DOKUZ EYLÜL UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

THE INFLUENCE OF URBAN MORPHOLOGY ON NEIGHBORHOOD SATISFACTION: A CROSS-CULTURAL STUDY

by
İrem ERİN

May, 2022
İZMİR

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Ph.D. THESIS EXAMINATION RESULT FORM

We have read the thesis entitled **“THE INFLUENCE OF URBAN MORPHOLOGY ON NEIGHBORHOOD SATISFACTION: A CROSS-CULTURAL STUDY”** completed by **İrem ERİN** under supervision of **PROF.DR. EBRU ÇUBUKÇU** and **ASSOC.PROF.DR. GIOVANNI FUSCO** and we certify that in our opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Doctor of Philosophy.

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İrem ERİN

THE INFLUENCE OF URBAN MORPHOLOGY ON NEIGHBORHOOD SATISFACTION: A CROSS-CULTURAL STUDY

ABSTRACT

Neighborhoods are fundamental units of cities and influence human well-being directly. Therefore, neighborhood satisfaction is highly related to life and community satisfaction. In literature, 'human-housing/neighborhood interaction' is mostly considered as sheltering and discussed mainly on economic, physical health and social planning perspectives. Influence of existing urban forms on neighborhood satisfaction has rarely been a topic of research. This study investigates spatial characteristics of neighborhoods with urban morphology approach and aims to compare neighborhood satisfaction in different urban fabrics.

In this thesis, urban fabric classification is achieved through a new quantitative protocol Multiple Fabric Assessment in two study areas: French Riviera Region and Karşıyaka District in Izmir. Neighborhood satisfaction in French Riviera Region is gathered from a national survey. In Karşıyaka it is measured via a designed survey.

In French Riviera nine, in Karşıyaka eight urban fabrics are found. An important influence of urban fabric on neighborhood satisfaction is observed especially in Karşıyaka case. However, when the sample is reduced by controlling location and SES groups, statistical findings failed to show such an important influence. In future studies, location and participants’ characteristics should be controlled to achieve more accurate results.

The results of this study are significant in building a comprehensive method which enables to measure and compare neighborhood satisfaction, and in inspecting the relationship between neighborhood satisfaction and diverse urban fabrics. Moreover, the results of this study have a potential to guide future urban planning and design projects, make contribution to real-estate market and studies.

Keywords: Neighborhood satisfaction, urban morphology, urban fabric, French Riviera, Karşıyaka

KENT MORFOLOJİSİNİN MAHALLE MEMNUNİYETİNE ETKİSİ: KÜLTÜRLER ARASI KARŞILAŞTIRMALI ÇALIŞMA

ÖZ

Mahalleler, şehirlerin temel birimleridir ve kişinin refah seviyesini doğrudan etkilerler. Bu nedenle, mahalle memnuniyeti yaşam kalitesi ve toplumsal memnuniyet ile yüksek oranda ilişkilidir. Literatürde 'insan-konut/komşu etkileşimi' daha çok barınma olarak ele alınmakta ve çoğunlukla ekonomik, fiziksel sağlık ve sosyal planlama perspektiflerinde tartışılmaktadır. Mevcut kentsel biçimlerin mahalle memnuniyeti üzerindeki etkisi nadiren araştırma konusu olmuştur. Bu çalışma, kent morfolojisi disiplini yaklaşımıyla mahallelerin mekansal özelliklerini araştırmayı ve farklı kentsel dokularda mahalle memnuniyetini karşılaştırmayı amaçlamaktadır.

Bu tezde, kentsel doku sınıflandırması için Fransız Rivierası Bölgesi ve İzmir Karşıyaka İlçesi olmak üzere iki çalışma alanına yeni bir nicel protokol Çoklu Doku Değerlendirmesi uygulanmıştır. Fransız Rivierası Bölgesi'ndeki mahalle memnuniyeti ulusal bir anketten elde edilmiştir. Karşıyaka'da tasarlanmış bir anket ile ölçülmüştür.

Fransız Rivierası'nda dokuz, Karşıyaka'da sekiz kent dokusu bulunmuştur. Kent dokusunun mahalle memnuniyeti üzerinde önemli bir etkisi özellikle Karşıyaka örneğinde görülmektedir. Ancak, örneklem, lokasyon ve SES grupları kontrol edilerek azaltıldığında, istatistiksel bulgular bu kadar önemli bir etki göstermemektedir. Gelecekteki çalışmalarda, daha doğru sonuçlara ulaşmak için yer ve katılımcıların özellikleri kontrol edilerek anket uygulanmalıdır.

Bu çalışmanın sonuçları, mahalle memnuniyetini ölçmeyi ve karşılaştırmayı sağlayan kapsamlı bir yöntemin oluşturulması ve mahalle memnuniyeti ile çeşitli kentsel dokular arasındaki ilişkinin incelenmesi açısından önemlidir. Ayrıca bu çalışmanın sonuçları, ileride kentsel planlama ve tasarım projelerine yön verme, emlak piyasasına ve çalışmalara katkı sağlama potansiyeline sahiptir.

Anahtar kelimeler: Mahalle memnuniyeti, kent morfolojisi, kent dokusu, Fransiz Rivierası, Karşıyaka

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ABBREVIATIONS

MFA : Multiple Fabric Assessment
GIS : Geographical Information Systems
SPSS : Statistical Package for the Social Sciences
ISUF : International Seminar on Urban Form
HMS : Household Mobility Survey
ILINCS : I statistics in Local Indicator of Network-Constrained Clusters
LISA : Local Indicators of Spatial Association
BN : Bayesian Networks
CPT : Conditional Probability Table
UF : Urban Fabric
UF1 : Old constrained urban fabrics of town-houses
UF2 : Traditional urban fabrics of the plain with adjoining buildings
UF3 : Discontinuous and irregular urban fabrics with houses and buildings
UF4 : Modern discontinuous urban fabrics with big and medium-sized buildings
UF5 : Suburban residential fabrics in hills or plain
UF6 : Small house constrained suburban fabrics
UF7 : Connective artificial fabrics with sparse specialized big buildings
UF8 : Non urbanized space in hills or plain with sparse homes and buildings
UF9 : Mountain natural space with sparse houses
F1 : Traditional Meshed Hyper-Compact Fabric
F2 : Planned Compact Aligned Continuous/Discontinuous Urban Fabric
F3 : Irregular Hyper-Compact Fabric
F4 : Open-worked and Heterogeneous Fabric
F5 : Informal Low-Rise Compact Fabric
F6 : Discontinuous Heterogeneous Irregular Fabric
F7 : Discontinuous Spaced-out Modernist Fabric
F8 : Empty and/or Connective Spaces
B1 : Mid-to-large size, mid-to-high-rise, often isolated and sometimes not so compact ordinary buildings

B2 : Large, low-rise, isolated and often specialized buildings
B3 : Small-to-mid size, mid-rise, contiguous, compact ordinary buildings
B4 : Small, low-rise, often contiguous, compact ordinary buildings
SES : Socio-Economic Status
M : Mean
SD : Statistical Deviance
XF1 : Mixture of fabrics F1 being the prevalent fabric
XF2 : Mixture of fabrics F2 being the prevalent fabric
F5F6 : Combination of the fabrics F5 and F6
XF6 : Mixture of fabrics F6 being the prevalent fabric
C : Coastal
S : Semi-Coastal
H : Hinterland
CS : Coastal + Semi-Coastal

CHAPTER 1

INTRODUCTION

Neighborhoods are fundamental units of cities. Living environments influence human well-being and happiness directly. Therefore, neighborhood satisfaction is highly related to life satisfaction and community satisfaction. In literature of developed countries, 'human-housing/neighborhood interaction' is mostly considered as sheltering and discussed mainly on economic, but also on physical health and social planning perspectives. However, the influence of existing urban forms (urban morphology) on neighborhood satisfaction has rarely been a topic of research. Independently of each other, both neighborhood satisfaction and urban morphology are popular research subjects since 1960s. A case insensitive search for “Neighborhood satisfaction” via Google Books Ngram viewer reveals that the share of references starts around 1920s and significantly increases between 1960s to 1980s. Although it does not have an increasing rate recently, neighborhood satisfaction is still a popular research subject. Google Books Ngram viewer search for “Urban morphology” shows that research starts around 1880s, it has risen by 1960s like neighborhood satisfaction but recently after 2010 it reaches to peak, and the number of the research in this field is still tremendously rising (Figure 1.1).

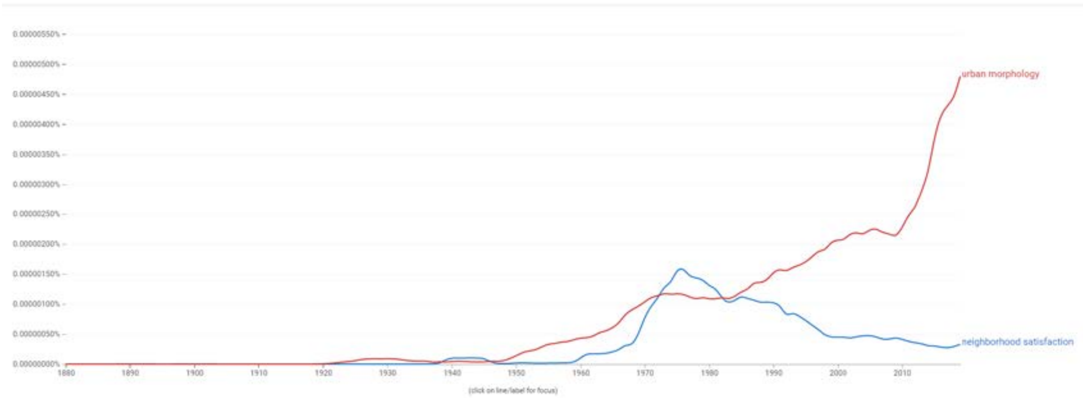


Figure 1.1 Google book Ngram viewer search for the keywords “neighborhood satisfaction” and “urban morphology”

1.1 Purpose of the Thesis

With the intention of understanding human-neighborhood interaction, this thesis investigates spatial characteristics of neighborhoods and neighborhood satisfaction. Concepts related to residential satisfaction and quality of life have been studied in various scales and numerous research before, but none have been focused on the influence of urban morphology on neighborhood satisfaction. This thesis examines the relation between spatial form of residential areas and neighborhood satisfaction by comparing neighborhood satisfaction in different urban morphologies. Also highlighting the necessity to develop a method to measure neighborhood satisfaction, this study intends to define uniform instruments and develop a model of measure neighborhood satisfaction.

The aim of the research is to understand the influence of urban morphology on satisfaction of residents and has three objectives related this aim:

- To develop a method to measure neighborhood satisfaction defining uniform instruments and parameters,
- To measure the urban form and make a classification in study areas,
- To investigate the urban forms where neighborhood satisfaction is high.

