transport system more accessible. This should be supported by the concept of safety and comfort for the pedestrian movement and non-motorized vehicles on the street.

Regional strategic development

Enabling polycentric urban structure**:** The network of the public transport system should focus on connecting the 'centers' of activities. These activities are linked to land use and shape the urban form of the cities. The concentration of the centers can be monocentric and polycentric. The study suggested a centralized or unified urban agglomeration with Raipur as the center. The settlements sizes depend on the dynamics of area and population. A balanced service in the inner and outer city areas are to be made as per the population densities.

Regional Transit-Oriented Development: High-density development is promoted around transit stations and transport corridors. This can allow multiple choices for the future through multimodal integration in the region. Development of mixed or composite land use is encouraged along the regional public transport corridors. With these interventions, the region has the potential to achieve the different scales of transit-oriented development such as transit level, block-level, corridor level and eventually at regional level.

Increasing the urban land value: Land pooling and reconstitution of plots are encouraged for the new Town development schemes in the peripheries of Raipur. Mixed-use zoning in the Master plans should be implemented using Transferable development rights in the brownfield areas of Raipur.

CONCLUSIONS

The accessibility offered in the Raipur and Naya Raipur by the current public transport systems is higher in the core city areas as expected and delivers poor accessibility in the outskirts and the peripheries of both the two cities. To make the work centers accessible has been the primary focus of the proposal which has been achieved using a complete ring radial network in Raipur and Naya Raipur with additional improvements in bus service frequencies, bus stop locations and new routes in the public transport network. The study clearly illustrates that the application of PTAL as a tool is successful in analyzing and improving the accessibility levels by guiding future transport networks. This promotes the idea that the existing public transport accessibility levels can guide future transport networks and is an important area of research in spatial planning. The study further identified the interdependency of the urban centers in the region. The travel desire pattern of bus trips suggests that a comprehensive transport network for the region would be a more efficient solution rather than limiting the network to cities. As the growth of the two cities is not limited to the administrative or planning boundaries; it is mandatory to extend and evaluate the supporting growth directions in the region. The study considered three possible growth directions in the Greater Raipur region. The alternative development scenarios have been compared based on the perspective obtained from the stakeholders' consultations; a unified urban agglomeration with polycentric urban structure is the most probable growth scenario. The unified urban agglomeration of Raipur can optimize densities, promote mixed-use and affect the land values and the affordability. The study promotes the idea to consider PTAL as a prerequisite spatial planning tool and for the decision-makers. The research has contributed to the application of the PTAL as a guiding tool to explore the possible development scenarios driven by public transport networks and their expected outcomes in spatial growth.

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ADAPTATION AND MODIFICATION: A CASE STUDY OF THE FLOATING COMMUNITY IN THAILAND

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Abstract

This paper aims to explore the factors of adaptation and the existence of floating houses relating to natural resources and the environment in Uthai Thani province, Thailand. This paper employs the ethnographic method engaging observations, drawing, mapping, interviews and group conversation. The fieldworks data indicates the process of spaces and other physical factors affecting the floating Sakae Krang community's modification. The discussion of the findings focuses on cultural and environmental factors, the process of spaces, materials and construction technology, settlement and economic factors associated with the way of life. The outcomes of the processes show not only the adaptation of the floating house, but it is also the relation of houses and settlement relating to the dynamics of the city.

Keywords: Floating house, vernacular house, Sakaerang community, adaptation, modification

1. INTRODUCTION

Various factors influence the change and modification of a house, such as the environment, location, material and construction technology, and economic factors. With the specifics of the area, the floating Sakae Krang houses have changed and decreased in the number of houses each year. These houses are expressing a change in value, image and identity. Therefore, we cannot understand the floating Sakae Krang community if we don't understand the social and cultural contexts. In addition, the physical factor has a significant influence on the changes in the habitats. However, we can monitor the formation and modification of buildings from the relationship between resident behaviour, spaces, materials and construction (Rapoport, 1969). Hence, this paper intends to discuss the factors of change and the existence of a floating community relating to natural resources and how these factors change or modify the house?