1.2 Hypothesis

The hypothesis of the thesis is that there is a relationship between the urban fabric of a neighborhood and the satisfaction of residents in that neighborhood. The questions to support this hypothesis are as below:

- Does urban form have an influence on neighborhood satisfaction in contemporary Mediterranean Cities?
    - How can neighborhood satisfaction be measured?
    - How can urban form in a way that is pertinent to the study of neighborhood satisfaction be measured?
    - Is the urban fabric the only prospect of urban form that counts for explaining neighborhood satisfaction?

- What is specific to each of the two case studies and what is common?
- Are the satisfaction/dissatisfaction factors the same in each urban fabric?
- Have perceptions changed with the Covid-19 restrictions?

1.3 Methodology

In order to test the hypothesis "there is a relationship between the urban fabric of a neighborhood and the satisfaction of residents in that neighborhood", a series of methods are held in cross cultural cases. There are two different approaches applied in two different cases, one in France (the French Riviera Region) and the other is in Turkey (the Karşıyaka District). Two cases are chosen due to the following reasons:

- to observe the phenomenon in two different cultures,
- to develop an existing project in France and build a new method in Turkey.

These study areas are selected on the basis of the following criteria:

- having climatic and geographical similarities,
- holding diverse urban forms which allows a successful classification.

The first case study, the French Riviera, is a hypothesis driven research. Relation between neighborhood satisfaction and urban morphology is sought with the existing database. Urban fabric clustering of the French Riviera is sourced from the study of Araldi and Fusco (2019) who developed a protocol called Multiple Fabric Assessment (MFA) for urban fabric classification. Neighborhood satisfaction is extracted from the national database (the Household Mobility Survey). Two databases are matched thanks to the geoprocessing in GIS platform and Bayesian Networks.

In the second case, the Karşıyaka District, data is gathered in the light of research questions and previous studies in literature. First, MFA is modified in accordance with the geographical database of Karşıyaka and applied to have an urban fabric clustering. In the meantime, a neighborhood satisfaction survey is designed considering the literature and local characteristics. The survey is conducted in different urban fabrics in the study area. Lastly, the influence of urban morphology on neighborhood satisfaction is observed via statistical analysis on SPSS.

1.4 Significance of the Study

Environmental psychologists have been studying the interrelation between “urban form” and “human perception, cognition, behavior and preferences” since 1960s. Given that, various measures of “urban form” were used vastly in research and practices of urban design and environmental psychology. The use of quantitative methods of urban morphology are minor in urban design and especially in environmental psychology. Strengthening the link between these disciplines, this thesis intends to apply quantitative methods of urban morphology in environmental psychology.

Today in urban morphology studies it is possible to conduct spatial analysis and multiple calculations through geoprocessing. However, the method, the spatial unit, and the parameters to classify the urban form are still debated. Fusco and Araldi's (2019) MFA protocol aims to classify the urban form in terms of pedestrian point of view. Considering the necessity of human scale for environmental psychology studies, urban fabric classification from the pedestrian point of view allows to measure the interrelation between “urban form” and "neighborhood satisfaction" and fill this gap in literature.

This thesis makes a contribution to the neighborhood satisfaction and urban morphology literature particularly in Mediterranean cities. The results are significant in building a comprehensive method which enables to measure and compare neighborhood satisfaction in inspecting the relationship between neighborhood satisfaction and diverse urban fabrics. Moreover, the results of this study have a potential to guide future urban planning projects by being an input to urban plans and urban design projects, as it to defines satisfied and dissatisfied urban fabrics. It can be also useful in land use plans which are limited to floor/surface ratio today in Turkey. This thesis allows parametric design to integrate in urban design and planning projects thanks to quantitative urban fabric clustering. Further, this thesis contributes to real-estate market and studies considering analysis of residents’ perceptions and preferences in diverse urban fabrics, as well as in different periods (before the Covid-19 pandemic, after the Covid-19 pandemic).

1.5 Content of the Study

In the first chapter, the purpose, the hypothesis, the methodology, the significance and the content of the study are introduced.

In the second chapter, theoretical, explanatory, and methodological approaches related to neighborhood satisfaction including neighborhood concept, quality of life and residential satisfaction are discussed on the basis of literature of environmental psychology, urban design, and urban planning. Likewise, theoretical, explanatory and methodological approaches related to urban morphology including urban form, urban fabric and morphological analysis are discussed on the basis of literature of urban design, urban planning and geography.

The third chapter focuses on the methodology through the case studies. The urban development of the study areas, data collection phase, implication of MFA protocol, measurement of neighborhood satisfaction, and interrelating neighborhood satisfaction with urban fabrics are presented in this chapter.

The fourth chapter demonstrates the results of the analysis in each case separately. In the first case, satisfaction of the households in residential urban fabrics are demonstrated through the existing urban fabric classification and survey results. In the second case, first urban fabric classification is presented. Then neighborhood satisfaction is studied in three stages, because the Covid-19 pandemic took place while conducting the survey. First neighborhood satisfaction is analyzed before the pandemic in all urban fabrics, then after the pandemic in two urban fabrics where the socio-demographic characteristics of the residents are similar. Lastly the neighborhood satisfaction before and after the pandemic is compared (Figure 1.2).

The conclusion makes an evaluation of the whole study, interprets the findings and results by summarizing theoretical assumptions. It makes a short restatement of the whole study including the key points, outcomes, and findings, as well as the most striking results.

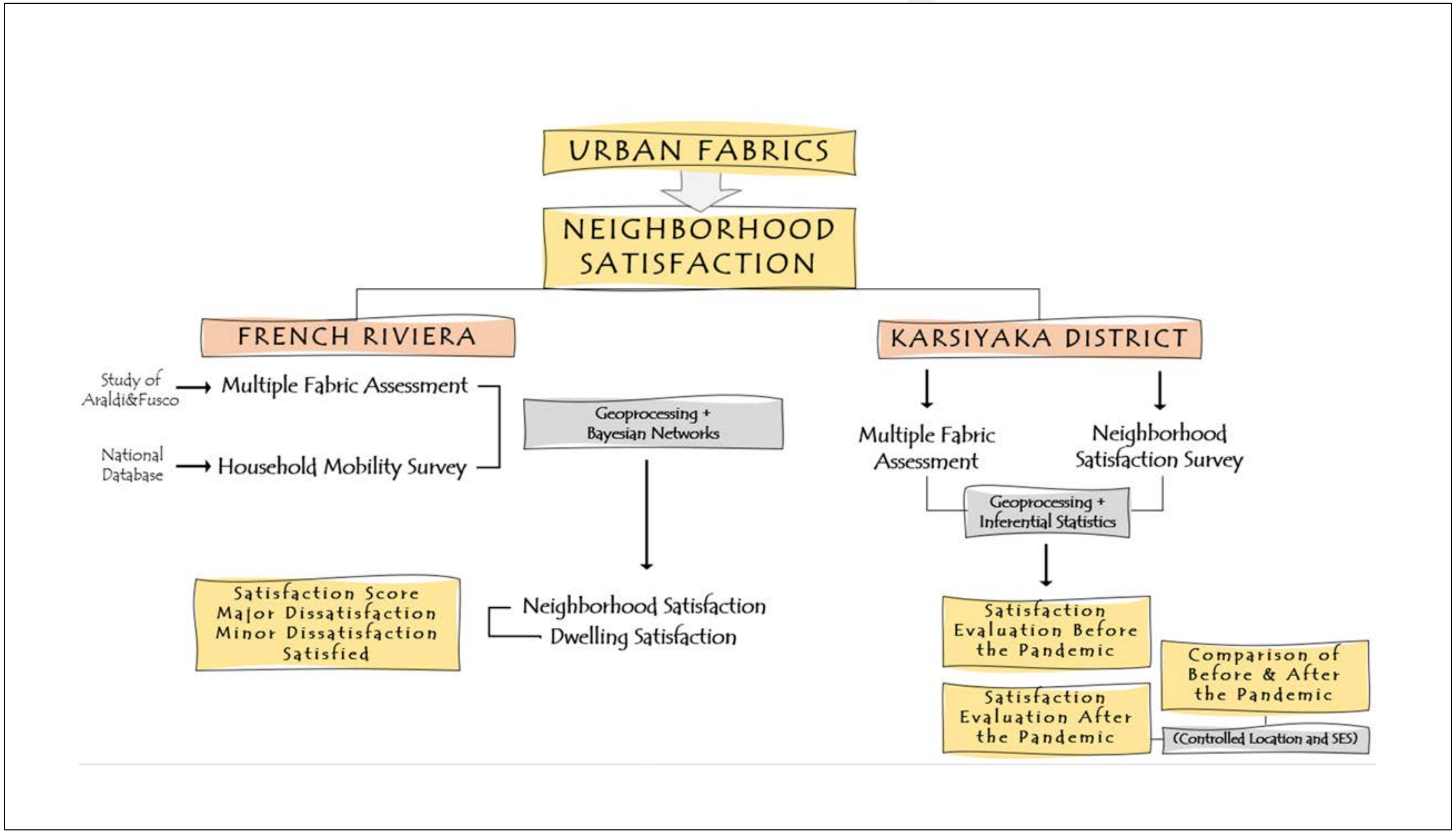


Figure 1.2 Flow chart of the thesis

CHAPTER 2

CONCEPTUAL FRAMEWORK

2.1 Neighborhood Satisfaction

"Don't buy the house; buy the neighborhood." says a Russian proverb. "The neighborhood environment is a central setting for everyday life (Lee et al., 2017)" and urban environments influence human well-being directly (Honold et al., 2012). As being the fundamental unit of urban environments neighborhood is an important predictor in community satisfaction. Also, life satisfaction in general is highly related to residential satisfaction (Amerigo & Aragones, 1997), and neighborhood is one of the most essential units in determining quality of life of residents (Hur & Morrow-Jones, 2008). As Fried (1984) found out in his study, neighborhood is the second indicator in determining overall life satisfaction where the first is family satisfaction (cited in Kweon et al., 2010). Thus, neighborhood satisfaction has a direct effect in personal well-being.