2. THEORETICAL FRAMEWORK

2.1 Studying vernacular architecture

For decades, Thailand has studied vernacular architecture and has now established a solid foothold in many universities. Studies of vernacular architecture have produced and recorded local buildings or architecture stories in various ways, such as building patterns, building evolution studies, or geography and resource studies. Vernacular study remains widespread among many scholars (Oliver, 1969; Bourdier & Alsayyad, 1989; Abu-Lughod, 1988; Upton, 1993). Also, many Thai scholars have defined the meaning of vernacular architecture differently and consistently as follows: Charoensupakul (1985) explained that vernacular architecture refers to traditional architecture that exists in local communities, most of them are residential architectures, as well as Temeypan (2010), which says that vernacular architecture is a form of buildings built by locals in each locality. The building may have evolved from the original model to improve it to suit the current livelihood (Chakraphan et al., 2010) and reflects the values, tradition, culture, and beliefs (Sajjakul, 2010). It can be said that vernacular architecture is a building in the form of buildings that are built by each locality to meet the needs of the community or individuals.

However, Maudin (2010) mentions that endemicity can be defined through social status by the builder. The word "vernacular" defines those buildings as something humble to nature. In addition, vernacular architecture is also defined as a study of traditional buildings, and traditional structures make us understand the locality best. Vernacular architecture is well understood in the structural part because the structure determines the living space. These are central to the study of vernacular architecture (Maudin, 2010).

Rapoport (1969) defines vernacular architecture as a process that focuses on designing and building. Rapoport emphasizes that vernacular architecture is a distinctive architecture in the subject of built environments, vernacular architecture to create natives using local materials and traditional construction methods and designs by ordinary people. It is defined as "*architecture without architects*."

In the early 20th century, traditional buildings were studied in the form of ethnic groups. The study of Amos Rapoport and Paul Oliver expands the understanding of elements that contribute to the productivity and development of traditional buildings to integrate cultural practices and social rituals. Oliver (1997) has shown that the culture that affects buildings is the summary of human values. Activities and artefacts relate to the formation of buildings and give meaning and direction to the life in the building. Whether built with stone, wood, soil, not just an example of the modern theory that "form follow function" but has complex social and cultural contexts. Oliver (1997, 2003) has consistently demonstrated that traditional buildings are highly sophisticated cultural resources that express many meanings through the patterns and decorations surrounding living and frame human rituals and everyday practices (Maudin, 2010).

These are what make vernacular architecture which is different from other architectures. This defines the boundaries of vernacular architecture and the social definition of vernacular architecture because buildings are inventions of human culture. Vernacular architecture is the architectural language of the people. The study of vernacular architecture can be a comprehensive and ongoing field of study which combines many methods and

perspectives. It may include buildings as a reflection of traditionality, regionality, everyday life, and contemporary.

2.2 Vernacular architecture is a process.

Oliver (2003) depicts a habitat in each culture connected to the economy. It shows that dwelling is both a process and an artefact and that housing is more than structure. "*Vernacular architecture consists of involving the environmental context and resources available. They are owned or built by communities that use traditional technology. All forms of vernacular architecture are built to meet specific needs, accommodating the economic values and lifestyles of the cultures that create them*" (Oliver, 1997: xxiii). Values, lifestyles and construction methods are inherited from people. An essential point for tradition problems is the persistence and complexity of architecture, which is continuity and change. It is not just a message of what those buildings are like. And why are they located, and what their process of change is like? Of course, these are important questions for the floating Sakae Krang community. Glassie (1993, 2000) mentions tradition as something that reflects shared resources essential to creativity. Tradition is something that references a non-fixed example and as a structure of society. It interacts with people of all generations, which can later become part of the dynamics of traditions rooted in a wide range of intentions.

3. SCOPE OF THE STUDY AREA

Sakae Krang community is located in three sub-districts: Uthai Mai, Sakae Krang and Namsum sub-districts. The Sakae Krang river characterizes the settlement of the Sakae Krang community. The floating houses near the city centre and market are high density, while the southside is a low number of floating houses. However, 40 samples are selected to show the patterns and characteristics of the building. The examples of floating houses in front of Wat Upostharam are taken as the most examples, as an idea has a higher density than other parts of the river.

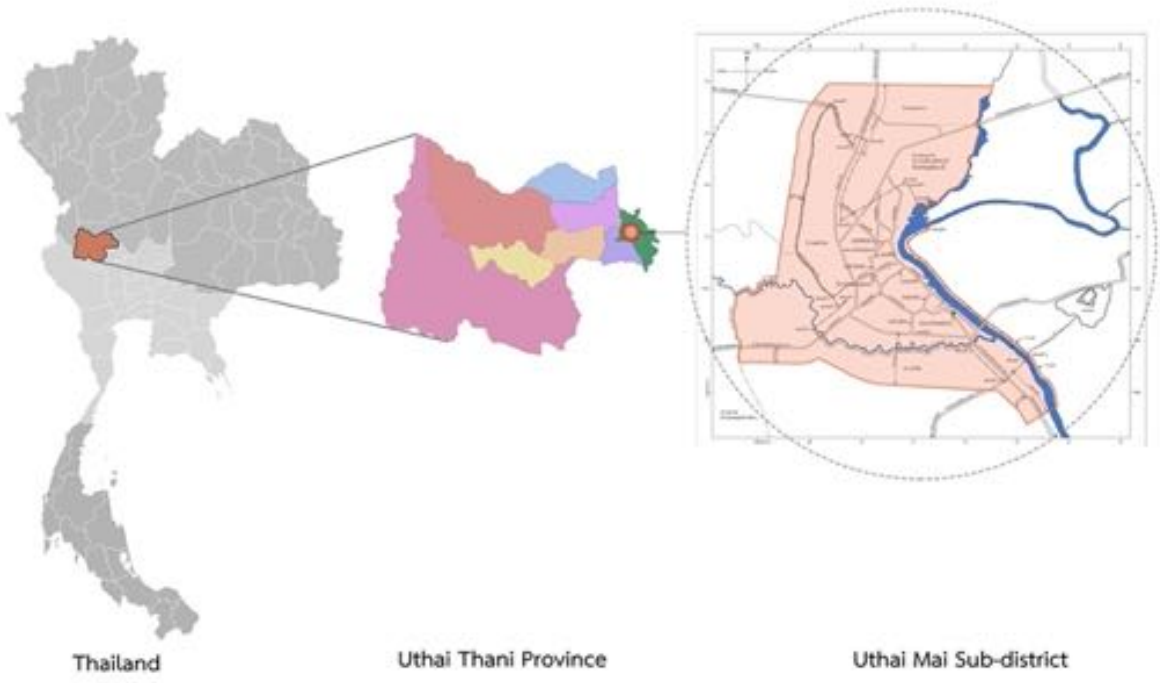

Figure 10. Uthai Thani province

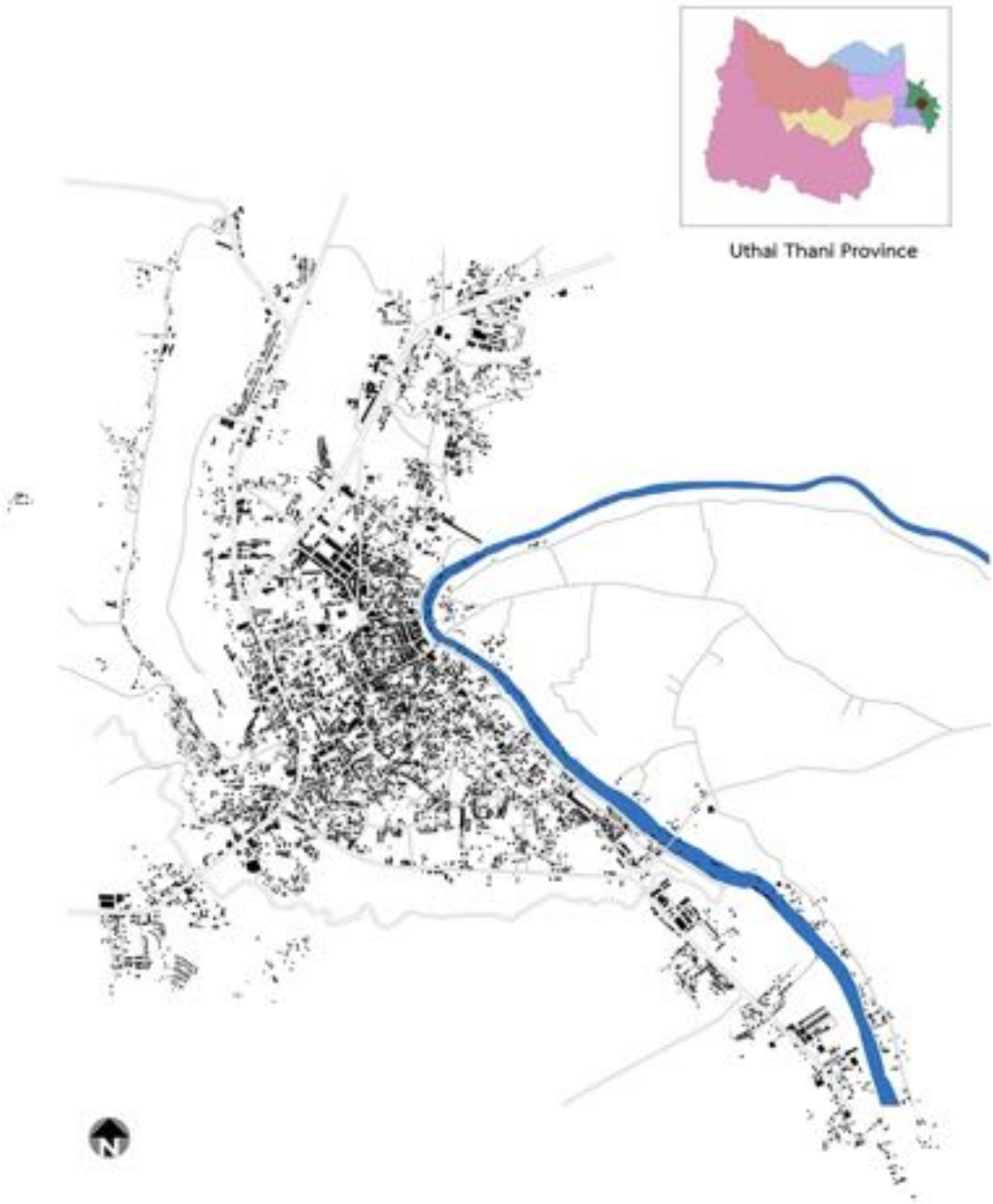

Figure 11. The Sakae Krang river

4. RESEARCH METHODOLOGY

This research employs various field data collection methods, such as drawing, recording, photographs, mapping, interviews: group discussions and participant observation. As part of the study, the documented data focuses on the history and settlement of the community. I explore the area and physicality of the residents throughout the river by using mapping, interviewing and note-taking. The data will be processed from physical surveys such

as diagrams and drawings of the floor plan, furniture, structure and materials. Analyzing physical data uses architectural methods displayed by drawings, photographs, diagrams and architectural styles. The information will be analyzed to explain the changes and adaptations of the floating houses to serve as a base for community development planning at the same time.

5. HOUSE CHARACTERISTIC

The physical characteristics of the area and the environment result in the construction of floating houses. House forms are under a variety of related factors. The houses are built correlating with the culture and environment. This section shows the character of architecture. I selected 40 case studies, from Wat Khum Sub to Wat Phum Tham, with the total number of floating houses used as case studies, chosen randomly from 127 houses.

From the 40 houses surveyed, I found common characteristics of the floating house, both interior and exterior; for example, the area in front of the house is a cooking area. Next to it is a multipurpose area, sleeping area, storage. The house's surroundings have a walkway, including a patio where they can do washing and cooking. If a group of raft houses are related to each other, a walkway is connected through a plank connecting the houses.

Most of the roof shapes are gable. Most of the walls of the house are wooden. Also, they prefer galvanized metal sheet to repair walls or replace wooden walls because they are easy to find and cheap. It doesn't take much skill. The householders can do it themselves. Windows and doors are relatively diverse, and most of them are wood, except for galvanized doors, as they are lightweight, making them easy to open and close.