2.1.1 Neighborhood Concept and Neighborhood Satisfaction

Since 1960s, there is a growing literature on neighborhood satisfaction (Dassopoulos & Monnat, 2011). In order to understand neighborhood satisfaction properly, it is necessary to comprehend the meaning of neighborhood at first. Neighborhood refers to concepts beyond the administrative boundaries. In Oxford Dictionary, it is defined as "a district or community within a town or city" (n.d.). Researchers have various definitions for the discourse. Although there are diverse definitions, Keller (1968) claims that all definitions associate the neighborhood with physical and social components (as cited Schwirian, 1983). Physical components are addressed as an identifiable geographic area or an area with distinct physical or aesthetical characteristics (Barton, 2003; Dassopoulos & Monnat, 2011; Schwirian, 1983). The keywords walking distance or everyday walking needs are also used in definitions of neighborhoods (Smith, Gidlow, Davey & Foster, 2010). Social components are more varied and involve concepts such as social network (Schoenberg, 1979), social characteristics (Glass, 1948), and sense of belonging (Abdollahi, Sarrafi & Tavakolinia, 2010) (as cited in Hosseini & Soltani, 2018).

Neighborhood concept is one of the most debated subjects of the urban planning in the 20th century. In 1929 two original ideas were developed to describe the neighborhood unit, which can be referred as the antecedents of neighborhood concept (Patricios, 2002). The first is the Radburn neighborhood model by Clarence Stein and Henry Wright, who were influenced by Garden City Model of Howard (1898) and proposes a hierarchical model in four levels. First level is the enclave which is formed of 20 or so houses; in the second level three or more enclaves form the block, where four blocks form the superblock in the third level, and finally six blocks constitute the neighborhood. The second model by Clarence Perry describes the neighborhood unit with six principles as:

1. All sides equidistant from the center,
2. Center includes institutional sites, school, central green space etc.
3. Local shops and apartments at the outer corners,
4. Scattered small parks and open spaces in each quadrant of the neighborhood,
5. Arterial streets to bound each side of the neighborhood,
6. Internal streets to be a combination of curvilinear and diagonal roads.

Both models proposed a fixed population and neighborhood size. In the Radburn model, the population is proposed as 10,000 people and maximum walking distance 0.8 km. Whereas in the Perry's neighborhood model, the population is 3,000 to 9,000 people and the maximum walking distance is 0.4km (Patricios, 2002). However, neighborhood borders or neighborhood size is a subject which is still discussed in literature. By authorities they are defined with administrative borders. According to researchers the concept is beyond the borders. For residents it is a subjective concept and does not overlap with the administrative borders. As these borders may vary depending on the perception of the resident, the use of resident-defined neighborhoods is suggested by environmental psychology and urban sociology researchers instead of administrative borders in related studies (Coulton, Korbin, Chan, & Su, 2001). Moreover, definitional precision such as a residential zone or a greater zone with social interaction may influence the perception of neighborhood boundaries (Campbell

Henly, Elliott, & Irwin, 2009), that's why a specific definition is also necessary for a more precise neighborhood evaluation of residents in related studies.

Neighborhood satisfaction can be defined as overall evaluation of residents for their neighborhoods (Hur et al., 2010). Table 2.1 presents the definition of researchers for neighborhood satisfaction. The definitions reveal that the researchers highlight either physical and social aspects as well as dimensions of neighborhood satisfaction such as safety, services or the perception and the correspondence between the expectations/needs and actual environment in the neighborhood.

Table 2.1 Definitions for neighborhood satisfaction

the evaluation of features of the physical and social environment (Mesch and Manor, 1998).	Hur and Morrow-Jones, 2008, p.620
residents' complex evaluation about how well a neighborhood meets their physical and social needs (Galster and Hesser 1981; Amerigo and Aragones 1997; Lu 1999).	Dassopoulos et al., 2012
based on residents' evaluation of the physical, social, and economic features of their neighborhood (Sirgy & Cornwell, 2002).	Youssoufi & Foltête, 2013
a consequence of satisfaction with housing, personal safety, schools, health services, and employment opportunities (Jeffres & Dobos, 1995; Msller & Jackson, 1997; Msller, 2001a, 2001b; Westaway, 2006).	Westaway, 2007
the complex perceptual construct of a person based on his/her objective and subjective environments and personal characteristics (Amérigo and Aragonés, 1997).	Lee et al., 2008, p.61
the degree of `fit' or congruence between one's neighborhood aspirations (or ideal neighborhood concept) and one's actual residential circumstances (Campbell et al, 1976).	Kweon et al., 2010, p.500-501
individual perception of the quality of neighborhood environments in meeting expectations and aspirations (Salleh 2008; Feijten and Van Ham 2009).	Ma et al., 2018, p.12

2.1.2 Neighborhood Satisfaction, Residential Satisfaction and Quality of Life

Neighborhood satisfaction is a contradictory discourse due to the complex nature of the term "satisfaction" (Kweon et al., 2010). Another contradiction is that the concept has a close relation with concepts of quality of life, user satisfaction and residential satisfaction. It is challenging to notice where these concepts are overlapping or differentiating. Thus, it is necessary to define not only the concept "neighborhood satisfaction", but also quality of life, user satisfaction and residential satisfaction.

The conceptual difference between neighborhood satisfaction and residential satisfaction is confusing for researchers, because concerning their meaning and their indicators they have a lot in common. Residential area refers to housing area. Neighborhood is a more general concept of living environment containing not only a residential use, but also commercial, educational, recreational uses which residents need. In other words, residential satisfaction is a narrower concept compared to neighborhood satisfaction and focused more on the dwelling. Researchers define residential satisfaction both in terms of satisfaction with residential environment/neighborhood (Lu, 1999; Perez, 2001) and satisfaction with the house (Mohit et al., 2010). Therefore, indicators of residential satisfaction except for the ones related to interior of housing can be utilized in neighborhood satisfaction research.

Another discourse, which has a close relationship with neighborhood satisfaction is quality of life. Quality of life is defined with the overall well-being of societies and individuals (Woźniak & Tobiasz-Adamczyk, 2014). Governments and municipalities are generally in effort of taking actions on increasing quality of life, because they consider it as the major domain of development and community satisfaction (Çubukçu and Erin, 2015). There is a challenge on defining the meaning and the indicators of both quality of life and neighborhood satisfaction. However, there is a further challenge for neighborhood satisfaction in terms of defining indicators, as it is based on perception of users/residents. Quality of life is a more objective and broader concept compared to neighborhood satisfaction. Thus, although their dimensions are mostly overlapping, having a high quality of life does not mean being satisfied with life or vice versa (Hur et al., 2010).

2.1.3 Research on Neighborhood Satisfaction

In order to figure out the contradiction and multidimensional characteristics of neighborhood satisfaction, researchers from various disciplines such as geography, sociology, architecture, psychology, environment and behavior, urban planning and engineering have been studied the issue. However, measuring neighborhood satisfaction and determining its indicators are still debated, because there is a far contradiction on neighborhood satisfaction due to the factors of actual and perceived environment (Hur et al., 2010). Hur & Morrow-Jones (2008) claim that the indicators which are important in neighborhood satisfaction may vary from neighborhood to neighborhood. For example, residents who are satisfied with their neighborhood mention different factors related to neighborhood satisfaction compared to residents who are dissatisfied with their neighborhood (2008, p.8). The characteristics of the participants are also effective in neighborhood satisfaction, thus in its indicators. Referring to previous research Kweon et al. (2010) summarize how the perception may change from person to person concerning neighborhood satisfaction. According to those research "older (Galster and Hesser, 1981; Jirovec et al, 1984; Lu, 1999; Parkes et al, 2002), white (Galster and Hesser, 1981; Lee and Gues, 1983; Lu, 1999; Marans and Rodgers, 1975; Parkes et al, 2002), higher income (Loo, 1986; Lu, 1999; Miller et al, 1980; Parkes et al, 2002), homeowning (Galster and Hesser, 1981; Lee and Guest, 1983; Lu, 1999), and higher educated individuals (Bruin and Cook, 1997; Lu, 1999; Miller et al, 1980) are more satisfied with their neighborhood than their counterparts (cited in Kweon et al., 2010)." In a similar vein, Hur & Nasar (2014) reveal that homeowners (Grinstein-weiss et al., 2011; Lipsetz, 2000) and longer-term residents (Lipsetz, 2000; Oh, 2003; Potter & Cantarero, 2006; Speare, 1974) are more satisfied with their neighborhoods. Jansen (2014) claims that although satisfaction is related to "the level of agreement between what one has and what one wants”. Nevertheless, although household characteristics has a great influence on neighborhood satisfaction, Parkes et al. (2002) state that neighborhood attributes play a more important role in change of neighborhood satisfaction level.

Literature review on neighborhood satisfaction showed that some studies approach the issue in general, some focus on a group of users, a type of housing or a single indicator of neighborhood satisfaction. For example, concerning a group of user Rioux & Werner (2011), Perez and others (2001) focus on elders; Gärling & Gärling (1990), Bruin & Cook (1997), Cook (1988) on parents; Coulombe et al. (2016) on people with disabilities. Concerning a type of housing Amérigo & Aragonés (1990) limit their research in council housing and Wiesenfeld (1992) in public housing. Concerning a single indicator of satisfaction, there are studies focused on safety (Gärling & Gärling, 1990; Loo, 1986) and place attachment (Bonaiuto et al., 1999). Most of these studies are empirical and researchers usually have used subjective methods to measure neighborhood satisfaction. Subjective measures have been made generally via conducting surveys in which the residents' perceptions are asked (Coulombe et al., 2016; Bernardo & Palma-Oliveira, 2016; Mridha, 2015; Hur & Nasar, 2014; Jansen, 2014; Rioux & Werner, 2011; Wright & Kloos, 2007; Rioux, 2005; Abu-Ghazzeh, 1999; Bonaiuto et al., 1999; Wiesenfeld, 1992; Amérigo & Aragonés, 1990 ; Gärling & Gärling, 1990; Trumpeter & Wilson, 2014; Hur & Morrow-Jones, 2008; Kearney, 2006). Some studies contain two types of measurements subjective and objective (Kweon et al., 2010; Lee et al., 2016; Honold, 2012). Objective measurements have been made via using geographic information systems (GIS) tools.

Considering that neighborhood satisfaction is based on evaluation and perception of residents, this study aims to measure neighborhood satisfaction only via subjective methods. Objective methods will be used in identification of urban fabrics, and it will not be dependent on quality of place, but physical form of place.

2.1.4 Indicators of Neighborhood Satisfaction

This thesis attempts to define a set of indicators, which utilize to measure satisfaction in diverse neighborhoods and make a comparison between them. Neighborhood satisfaction is determined by two sets of influencers: one is the characteristics of the households/participants and the other is the evaluation on the neighborhood attributes. Table 2.2 shows the indicators used to measure neighborhood satisfaction in previous studies. They are grouped in categories as household characteristics, general satisfaction of neighborhood, location / accessibility, physical characteristics, dwelling attributes, social relations, and safety.

Table 2.2 Neighborhood satisfaction indicators used in previous studies

Household Characteristics	
Age	Cao et al., 2020; Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008; Kearney, 2006; Kweon et al., 2010; Lee et al., 2016; Lovejoy et al., 2010; Ma et al., 2018; Mouratidis, 2020; Parkes et al., 2002
Gender	Cao et al., 2020; Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008; Kearney, 2006; Kweon et al., 2010; Lee et al., 2016; Lovejoy et al., 2010; Ma et al., 2018; Mouratidis, 2020; Parkes et al., 2002
Education	Cao et al., 2020; Hur & Morrow-Jones, 2008; Kweon et al., 2010; Lee et al., 2016; Lovejoy et al., 2010; Ma et al., 2018; Mouratidis, 2020
Household income	Cao et al., 2020; Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008; Kearney, 2006; Kweon et al., 2010; Lovejoy et al., 2010; Ma et al., 2018; Mouratidis, 2020; Parkes et al., 2002
Race/Ethnicity	Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008; Kweon et al., 2010; Lee et al., 2016; Mouratidis, 2020; Parkes et al., 2002
Number of people in the household	Cao et al., 2020; Kearney, 2006; Lovejoy et al., 2010; Ma et al., 2018
Number of children in the household (under 18)	Cao et al., 2020; Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008; Kearney, 2006; Kweon et al., 2010; Lee et al., 2016; Lovejoy et al., 2010; Mouratidis, 2020; Parkes et al., 2002
Number of elders in the household	Cao et al., 2020
Marital status	Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008; Mouratidis, 2020
Length of residence	Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008; Hur & Nasar, 2014; Kearney, 2006; Lovejoy et al., 2010; Ma et al., 2018; Mouratidis, 2020; Parkes et al., 2002
Months at previous residence	Dassopoulos & Monnat, 2011
Tenure	Cao et al., 2020; Hur & Nasar, 2014; Kweon et al., 2010; Jansen, 2014; Ma et al., 2018; Parkes et al., 2002
Satisfaction with ratio of owners/renters	Hur & Morrow-Jones, 2008
Neighborhood Satisfaction in General	
Overall neighborhood satisfaction	Dassopoulos & Monnat, 2011 ; Hur & Nasar, 2014; Jansen, 2014; Lovejoy et al., 2010; Ma et al., 2018
Alive residential environment	Jansen, 2014; Lovejoy et al., 2010
Rating of neighborhood as place to live	Dassopoulos & Monnat, 2011
Calmness of the neighborhood	Cao et al., 2020; Lovejoy et al., 2010; Mouratidis, 2020; Parkes et al., 2002
Location / Accessibility/Amenities	
Type of residential environment: (City center, City edge, Smaller municipality, Outside the built-up environment) / Distance to city center	Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008; Jansen, 2014; Lovejoy et al., 2010; Mouratidis, 2020
Street connectivity	Lee et al., 2016
Average number of miles driven per week	Kearney, 2006
Access to / distance from shops and services	Cao et al., 2020; Dassopoulos & Monnat, 2011; Lee et al., 2016; Mouratidis, 2020; Parkes et al., 2002; Rioux & Werner, 2011
Access to / distance from green areas and recreational opportunities	Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008 ; Lee et al., 2016; Ma et al., 2018; Mouratidis, 2020; Parkes et al., 2002; Rioux & Werner, 2011
Satisfaction with distance to work	Cao et al., 2020; Hur & Morrow-Jones, 2008
Satisfaction with distance to family/friends	Hur & Morrow-Jones, 2008; Lovejoy et al., 2010
Public transportation	Cao et al., 2020; Ma et al., 2018; Mouratidis, 2020; Parkes et al., 2002
Mixed-use	Lovejoy et al., 2010
Proximity to problem areas	Hur & Morrow-Jones, 2008
Walking/cycling facilities	Cao et al., 2020; Lee et al., 2016
Traffic	Cao et al., 2020; Hur & Morrow-Jones, 2008
Parking places	Cao et al., 2020
Physical Characteristics	
General appearance / Aesthetics	Cao et al., 2020; Hur & Morrow-Jones, 2008; Lee et al., 2016; Lovejoy et al., 2010; Mouratidis, 2020; Parkes et al., 2002
Physical upkeep	Cao et al., 2020; Hur & Nasar, 2014; Mouratidis, 2020
Satisfaction with cleanliness	Hur & Morrow-Jones, 2008
Building density	Hur et al., 2010; Hur & Morrow-Jones, 2008; Kearney, 2006; Lee et al., 2016; Lovejoy et al., 2010; Ma et al., 2018
Naturalness (vegetation, green areas and water)	Cao et al., 2020; Hur et al., 2010; Hur & Morrow-Jones, 2008; Kearney, 2006; Lovejoy et al., 2010; Mouratidis, 2020
Openness (open views and open space)	Cao et al., 2020; Hur et al., 2010; Hur & Morrow-Jones, 2008; Lovejoy et al., 2010
Street lighting	Cao et al., 2020; Parkes et al., 2002
Infrastructure	Lovejoy et al., 2010

Table 2.2 Continues

Dwelling Attributes	
Dwelling type: Detached/Semi-detached, Terraced, Upstairs/Ground-floor flat, Apartment	Jansen, 2014; Parkes et al., 2002
Satisfaction with current dwelling	Cao et al., 2020; Jansen, 2014; Lovejoy et al., 2010; Parkes et al., 2002
Type of architectural design: Traditional, Modern, Innovative*	Jansen, 2014
Building age*	Kweon et al., 2010
Overall unit structure	Dassopoulos & Monnat, 2011
Number of rooms*	Jansen, 2014
Size of the living room*	Jansen, 2014
Conversions inside the home*	Rioux & Werner, 2011
View from the home: 15 elements described the view from their home	Kearney, 2006
Property value: House price, Rent	Cao et al., 2020; Jansen, 2014; Lovejoy et al., 2010;
Mortgage-to-income ratio / Loan-to-value ratio / Ratio of housing costs to household income	Dassopoulos & Monnat, 2011
Social Relations	
Population density	Ma et al., 2018; Mouratidis, 2020
Neighborhood reputation	Mouratidis, 2020
Attachment	Mouratidis, 2020
Satisfaction with social contacts in the neighborhood	Cao et al., 2020; Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008; Jansen, 2014; Parkes et al., 2002
Interaction by communication / Participates in neighborhood block meetings	Dassopoulos & Monnat, 2011; Hur & Morrow-Jones, 2008
Interaction through favors / Volunteers	Dassopoulos & Monnat, 2011 ; Hur & Morrow-Jones, 2008
Social support	Dassopoulos & Monnat, 2011
Social control	Dassopoulos & Monnat, 2011
Satisfaction with racial composition	Hur & Morrow-Jones, 2008
Neighbors with similar socio-economic status	Cao et al., 2020; Lovejoy et al., 2010
Frequency of visitors	Rioux & Werner, 2011
Having friends or relatives in neighborhood	Dassopoulos & Monnat, 2011; Parkes et al., 2002
Safety	
Safety	Lovejoy et al., 2010
Satisfaction with safety from crime	Cao et al., 2020; Hur & Morrow-Jones, 2008;; Dassopoulos & Monnat, 2011; Hur & Nasar, 2014 Lee et al., 2016; Ma et al., 2018; Mouratidis, 2020; Parkes et al., 2002
Feeling safe to walk around alone	Dassopoulos & Monnat, 2011
Pedestrian/traffic safety	Lee et al., 2016
Safety for kids	Cao et al., 2020

* Appears only in residential satisfaction studies

2.1.4.1 Household Characteristics

This dimension is formed of independent variables. As seen in previous studies, household characteristics change residents' perception so their neighborhood satisfaction level. Indicators of age and gender involve almost in all environmental psychology studies. Education and income (socio-economic status) are also essential and common variables. Race and ethnicity are considered mostly in cosmopolites study areas like the ones in the United States. Number of people in household, number of children (under 18) or elders in the household, marital status are also the indicators which influence preferences of residents. Length of residence and tenure along with their variation are critical indicators in neighborhood satisfaction studies (Table 2.2).

2.1.4.2 Neighborhood Satisfaction in General

In certain research satisfaction with the neighborhood is asked directly instead of a set of parameters or it is asked to cross check the given answers to neighborhood satisfaction parameters. Also generalized evaluation of the neighborhood such as rating as a place to live, aliveness or calmness are asked. This type of questions can be categorized in neighborhood satisfaction in general dimension (Table 2.2).

2.1.4.3 Location/Accessibility

Parameters of location and accessibility appear in most of the neighborhood satisfaction studies. Distance to certain points such as the city center, shops and services, green and recreational areas, work, or family and friends is frequently included in neighborhood satisfaction literature. Public transportation, working and cycling facilities are covered especially in recent studies. Parameters related to traffic and parking places are also involved in these studies usually having a negative relation with neighborhood satisfaction (Table 2.2).

2.1.4.4 Physical Characteristics

Just like location and accessibility, physical characteristics of the neighborhood is studied frequently in neighborhood satisfaction literature. Physical attributes of the neighborhood have a strong correlation with neighborhood satisfaction (Lee et al., 2017). Building density and amount of green areas are the mostly used parameters in the literature. A related parameter amount of open spaces is also often included. Other than that, aesthetics, upkeep, and cleanness of the neighborhood are the parameters that are involved in neighborhood satisfaction studies. Some studies are focused on one or a couple of physical characteristics parameters measuring them objectively e.g. via GIS tools and comparing these objective measures with the subjective neighborhood evaluation (Table 2.2).

2.1.4.5 Dwelling Attributes

Dwelling attributes are generally involved in residential satisfaction studies which cover similar parameters with neighborhood satisfaction except for dwelling attributes.

However, satisfaction with the current dwelling, overall unit structure, view from home, the value of the property and its affordability are included also in neighborhood satisfaction studies (Table 2.2).

2.1.4.6 Social Relations

Social relations are one of the dimensions with various parameters. Satisfaction with social contacts is the parameter that is repeated the most in reviewed literature. Other parameters are quite diverse including density, reputation, attachment, social support, similarity and familiarity with other residents (Table 2.2).

2.1.4.7 Safety

On safety dimension, safety from crime is mainly handled in literature. Although they are not much repeated safety to walk around alone, pedestrian/traffic safety and safety for kids are also included in the neighborhood satisfaction studies (Table 2.2).

2.2 Urban Morphology

2.2.1 General Overview

First used by Goethe in 1852, the term 'morphology' means the study of physical form and it is generally used in arts and biology (Kropf, 2009, p.108; Urban Morphology Research Group, 1990). Urban morphology, which is the second dimension of this research, studies physical forms in cities. Cities are complex objects and composed of different elements. Thus, researchers on this field investigate the relationship between these elements to understand the complexity of cities. Marshall and Çalışkan (2011) reviews definitions of urban morphology by various researchers. Defined as the study of urban form, physical or built form in general, urban morphology is an approach to understand and conceptualize the complexity of the urban form by investigating the relationship between components of the city such as street, building, plot through an analytic study (Figure 2.1).