Figure 12. Sakae Krang House form

6. RESULTS AND DISCUSSIONS

This section discusses the social and cultural relationships associated with life, social organizations, material culture and settlement. The critical question is, how does their daily practice affect spatial movements and

cultural understanding that affect the floating house in practice? This section will debate by emphasizing the details of society and houses with the question of how the economy, ecology and other factors related to spaces defining roles in the creation of social structures and living patterns of the floating Sakae Krang community?

In this discussion, I will discuss their association with lifestyle, the image of life and basic needs, which connect between housing and settlement. It seeks to look deeper into the theory of the formation of housing patterns, which intend to show different conditions and describe climate conditions related to physical characteristics and living conditions, materials, technology, economy and self-protection.

6.1 The relationship of house and settlement

In physical factors, this does not mean only location or climate, but this applies to many aspects of geography and housing and settlement (Rapoport, 1969). Therefore, the location is not just the places, climates or materials that determine the way of life of the local people. In addition, the habitat and settlement of people is not the only result of the physical environment.

The pattern of settlements - rivers and landscapes of floating community is represented by the floating house and the culture of the water community. The level of water each year directly affects the floating house, especially in the year 2020-2021. The amount of water in the river is less than usual, resulting in the breakdown of the houses, and has contributed significantly to the residents wanting to modify the houses using more durable materials such as steel and plastic buoys.

Floating settlements complicate the structure of the culture. It means that they maintain a changing lifestyle with the modern, especially change and unpredictability of climate. Therefore, we should look at the world as a process and experience rather than see it as stable or non-changing. Changes in the relationship of people often depend on accepted events and understanding of uncertain water. Also, house layouts represent the characteristics of the family, which contribute to the social structure of the floating community. I found that they built houses similarly; no one built houses on the shore or the stilt.

The Sakae Krang community is changing, showing the habitat patterns associated with household relations. Connectivity and arrangement of floating houses and modification capabilities are direct manifestations of changing values, perception and lifestyle. Similarly, we cannot understand the Sakae Krang house if we don't understand the context of the culture. Building a house is more than occupying space, underlining the importance of the environment.

6.2 Climate as a Modifying Factor

Oliver (1997) notes that no environmental factor contributes more to the development of human life than the weather. The weather condition is a significant factor that we often mention and associate with the way of life. For instance, self-protection is a unique form of floating house that correlates with their attitude towards rivers and the environment. Climate plays a role in the determination of the formation of houses. They build a house so that they can survive on the river in that climate.

Similarly, the floating house has been modified to be treated with climatic conditions. Therefore, the types and patterns of houses have similar characteristics. The activities caused by the climate such as fish farming, cooking and growing floating vegetables and environment (Figure 4). Thatches, roofing materials have been replaced by galvanized metal sheets, which respond to applications due to their durability, and it is widely employed today. The average height of the ceiling is 1.90- 2.2 meters, and the roof level is low in order not to hit the wind in the rainy season (Figure 5). All units have a walkway around the floating house for easy pulling in and out of the house. On the other hand, climate conditions also determine buildings' comfort and reflect how people create self-housing suitable for climate conditions.

Figure 13. Fish farming

Figure 14. The average height of the ceiling

6.3 Materials and Construction Technology

Wood, galvanized metal sheet, steel, plastic and plywood determine the characteristics of the building. These materials are used generally in common in the community. In addition, construction, materials and technology are some of the pillars of floating house development. Materials and technologies reflect people perspectives on the environment and context. Most people accept it in terms of building performance. The change in pattern involves construction materials and technology to match current living conditions; therefore, there are not surprised to find new materials instead of natural materials. This might be a sign for future living.

Thus, the materials used to build the floating house are wood and galvanized metal sheets, which are locally available and lightweight. In contrast, some houses have been repaired or rebuilt by using steel. It is used to replace wooden structures such as roof frames, pillars and beams, roofing with galvanized metal sheets. Thus the shape of the material reflects the rationale, coming from the weather and economy. All roofs are made of galvanized metal sheets, reflecting the thoughts of the people who live in the floating community.

It can be said that the construction technology and the characteristics are similar and the same technology, which also produces similar structure patterns. However, material changes do not require changing the layout of the building (Rapoport, 1969), such as the use of galvanized sheets to make walls instead of wooden walls.

On the other hand, rising temperatures of the houses are an obstacle to living, but there are also less influential than survival in social conditions and economic factors.

According to Vellinga (2013: 571), he explains that showing off traditional architecture may be part of participating in contemporary architecture. It also reflects the on-going process (De Landa, 2006). Many of the floating houses have been repaired and renovated. This is because the materials used in the construction are decaying over time, especially bamboo. The existing house building process is to create something new from the relationship between existing raft houses and other buildings in the city. It represents water architecture that has not been frozen in time.

6.4 Economic Factors

Economic factors have been widely used to describe settlements and building patterns. However, it is possible to question how economic role determine the floating houses. The scarcity, the need for survival, and the cost-effective use of resources to build housing are all economic factors that define and drive the housing forms. There is a part to consider regarding the construction. In their lifestyle system, they have a similar family economy. The income comes from fish farming and self-employed.

However, today I found that most of them are elderly residents. Teenagers and children are not popular with younger generations younger than 30-35 years old who prefer to rent a house on the land. If they get married or go to work, they will move to a new place due to better comfort. The current inhabitants have bound the river since birth, including homeless people or have no land to build a house. Interestingly, using the waterfront area on other people's land or requesting to use other people's land to pin down temporary electricity poles, they have to ask the landlord for allowing. Also, it depends on the relationship between the landowner and the floating house owner.