There is a contradiction among researchers if the concepts of urban form and urban morphology are the same or not. Although urban morphology is described as the study of urban form in general, it does not exactly refer to urban form. Larkham (2002) criticizes the misuse of the very term “urban morphology” in various research where researchers casually use the term *morphology* instead of *form*. He suggests the definition by himself and his colleague Jones “the study of the physical (or built) fabric of urban form, and the people and process shaping it” (Larkham & Jones, 1991, p.55). The definition varies from research to research depending on the perspective of the researcher.

	Definition	*Source*
General	‘The study of urban form.’	(Cowan, 2005)
	‘The science of form, or of various factors that govern and influence form.’	(Lozano, 1990, p. 209)
	‘The study of the physical (or built) fabric of urban form, and the people and processes shaping it.’	(Urban Morphology Research Group, 1990)
	‘Morphology literally means ‘form-lore’, or knowledge of the form … what is the essence of that form; does certain logic in spatial composition apply, certain structuring principles?’	(Meyer, 2005, p. 125)
Focus on the object of study (urban form)	‘… an approach to conceptualising the complexity of physical form. Understanding the physical complexities of various scales, from individual buildings, plots, street-blocks, and the street patterns that make up the structure of towns helps us to understand the ways in which towns have grown and developed.’	(Larkham, 2005)
	‘Urban morphology … is not merely two dimensional in scope. On the contrary, it is through the special importance which the third dimension assumes in the urban scene that much of its distinctiveness and variety arise.’	(Smailes, 1955, p. 101; cited in Chapman, 2006, p. 24)
Focus on the manner and purpose of study	‘A method of analysis which is basic to find[ing] out principles or rules of urban design.’	(Gebauer and Samuels, 1981; cited in Larkham, 1998)
	‘… the study of the city as human habitat… Urban morphologists … analyse a city’s evolution from its formative years to its subsequent transformations, identifying and dissecting its various components.’	(Moudon, 1997)
	‘First, there are studies that are aimed at providing explanations or developing explanatory frameworks or both (i.e. cognitive contributions); and secondly, there are studies aimed at determining the modalities according to which the city should be planned or built in the future (i.e. normative contributions).’	(Gauthier and Gilliland, 2006, p. 42)

Figure 2.1 Definitions for urban morphology (Marshall and Çalışkan, 2011, p.412)

Influenced by Levy (2005), Fusco (2018) categorizes the urban form studies under six headings while discussing the polysemy of the term urban form in his book (Figure 2.2). The first category is *visually grasped urban landscape*. It focuses on three-dimensional, perceived form of the city and it refers mainly to environmental psychology studies and approaches of Camillo Sitte, Kevin Lynch and Gordon Cullen. The second category is *social morphology of the city* which studies the relationship between spatial structure and different ethnic, demographic and social groups or activities in the city. It implies to the approaches of school of social morphology in France and Chicago School, as well as the studies of Jane Jacobs. The third category is *bio-climatic form of the city* and it includes the studies which characterize urban space in its environmental dimension, and the issues like global warming and sustainability. These studies have risen after 80s and 90s, as the issue got critical. The fourth category the *form of urban fabrics* corresponds to the analysis of urban typo-morphology. It deals with the interrelations between the elements composing the physical city, tries to understand the dialectical relationship between building typology and form of tissues, as well as the historical processes of fabric formation. The fifth is the *form of urban layout* which is geometrical form of the city plan as a whole (geometric / organic plane, orthogonal / radioconcentric plane) and initiates with the studies of geographers in German and French School in 19th century. Fusco (2018) adds one last category which is urban form studies on *configuration of street networks.* These studies are generally developed using the methods Space Syntax, Multiple Centrality Assessment etc.

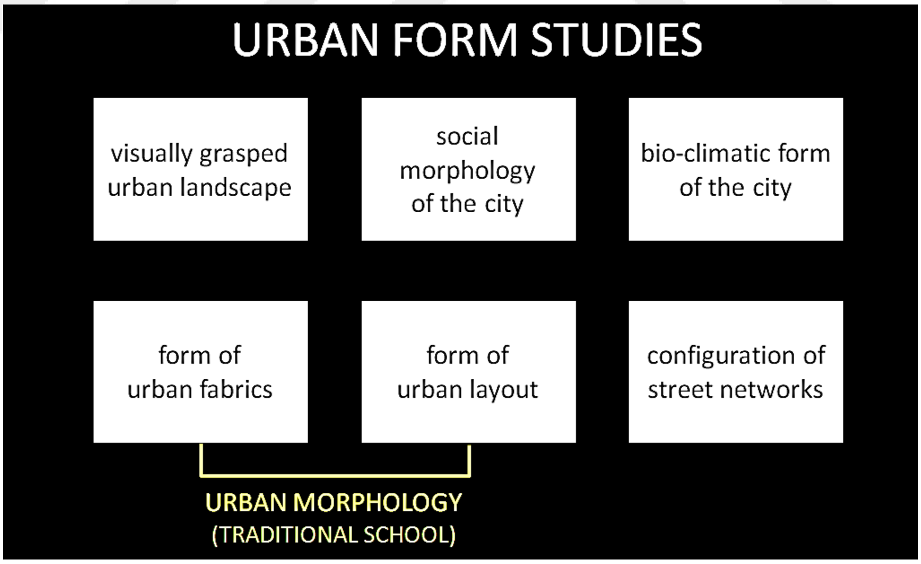


Figure 2.2 Urban form studies

The fourth and fifth categories together constitute traditional school of urban morphology including studies of Conzen, Muratori, Canaggia, Castex, Panerai, Borie etc. Mentioning the concept of "urban morphology", some researchers refer to these two categories and to the approach of the traditional school (Figure 2.2). The studies of the International Seminar on Urban Form (ISUF) which is the international organization of urban form for researchers and practitioners, are also based mainly on these two categories. Likewise, focusing on urban fabric this study refers to the traditional school as "urban morphology".

Manifested in the ISUF meetings, there are three schools (traditional schools) in urban morphology with significant contributions to this field in a broad sense: British, Italian and French schools (Moudon, 1997). British school emerges with the studies of geographer M.R.G. Conzen, who has developed a technique to analyze townscape based on three components (1) the town plan (comprised of streets, plots, and buildings), (2) pattern of building forms, (3) pattern of land use (Conzen, 1960). Italian school centers on the studies of the architects Muratori (1959) and Caniggia and Maffei (1979), who characterize typo-morphologies via history, urban tissue and building types (cited in Moudon, 1997). In France, schools of Paris and Versailles propose a systematic way to qualify and quantify spatial relations among form elements via manual measurements and interpretation of calculus (Allain, 2004; Borie and Denieul, 1984; Castex et al., 1980).

Urban morphology studies cover a wide range of topics and spatial analysis techniques. Compiled by Larkham in 2002, the consolidated urban morphology reading list of ISUF demonstrates ten main research areas on urban morphology studies as below:

- General Works (terms, definitions, overview etc.)
- Sources for Morphological Research
- Morphological Technique
- History of Urban Form
- Morphological Elements (grids, streets, spaces, plots, buildings etc.)
- Morphology and Architecture
- Cycles: Trends and Fluctuations in Urban Development
- Agents of Change - The Urban Fringe Including Fringe Belts, Town and City Centres Since the Beginning of The Nineteenth Century

- Pre-Twentieth Century Residential Areas - Twentieth-Century Residential Areas -Townscapes: Planning and Management
- M.R.G. Conzen: His Work and His Influence on Urban Morphology

Between the years 1960s and 1980s, qualitative approaches such as figure-ground and tissue analysis were more common in urban morphology studies (Marshall and Çalışkan, 2011). In this period quantitative approaches relied heavily on manual measurements. As an exception Martin et al. (1972) first used computer aided mathematical models, next Kruger (1977) and Steadman (1983) applied graph theory on urban morphology analysis. Later on, geoprocessing methods began to be developed by spatial analysts. So far quantitative methods in urban morphology can be classified in two broad directions: (1) configurational analysis and (2) geoprocessing and spatial analysis (often within GIS environments) (Erin et al., 2017). Configurational analysis deals with network configuration in particular street segments, visual axes etc. It quantifies the capacity of network to structure movement patterns. Space Syntax (Hillier & Hanson, 1984), Multiple Centrality Assessment (Porta et al., 2006), Angular Analysis (Turner, 2000), Visual Graph Analysis (Turner et al. 2001), Continuity Analysis (Figueiredo & Amorim, 2005) are some of the methods developed for configurational analysis. In the geoprocessing of urban fabric analysis, the spatial relations between urban elements are examined. Next section on urban fabric discusses these methods in detail.

2.2.2 Urban Fabric Studies and Measurements

In urban morphology studies, researchers mostly signify the form of urban fabric when they mention urban form (Levy, 1999). Kropf (1996) states that the city at a general level is constituted by urban tissues. As an organic whole, urban tissues can be identified with different levels of resolution. He indicates low resolution as streets and street blocks; high resolution as plots and buildings and more in detail rooms, structures, building materials etc. Depends on the scope of the study, level of resolution and specificity vary in urban fabric analysis. However, in general urban fabric is defined as the pattern that is formed by the interplay between buildings, parcels, streets and site (Araldi and Fusco, 2019).

In each city, these elements come together in different ways, and they form different tissues, that is to say different urban fabrics (Figure 2.3). Depending on the combinations, some fabrics get more recognizable and have a unique character, but some do not. In formation of especially unique fabrics, time is a significant factor. Over time, the process of construction continues, new layers overlap on older ones while keeping the identity of the previous layers and a new fabric emerges (Oliviera, 2016).

Figure 2.3 Different urban fabrics in different cities and continents (Oliviera, 2016, p.9)

According to Levy (1999) urban form elements are either analyzed individually or in relation to each other in morphological analysis and fundamental urban fabric elements are as in Table 2.3. He further discusses that variation of these elements are adopted and handled in morphological analysis in accordance with the aim of the research.

Table 2.3 The primary elements of the urban fabric (Source: Levy, 1999, p.80)

	Plot (P)	Street (S)	Constructed space (CS)	Open space (OS)
Plot (P)	P/OS	S/OS	SC/OS	OS/OS
Street (S)	P/CS	S/CS	CS/CS	OS/CS
Constructed space (CS)	P/S	S/S	CS/S	OS/S
Open space (OS)	P/P	S/P	CS/P	OS/P

The traditional school of urban morphology approaches the analysis of urban fabric at micro scale. Its scholars use urban blocks enclosed by streets segments as a base spatial unit of analysis (Araldi and Fusco, 2019). Three main study aspects of their studies are as below (Borie and Denieul, 1984 and Pinon, 1991 cited in Fusco and Araldi, 2017a):

1. the identification of urban form components (urban network, buildings and parcels),
2. their geometrical description
3. the analysis of their spatial relationships.