As a result of the economic factor and characteristics of the houses, many houses contain similar elements, such as cooking areas in the front area of the houses. However, space arrangements illustrate the general view that it is the result of economic factors such as fish farming and growing floating vegetables. These reflect the relationship between humans, environment and dwelling. The houses have the characteristics of forming a figure that focuses on social and cultural factors rather than economic influences. Low-income people still have a massive problem with the household economy. Thus, we can conclude that similar patterns of household economies also lead to the creation of similar housing, including the management of their areas.

7. HUMAN RELATIONSHIP AND SPACE

Ballantyne (2002:1) said that "*architecture always has a cultural dimension to the practicalities of living*." In this case, floating architecture is a form of cultural productivity adapted to the traditions of living in society. Bourdieu (in Webster, 2011:41) mentions, "the right culture is circulated, transformed into a form of social capital and cultural capital as an object of social struggle and shows a status that should be appreciated as authentic, meaningful and valuable". Based on these, the floating house reflects the idea that the traditional floating houses are developed in ways relative to the current situation.

Houses are characterised by individuals who express intent to organise their own lives and the way of coexistence in groups. Interestingly, their own rules are established to manage cohabitation. It can be seen that the built environment of the settlement of the Sakae Krang community is expressed according to their culture. The structure of the built environment determines where social and economic activities are shared. The built environment also returns to determine the movement pattern of social interaction and people's behaviour in the community (Bornberg, 2008).

Other public spaces serve as media for connecting both land and the river, such as temples, markets, waterfront and waterways. Therefore, the individuality of the group is tied together through these public spaces. The combination of these spaces and spaces may be sufficient to create shared memories embedded in the area

with social meaning, especially social activities such as celebrations or water offerings tradition. Activities and rituals connect people to the river and add it to their memory. The social situation and representation of the area is a symbol of the city.

On the other hand, space represents a social situation when people used the space as part of their individuality communication. The groups of individuals who gained experience of the area and social behaviour together were produced (Park, 1952), which was a process of symbolisation. However, some activities have gradually faded over time, and people are progressively migrating to build more dwellings on the land. The number of floating houses is decreasing, which challenges the developing community.

Change and modification occur everywhere, and home is typical of change. It is a localising phenomenon that is not the only independently seductive process but is inevitably influenced by local management (Vale, 2008). In the last decade, all floating houses face problems, including fish farming. Of course, water management is one of many reasons, which affects the ecosystem and habitat. The process of this area can be seen as unique to the site. It is meaningful under the crisis of the area. A floating house is a prominent example of how space changes affect architecture. This has created architectural cross-pollination or new forms, including modifications to new materials such as plastic, galvanised metal sheet and steel that respond better to the new way than the natural material (Figure 6).

Figure 15. The use of new materials

8. CONCLUSION

This paper has examined factors affecting the modification of the Sakae Krang community. Material and construction, economic, ecological, and settlement conditions are often seen as causal factors, which can be considered critical situations that cause social and cultural life that create a dynamic impetus for floating architecture. Empirical evidence of adaptation to the environment is modification and replacement of building materials.

It can be said that the words to describe the situation of the floating community are *"response, adaptation, and flexibility"*. Adaptation and resilience of the Sakae Krang community lead to the idea of something new for survival. In various ways, there are individuals and collectives based on capital factors and skills for the limited use of resources to benefit a wide range, including awareness, social life, economic and ecological adaptation, outstanding skills, understanding and values of the culture of the floating community. Thus, the building represents the culture that produces them; it also connects things such as tradition, locality, modernity and informal settlement.

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FLEXIBILITY AS A PLANNING VISION - THE CASE STUDY OF ASPERN, VIENNA.

ANTONIA STRATMANN

The poster presents the results of the research of the planning approach of flexibility in the Urban Lakeside Aspern (Vienna, Austria). The aim of the case study is to find out the innovation content and the viability of the theoretical flexibility approach. Methodologically, literature analyses, explorative surveys as well as expert interviews and site visits have been conducted for this purpose. The research shows that flexibility is a planning vision despite numerous challenges, which brings many potentials in planning and faces the complexity of transformation.

The poster consists of a theoretical part on the Planning Vision flexibility, followed by the case study investigation of the Urban Lakeside Aspern and the subsequent findings from theory and empirics on the innovation content and the viability of the Planning Vision in the Urban Lakeside Aspern.

First, the Planning Vision flexibility is defined. Flexibility in planning was of no major importance for a long time and is increasingly fossilized again in recent years. In summary, flexibility in planning is understood as a robust designing tool which enables more efficient and effective land use. Other terms, such as adaptation, are often used synonymously with flexibility. The innovation content of flexibility primarily consists in the fact that planning does not have to react ad hoc to new circumstances, but already considers for them and at the same time can react to unpredictable developments. These advantages are used in the implementation of the Urban Lakeside Aspern. Aspern is an urban expansion area in Vienna and has been under construction since 2009 and is expected to have 20 thousand new residents by 2030. The planning principles and planning designs have been examined for flexibility. Aspern has had flexibility in planning since the beginning of its project. This flexibility can be seen in the analysis of the planning documents: in various places reference is made to flexibility and its viability. Likewise, the site visit and expert interviews have shown how viability can succeed. Nevertheless, the Planning Vision faces various challenges, such as flexibility is a first theoretical construct that needs to be defined and clearly applied. The research has shown that the Planning Vision flexibility can bring transformations in planning. The result is that flexibility is innovative especially because of its holistic approach, facing social, economic and ecological aspects as it is also viability, as the example of Urban Lakeside Aspern shows.

ASSESSMENT OF URBAN DYNAMICS AND LANDSCAPE STRUCTURE OF GREEN SPACES AT VARIOUS SCALES IN A TOURISTIC HILL CITY OF INDIAN HIMALAYA

M.M. ANEES, P.K. JOSHI

Urban regions are one of the most dynamic landscapes on the globe and consistently lead to changes in the basic structure and function of ecosystems within and around them. Globally, urban transformations are multidimensional changes which are both dynamic and non-linear. Nations, such as India are experiencing economic and urban transformation at a fast pace and is projected to add the largest urban population. However, small and medium sized cities, which would contribute the most to increasing urban population are often ignored. To counter the unplanned urban growth and lack of urban planning tools, urban remote sensing applications provide a much needed leap in technology due to their capabilities to monitor long-term changes at regular intervals and derive spatial pattern-process links. This study presents the urban dynamics and impacted landscape structure of green spaces of Shimla city, which is one of the busiest touristic destinations in northern India.

Complexity and dynamic trajectories of urban ecosystems by nature demand a comprehensive understanding of their elements, especially their composition and configuration. To understand the spatiotemporal growth and heterogeneity in evolution of Shimla city over a span of two decades (1999-2018), we assessed the (i) rate and intensity in built-up development (ii) spatial differentiation of built-up using various landscape metrics at multiple cell-sizes and (iii) spatial differentiation of green spaces using various landscape metrics at multiple cell-sizes. This integrated methodology is formulated to appropriately address various elements required for understanding how dynamics of built-up area contributes to depleting ecological connections in fast urbanizing cities and how we can improve urban planning measures.

The magnitude of urban expansion was quantified using two key indices- rate and intensity. These measures provide a direct evidence of demographic pressure on the land. The morphological regularities and irregularities of the urban landscape were characterized using a set of landscape metrics: patch density (PD), largest patch index (LPI), largest shape index (LSI), area-weighted mean patch fractal dimension (AWMPFD), mean euclidean nearest-neighbour distance (ENN_MN) and aggregation index (AI) at two different scales i.e. 500×500m, and 1,000×1,000m. The geometrical and spatial variations of the built-up land's landscape metrics were further used to understand the conformity to aggregation and diffusion of urban patches indicating the nature of city's growth. While selected landscape metrics for green spaces were used for understanding their impact on ecological processes such as fragmentation, edge-effect and shape complexity. Urban planning measures which improve the ecological quality of green spaces is one of the most important and cost-efficient ways of reducing anthropogenic pressure and making a city more sustainable.

Our preliminary results highlight the key spatial differences in the dynamics of the urban region. Over time, areas on the urban fringes show increased rate and intensity in the built-up area change. Spatial differences in landscape metrics reveal increased irregularity and fragmentation beyond the urban core, and increased aggregation and homogeneity within the core. In terms of green spaces, presence of large intact patches away from urban core highlight low levels of fragmentation and complexity. But urban core areas show an increasing trend of fragmentation. The results help us in improving our understanding of spatial pattern-process analysis

and provides a decision making tool to improve urban conditions. Landscape metrics can prove to be efficient indictors which provide easy to interpret scientific inputs and visual material for a sound urban planning.