The traditional school use either qualitative methods or manual calculations in morphological analysis, they are limited to neighborhoods and old towns. On the contrary, geoprocessing within GIS environments allows researchers to conduct analysis in larger areas but losing multidimensional character of urban fabric (Araldi and Fusco, 2019; Fusco and Araldi, 2017a). Geoprocessing of urban morphology is increasing in the last twenty years. Thanks to geoprocessing, studies on classification and clustering of urban forms (Urhahn and Bobic, 1994; Fusco, 2016), identification of typology of urban elements (Berghauser-Pont and Haupt, 2010; Marshall, 2005), investigation of the distribution of built-up elements (Frankhauser, 1994; Thomas et al., 2007) are carried. In these studies, superimposed grid, urban blocks or administrative boundaries were mostly used as spatial units. Recently, blocks (Bergauser-Haupt & Pont, 2010), streets (Gil et al., 2012), buildings (Perez et al., 2019a), plots (Bobkova et al., 2019) are used and Hamaina et al. (2014) proposed a spatial unit based on a generalized Thyssen polygon around the built-up footprint. Araldi and Fusco (2019) used it around street segments. Araldi (2019) summarizes the innovative quantitative protocols which are based on typo-morphological approach in his thesis. His works shows how these studies have a wide range in terms of study area, methods and the spatial unit, as well as how these protocols are growing in recent years (Figure 2.4). The MFA protocol of Araldi and Fusco (2019) which is utilized in this thesis can be added to the list which uses the street segment surrounded by a Thiessen polygon and a buffer as the spatial unit. Innovative aspect for this protocol is to identify urban fabrics from the pedestrian's perspective. First applied in the French Riviera, it is conducted to the metropolitan region of Osaka (Perez, Araldi, Fusco & Fuse, 2019), the Brussels Capital Region (Guyot, Araldi, Fusco & Thomas, 2021), and the metropolitan area of Marseille (Fusco, Araldi & Perez, 2022).

The advantage of quantitative methods is to provide robust outcomes and replicable techniques which allow to make generalizations in comparative studies. Further, the spatial unit of mentioned studies are in human scale; thus, they are promising in terms of having an input for micro scale environment-behavior studies.

As Fusco (2018) states in the first category of urban form studies, there are many environment-behavior studies which relates behavior to physical form starting with the studies of Camillo Sitte, Kevin Lynch and Gordon Cullen. However, there are limited number of studies which approach the issue referring to the traditional school as "urban morphology". The behavioral studies related to urban morphology are mostly configurational ones (Peponis & Wineman, 2002; Montello, 2007; Baran et al., 2008)

Authors	Year	City	Method	Spatial Unit	Innovative Aspect for this work
Typo-morphological approach					
Marshall	**2005**	-	ABCD Diagram	Small to large urban fragment	Diagram approach (4 measures) for the street pattern recognition
Song and Knaap	**2007**	Portland	Factor Analysis + K-means	Buffers of ¼ mile around 6788 sites	Location-Based context analysis
Berghauser-Pont and Haupt	**2004-2007-2010**	-	Spacemate Diagram	Blocks	Spacemate diagram
Gil et al.	**2012**	2 Neighb. of	K-means	Streets and Blocks	Combination of conf. and combina
Sevenet	**2013**	Nice, France	CHA	Building-based Voronoi	Thiessen tessellation, (Nice case study)
Vialard	**2013**	Atlanta, US	K-means	Blocks and Block-face	Operationalisation of block-face measures
Hamaina et al.	**2013**	District of Nantes, France	Geo-SOM	Building-based Voronoi	Spatial tessellation + GeoSOM
Song et al.	**2013**	20,467 Residential homes in US	Factor Analysis K means	Euclidean buffers of 1,3,5,8 km around 20,467 sites	Location-Based context analysis + Multiscale classification.
Hermosilla et. al	**2014**	Valencia, Spain	ANOVA, Decision Tree	Blocks and surrounding streets	Introduction of street and vegetation index
Berghauser Pont et L Marcus	**2014**	Stockholm, Sweden	Spacemate Diagram	Network-Constrained Location-Based Convex hull	Network-Constrained Location-based density and Spacemate
Berghauser Pont et al.	**2017**	Amsterdam London and Gothenburg with Stockholm			

Figure 2.4 Innovative quantitative urban morphology protocols with typo-morphological approach (Araldi, 2019, p.207)

2.2.3 Indicators of Urban Morphology

There are plenty of indicators to analyze and measure the urban form in the voluminous literature of urban morphology. In the antecedent study of Alnwick by Conzen (1960), it is analyzed through three components (1) town plan (which is comprised of streets, plots and buildings), (2) building fabric, (3) land/building utilization. Following studies analyzed the urban form similarly. For example, Gil and others (2012) measured it through parameters based on the dimensions *(1) Street, (2) Block, Street, (3) Block*; Vialard (2014) based on the components *(1) Street load (2) Building load, (3) Block morphology*; Hamaina and others (2012) based on the dimensions *(1) Buildings Geometry, (2) Open space Geometry, (3) Buildings Adjacency, (4) Density, (5) Neighboring, (6) Open space morphology (spatial openness).* Table 2.4 presents the parameters that are used in previous quantitative urban morphology protocols which have typo-morphological approach. The parameters are grouped in three as street load, built-up geometry and open space/spatial openness. Measure of perimeter, area, density and ratio is common in all studies. Generally built-up geometry includes more parameters. Connectivity of the streets, building and block size, floor space and ground space indexes, building height or number of floors, compactness/elongation and area of vegetation are mostly used parameters in the reviewed urban morphology protocols.

Table 2.4 Indicators of urban morphology in previous studies

Street Load	
Length	Song et al., 2013
Connectivity	Gil et al., 2012 ; Song et al., 2013; Vialard, 2014
Global/Local accessibility	Gil et al., 2012; Vialard, 2014
Continuity (angular)	Gil et al., 2012
Global/Local movement flow	Gil et al., 2012
Intersection Density	Song et al., 2013
Road Density by Road Types	Song et al., 2013
Pavement / Pedestrian area	Gil et al., 2012
Built-up Geometry	
Building or Block Size (Perimeter / Area / Volume / Length / Width)	Gil et al., 2012; Hamaina et al., 2012; Hermosilla et al., 2014; Song et al., 2013; Vialard, 2014
Floor Space Index (FSI): the ratio of floor space and ground area	Berghauser-Pont & Haupt, 2007; Gil et al., 2012; Hamaina et al., 2012; Hermosilla et al., 2014
Ground Space Index (GSI): the amount of built ground in an area	Berghauser-Pont & Haupt, 2007; Gil et al., 2012; Hamaina et al., 2012
Layer (L): the average number of floors in an area / Building height	Berghauser-Pont & Haupt, 2007; Gil et al., 2012; Hermosilla et al., 2014; Hermosilla et al., 2014
Standard deviation of building height (m)	Hermosilla et al., 2014
Shape Index / Compactness / Elongation	Hamaina et al., 2012; Hermosilla et al., 2014; Vialard, 2014
Fractal dimension / Shape complexity	Hermosilla et al., 2014; Song et al., 2013
Number of buildings	Hermosilla et al., 2014; Gil et al., 2012
Party-walls ratio	Hamaina et al., 2012
Orientation	Gil et al., 2012
Land use richness and patterns	Song et al., 2013
Open Space / Spatial Openness	
Open Space Ratio (OSR): the intensity of use of the non-built ground	Berghauser-Pont & Haupt, 2007
Frontage Ratio / Frontage Fragmentation	Vialard, 2014
Setback percentage	Vialard, 2014
Ground openness: Isovist area / Disk area / Volume of visible buildings / Isovist area	Hamaina et al., 2012
Sky openness: sky view factor	Hamaina et al., 2012
Vegetation covered area / volume / ratio / no of parks	Hermosilla et al., 2014; Song et al., 2013

In this thesis Multiple Fabric Assessment protocol of Araldi and Fusco (2019) is used. The protocol has a wide-range of parameters which is 21 parameters in six dimensions: Network Morphology, Built-up Morphology, Network-Building Relationship, Network-Parcels Relationship, Site Morphology, Network-Site Relationship. The parameters are adaptable based upon the dataset. In other words, the number of parameters can grow or shrink, also its measurement method may change, if the dataset does not allow the measurement of certain parameters. However, in their study Fusco and Araldi (2017a) found that heigh-width ration, building coverage ratio, street corridor effect, average building height, street length and open space with are the most effective parameters in defining the urban fabric. Thus, it is essential to cover at least these parameters in the studies which utilize the MFA protocol.

MFA protocol is preferred in this thesis for three reasons. First, it analyzes urban fabric with a holistic approach unlike the other protocols which have piecemeal approaches. Second, this protocol is the most advantageous protocol for environmental psychology studies, as it analyzes the urban form from pedestrian point of view. Third, as mentioned above, MFA is a flexible protocol that the parameters are adaptable based upon the dataset.

2.3 Neighborhood Satisfaction and Urban Morphology

In literature, most of the studies on neighborhood satisfaction and urban form approach the issue by handling one or a couple of urban form parameters. Building density (Hur et al., 2010; Kearney, 2006; Lee et al., 2016), open spaces or vegetation (Hur et al., 2010; Kearney, 2006; Kweon, 2010) are the most frequently used parameters while seeking the influence of urban form on neighborhood satisfaction studies.

Gestalt psychology, founded by Wertheimer and Köhler to formulate visual perception (Guberman, 2017), claims that “The whole is greater than the sum of the parts” and “Understanding the parts cannot provide an understanding of whole (Turner, 1996, p.29).” It is developed as a countermovement of structural psychology and analyzing the whole with its smaller elements. Translated as “form” or “pattern” (Gestalt in German) and based on visual perception (Guberman, 2017; Turner, 1996), Gestalt psychology is closely related to two major fields of this thesis: urban morphology and environmental psychology.

The Gestalt theory is well adopted in urban design theories. In the Urban Design Reader edited by Carmona and Tiesdell, the editors highlight the importance of the wholeness in urban design as “The process of design should also add value to the individual component parts, so that the resulting whole is greater than the sum of the parts. In the final analysis the quality of the whole is what matters because it is this that we experience.” (2007, p.1). With the same point of view Christopher Alexandre applied Gestalt ideas to urban design by proposing series of patterns for urban environments. Gordon Cullen also opposed the analysis of the individual elements of the urban environment, and he conceived the modern townscape approach and the concept of the serial vision (Carmona & Tiesdell, 2007).