A STUDY ON THE PLANNING OF THE MEDICAL COMPLEX AS A URBAN DESIGN RESPONSE TO THE CHANGES IN THE MEDICAL PARADIGM AFTER COVID-19 (FOCUSED ON THE STRATEGY TO BUILD A EXPANDABLE MEDICAL COMPLEX)

YOHAN JEONG

The medical paradigm in our society is shifting from existing care to prevention and health care, and this change has spread to the general public as well as the medical community since COVID-19. Along with the need for proper facilities and the creation of a healing environment corresponding to changes in medical paradigm, there is a need for cooperation and integration to systematically respond to large infectious diseases such as COVID-19. This work explores the design and planning of the physical environment in constructing a complex healthcare cluster capable of responding to paradigm shifts in healthcare, social needs, and market needs. In order to establish effective strategies and plans, various medical complex plans were analyzed to derive direction, and various possibilities of plans that scale step by step were presented. In addition, this study emphasized organic connections that must be considered in planning medical complexes by establishing virtual destinations and establishing practical environmental plans, and used planning indicators and phased expansion strategies as reference materials.

RETHINKING THE URBAN SPACE WITH SPACE SYNTAX: PUBLIC SQUARES AS CASE STUDIES.

ZEROUATI WIEM

Space syntax has been widely used for the analysis of architectural and urban spaces with the objective of improving their attendance and accessibility by users. This communication presents the different experiences undertaken in several cities around the world which have used Space Syntax methods for the improvement of urban spaces, mainly public squares. Firstly, Trafalgar Square (1996-1998) as the most known project of Space Syntax. The team provided an initial analysis of pedestrian activity patterns, which highlighted the main movement issues. An intensive observation study of pedestrians in the area was undertaken and a most advanced pedestrian movement model of that time was developed. This model allowed to diagnose problems throughout the masterplan area and identify design solutions. Trafalgar Square was the first element of the masterplan to be completed in 2003 and has been a huge success, with levels of pedestrian movement in the square increasing by thirteen times. Secondly, Broadgate Arena (2011-2012) is one of the most successful open spaces in the City of London. However, despite its popularity, the retail and catering units around the Arena were considered to be performing below their true potential. It was necessary to redesign the Arena to enhance both its commercial success and social conviviality. One of the key design questions was how to bring people into the commercial spaces at the lower ground level of the Arena. Space Syntax analysed emerging design options using Agent Modelling Software that simulates fine-grained movement flows. The analysis demonstrated key desire lines, pinch points and design opportunities to address these. Finally, the Nottingham's Old Market Square (2004) is one of the largest public spaces in the United Kingdom. In 2003, a competition was held for its redesign, which was entered by Gustafson Porter landscape architects, assisted by Space Syntax. An extensive site analysis was undertaken to provide design advice to Gustafson Porter. They were able to show how the design of the space influenced human behaviour. A redesign concept was developed, based on the creation of two large-scale diagonal routes that intersected at the centre of the square. This concept was adopted by Gustafson Porter, who developed a detailed design proposal for the competition submission. Gustafson Porter won the competition to redesign the square, which reopened in 2007. The project has won many design awards, including the RIBA CABE Public Space Award and three Civic Trust Awards for: Outstanding contribution to the public realm, The Centre Vision Award for best practice in town centre regeneration and the Charcon Hard Landscaping Award. To conclude, Space Syntax brings together over 30 years of experience in urban planning and design around the world, incorporating principles of spatial planning and design that have been demonstrated in practice to produce livable, sustainable and healthy results of the project. These experiences deserve to be studied in order to learn from them and adapt them to any local context.

TRACING THE LINKS BETWEEN LAND-COVER AND CLIMATE: CASE OF FOUR URBAN AREAS IN THE CZECH REPUBLIC.

SWATI SURAMPALLY

Evaporation and transpiration from various ecosystems on the land, such as forests, ponds/lakes, peat bogs, wet meadows, and wetlands are the key sources responsible for the recharge of atmospheric moisture over the land. When land is drained due to urbanisation or agriculture, there is an increase in the amount of surface runoff; the water is no longer available for evaporation or transpiration which ultimately affects the precipitation within the territory. Out of the total precipitation that falls on the land, it is estimated that about 50 to 65% of the precipitation goes into a repeated creation of precipitation through the process of evapotranspiration (Trenberth et al., 2007). Hence, it is crucial to maintain soil moisture and vegetation in order to keep small amounts of water circulating over a region. The decrease in precipitation in turn affects the growth of vegetation leading to a series of detrimental events resulting in negative effects on the local climate including air-temperature, precipitation, and relative air-humidity among others.