Considering this holistic point of view this thesis does not approach the relationship between the urban form and the neighborhood satisfaction through the components or a few parameters of the urban form. Yet it aims to consider the form of the neighborhood as a whole by defining its urban fabric and seeks the level of neighborhood satisfaction associated by that urban fabric.

When the keywords Neighborhood/Residential Satisfaction and Urban Morphology/Form/Fabric also Built Environment and Physical Form searched together academic search engines, limited number of studies have been found.

Patterson & Chapman (2004) compared neighborhood satisfaction in different urban forms (differed by the New Urbanism Index) in urban and suburban areas of Portland, USA. Controlling the personal characteristics, they found no significant difference in neighborhood satisfaction of residents in urban and suburban neighborhoods. In other words, they found that New Urbanism guideless had no contribution in neighborhood satisfaction.

Yang (2008) compares the relationship between physical form and neighborhood satisfaction in two cities of the USA, Portland and Charlotte. Both cities have similar demographic characteristics but different urban patterns. Portland has a high density and mixed-use urban centers, whereas Charlotte has a low-density suburban development. Speaking of the physical form he focused on housing density, land use mix, housing types and street connectivity. In terms of density and mixed-use he found different results. In Portland the residents are more satisfied in high density and mixed-use, in Charlotte it is inverse. Thus, he suggests that the planners should pay attention to the regional context when making decisions.

Lovejoy and other (2010) compared neighborhood satisfaction levels in four pairs of traditional and suburban neighborhoods of California, USA. Each pair have similar demographic characteristics, but different built forms. Traditional neighborhoods were mostly built before 1940, had grid-like street patterns with short blocks and mixed land-uses. Suburban neighborhoods were built more recently, had low densities and curvilinear street patterns together with cul-de-sacs and were reserved to residential use. They found that neighborhood satisfaction was higher in traditional neighborhoods.

Cubukcu (2011) studied the residential satisfaction in squatter settlements (gecekondu) and in social houses in Izmir. Social houses are four-story buildings on a slopy area surrounded by apartment blocks, a green area, a high school, and a vacant land. The slums are one-story detached dwellings lies on a flat area surrounded by a vacant area, a highway and apartment blocks. She found that although the physical conditions are much poorer in the squatter settlement, satisfaction of the residents with the house and the neighborhood is positive and similar in both areas.

Saeideh Zarabadi & Ghasemzadeh (2015) made a comparison of neighborhood satisfaction in three urban fabrics in Tabriz, Iran: traditional fabric, modern fabric, and mixed-use fabric which covers modern and historical elements as well as housing and business centers. They found the neighborhood satisfaction significantly less in the traditional fabric.

Mouratidis (2018) compared neighborhood satisfaction in compact and sprawled neighborhoods in Oslo, Norway controlling the socio-demographic characteristics, neighborhood attachment, overall aesthetic quality of the neighborhood, and quality of open public spaces. In addition, he surveyed the participants who lived in both urban forms in the last five years. He found that the compact urban form has a positive influence on neighborhood satisfaction.

In their study, Patterson & Chapman, (2004) handled the neighborhood satisfaction with other concepts (with service use, walking, driving, quality of life) instead of focusing directly on urban form and neighborhood satisfaction. Saeideh Zarabadi & Ghasemzadeh (2015) took neighborhood satisfaction as a component of another targeted concept neighborhood attachment. In other studies (Yang, 2008; Lovejoy et al., 2010; Cubukcu, 2011; Mouratidis, 2018), neighborhood satisfaction is assessed in two different study areas with different urban forms. However, in none of these studies urban form is analyzed in detail as an urban fabric and from urban morphology point of view. This thesis aims to fill this gap in literature.

CHAPTER 3

METHODOLOGY

This thesis has two different approaches applied in two different case studies, one in France and the other in Turkey. In France, the study is conducted in a metropolitan area of French Riviera and in Turkey in Karşıyaka District of Izmir. The first reason of having these two cases is to observe the phenomenon in two Mediterranean coastal cities belonging to two different national contexts, with historical, cultural, and regulatory implications. The second is to investigate the extent to which the methodology designed for one country (using France database) is applicable to another country (Turkish database) and to improve the methodology developed in France. The third one is finally to see whether urban forms produced are similar in two different regions with similar climatic and geographical conditions, but different national context. Both cases hold a variety of urban forms, which allows a successful classification of urban fabric types. The French Riviera is an ideal case for urban morphology studies due to its distinctive natural and urban setting. Its uniqueness comes from its hilly topography and socio-political history which produce diverse morphological characteristics. Similarly, although it is a much smaller scale, Karşıyaka District has a strong morphological heterogeneity with historical fabrics of the 19th century, squatter settlements starting from the 1960s, and more recent urban developments of gated communities involving high rise apartment buildings or villas.

The methodology followed in two cases differ slightly. Lessons learned from the first case study (French Riviera) and limitations regarding the national data base for the second case area (Karşıyaka Districts) paved the way for methodological improvements. The first case study, the French Riviera, is an extension of an existing project. The relationship between neighborhood satisfaction and urban morphology is sought with the existing database. In the second case, Karşıyaka District in İzmir, data is gathered in the light of research questions and previous studies in literature.

3.1 Case Study 1: French Riviera

3.1.1 Urban Development of French Riviera

The first case study of this thesis, the French Riviera (officially Alpes-Maritimes), is a conurbation in the southeast of France covering an area of around 1500km^2. It lies on the Mediterranean Coast from the Italian border at the east until the Esterel Mountains at the west. The region has a polycentric structure with its coastal cities Nice, Cannes, Antibes, Monaco, Menton, close hinterland centers Grasse, Vence, and new activity areas like Sophia-Antipolis technology center (Figure 3.1). As an emerging metropolitan area, the population of this agglomeration exceeds one million people (Fusco & Scarella, 2013).

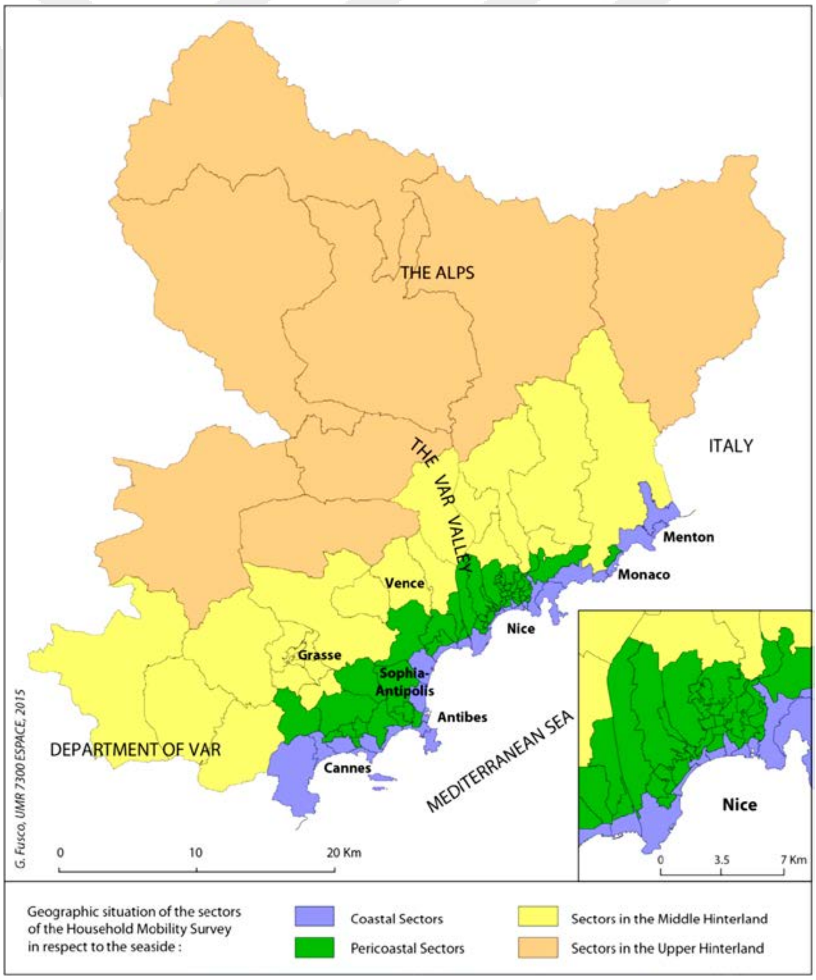


Figure 3.1 The French Riviera Metropolitan Area (Fusco, 2016, p.53)

Surrounded by mountains and the Mediterranean Sea, the topography of the area contains differently sloped hills and valleys, and its elevation ranges from the sea level up to 1700 meters. Due to the variety in topographical structure, socio-political and cultural influence on urban planning diverse urban fabrics can be observed in the area. These urban fabrics are traditional settings, suburban developments, highly dense urban areas with collective housing projects, regular urban areas in grid form, planned hilly areas, irregular developments (Fusco & Araldi, 2017b). This study is limited to the coastal conurbation and its close hinterland. Regardless of administrative boundaries it includes aforementioned centers and the sprawling villages in the close hinterland (Figure 3.2).

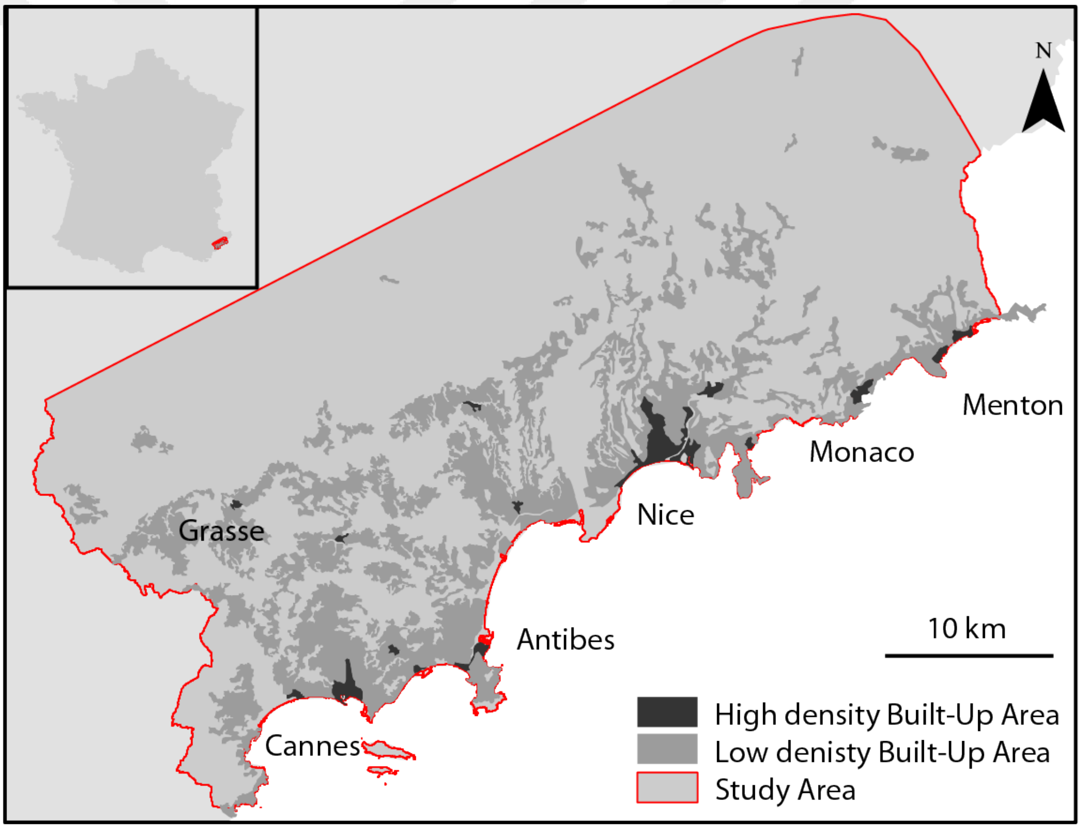


Figure 3.2 The French Riviera study area (Fusco & Araldi, 2017b, p. 1322)

3.1.2 Data Collection

Data collection of this case contains two phases in relation to the two aspects of the study. Neighborhood satisfaction data is derived from Household Mobility Survey (HMS - Enquête Ménages Déplacement) which was carried out in 2009 in the

Department of Alpes-Maritimes which includes the French Riviera. HMS is conducted by national institutions periodically in France since the 1960s. It aims to obtain knowledge of journeys undertaken by households. While gathering mobility and demographic information of the households, lifestyle of residents and their opinions about the environment they live in are also asked. The last HMS in Alpes-Maritimes was conducted in over 104 survey sectors and 786 subsectors at a finer scale, using a zone division with double ID numbers (ex: zone ID 001002 is subsector 002 within sector 001). The sectors were identified along administrative boundaries with the goal of having around 10 000 inhabitants within it. Sub-sectors were defined with some morphological coherence within them, distinguishing for example village cores from suburban expansion, compact city neighborhoods from more discontinuous ones, but without following any precise morphological protocol. Between October 2008 and May 2009, 9000 household were interviewed, and information of 18000 people were gathered with either face-to-face or telephone interviews (Department of Alpes-Maritimes, 2018). In this study, questions which can be inferred to neighborhood satisfaction are extracted from the survey.

The data related to urban morphology comes from the results of the study which Araldi and Fusco (2017) conducted in the French Riviera. In their project entitled "Retail distribution and urban form - Street-based models for the French Riviera” they developed a method named Multiple Fabric Assessment (MFA, Araldi and Fusco 2019) to classify the urban fabric families and they applied the method to the French Riviera. Thanks to this method by using the building footprint, building height, plot, street length, street network, building utilization, and topography information of the French Riviera which were gathered from the National Geographic Institute (Institut national de l'information géographique et forestière (IGN) database BD TOPO), they could classify the urban fabric families in the region at the grain of each street segment (Fusco & Araldi, 2017b).

3.1.3 Measuring Neighborhood Satisfaction

This study measures neighborhood satisfaction in the French Riviera by using the data of Household Mobility Survey 2009 in the region. There are strengths, but also weaknesses of using this dataset. The first strength is the availability of this large database which covers the whole study area with 9000 households except for the Principality of Monaco. The second is that the database is statistically large enough to have significant results, although the questions related to neighborhood satisfaction were asked only to half of the households, which is 4500 households.

In terms of weaknesses, the first problem is that the survey does not fully address all aspects of neighborhood satisfaction. As the survey is not designed specially focused on neighborhood satisfaction. Yet, it involves questions related to the neighborhood satisfaction of the residents. It poses a multiple-choice question on satisfaction

"Currently, what does not satisfy you in your accommodation?"

and it repeats the question three times to have three different items as answers. Next it asks

"Which of these reasons do you think is the most important?"

to figure out the most important factor for dissatisfaction. The options of the questions are as listed in Table 3.1.

Table 3.1 Options of the survey question related to satisfaction

00 No answer	16 ... without terrace or bigger balcony
01 Situation of the family	17 ... without private parking
02 Being a tenant	18 Neighbors
03 Insecurity of the situation (end of contract, put on sale by the owner, bad relations with the owner)	19 Too far from the workplace of a member (s) of the household
04 ... too expensive	20 Too far from the city center
05 ... with too many charges	21 Too far from nature
06 ... too big	22 Too far from the facilities (schools, shops, leisure ...)
07 ... too small	23 Too insecure
08 ... poorly arranged rooms	24 Lack of cleanliness of the neighborhood
09 ... too old	25 Difficulties in accessing public transport
10 ... badly equipped (WC, shower room, kitchen, heating ..)	26 Difficulties of walking
11 ... without elevator	27 Difficulties to move by car
12 ... poorly isolated	28 Environment (silence, calm, pollution ...)
13 ... poorly soundproofed	29 View
14 ... collective	30 Nothing
15 ... without garden	31 Other reasons

In order to adapt these questions and its answers to the study, the options of the questions are categorized in five groups. These categories are (1) no answer and other reasons, (2) status of the dwelling, (3) physical characteristics of the dwelling, (4) properties of the neighborhood, (5) satisfied (Table 3.2).

Table 3.2 Categorization of the survey question options

	Category	Corresponding Options
1	no response + other	00, 01, 31
2	status of the respondent	02-05
3	dwelling characteristic	06-17
4	neighborhood characteristic	18-29
5	satisfied	30

Another weakness of using this survey was that the exact addresses of the households were not recorded in the dataset. The zones (subsectors) where they live were known, but the exact addresses were missing. This missing information brought a difficulty in figuring out the satisfaction on street level and matching the survey answers with the exact urban fabric type. Following sections: *3.1.4. Overlaying Neighborhood Satisfaction Data with Urban Fabric Data* and *3.1.5. Uncertainty and Bayesian Networks* explain how to evaluate the survey questions to find out neighborhood satisfaction and how to merge two different data sets and treat weaknesses and differences in two data sets.

3.1.4 Multiple Fabric Assessment

Recall, Araldi and Fusco's (2019) MFA method results in the French Riviera are utilized in this study. The advantage of MFA method is that although it is conducted in large areas, it analyzes the urban form in terms of human scale. The method is especially useful for environmental psychology and behavior studies which are usually interested in measuring micro or meso scale physical environmental qualities. Given that, this method is quite suitable to analyze the relation between micro scale and environmental characteristics and human behavior / feeling, which is the focus of environmental psychology studies. In other words, one of the main strengths of this study is its uniqueness in borrowing a methodology from a different discipline (morphology) and applying it in another disciple (environmental psychology) to understand the mutual relation between human and environment.

In MFA method, Araldi and Fusco (2017a, 2017b, 2019) aim to classify urban form from pedestrians' point of view. They focus on the street segments, since in an urban environment people can perceive only two sides of a street not four sides of a block. Urban fabric classification via MFA has four-steps. First, the street-based spatial partition which is the unit of measurement of the MFA protocol is defined. Second, urban morphometric indicators are calculated via geoprocessing. Third, significant spatial patterns are identified based on the spatial distribution of the urban morphometric indicators. Finally, these patterns are clustered and interpreted.

The first step is defining the street-based spatial partition which is called proximity band. Araldi and Fusco (2017b) generate Thyssen polygons around street segments on ArcGIS. These polygons were limited to 10m, 20m and 50m from the left and the right-hand-side of each street segment considering the perceivable area of the pedestrian. As shown in Table 3.3 Indicators of MFA Protocol (Araldi, 2019, p. 236), each morphological analyses were based on different buffers; for Built up Morphology, Network-Plot Relationship and Site Morphology analysis 50m buffer, for Network-Plot Relationship analysis 20m buffer except for the street corridor effect parameter in which 10m buffer are used (Figure 3.3).

Figure 3.3 Spatial unit of MFA Protocol (Top: Araldi&Fusco (2016), p.35; Bottom: Fusco&Araldi, 2017b, p.1321)

Next, they calculate morphological indicators to classify urban pattern in ArcGIS platform. There are 21 parameters under six main dimensions: Network Morphology, Built-up Morphology, Network-Building Relationship, Network-Parcels Relationship, Site Morphology, Network-Site Relationship (Table 3.3). With the information of buildings, plots, streets, number of stories, land use and topography, they calculate the indicators listed below.

Table 3.3 Indicators of MFA Protocol (Araldi, 2019, p. 236)

Urban Fabric Component	Indicator	Definition and implementation formulae		Proximity Band width
Network Morphology	Street Length	Street segments length between two intersections	L_{street}	/
	Windingness	1-(Euclidean distance / Network distance) between two intersection	$1 - {}^{L_{eucl.}}/_{L_{street}}$	/
	Local connectivity	Average of the presence nodes of degree 1 (ND1)	$\sum \mathrm{ND}_i[0,1]/2$	/
		Average presence nodes of degree 4 (ND4)		/
		Average presence nodes of degree 3, 5+ (ND35+)		/
Built-up Morphology	Prevalence of Building types	(0:125] m2 building surf. / total built-up surf.	$\frac{\sum Sj}{S_{builted}}$	
		(125:250] m2 building surf. / total built-up surf.		
		(250:1000] m2 building surf. / total built-up surf.		
		(1000:4000] m2 building surf. / total built-up surf.		
		(4000: max] m2 building surf. / total built-up surf.		
	PB coverage ratio	Built-up Surface / PB Surf.	$\sum S_{tot}/\sum S_{PB}$	50
	Building Contiguity	Weighted average of buildings frequency on built-up units	$\frac{\sum S_{b-u(i)}({}^{1}/_{N_{build\ in\ b-u(i)}})}{\sum S_{b-u(i)}}$	
	Specialisation of Building Types	Specialized Building surf. / PB surf.	$\frac{\sum S_{spec}}{\sum S_{PB}}$	
Network-Building Relationship	Street corridor effect	Parallel façades length / street length	$L_{par.fac}/L_{street}$	10
	PB building height H	Building volume / PB surface	$\sum V_{builted}/\sum S_{builted}$	20
	Open Space Width W	(PB surf. - built surf.) / street length	$(S_{PB-}S_{built})/L_{street}$	
	Height/Width Ratio	PB Building Height /Open Space Width	H/W	
	Building frequency along SN	Number of Buildings / Street length	N_{build}/L_{street}	
Network-Plot Relationship	Land ownership fragmentation along the street network	Number of Plots / Street length	N_{plot}/L_{street}	50
Site Morphology	Surface slope	High sloped surf. (S>30%) / PB Surface	$\sum Sloped\ Surf_i/S_{PB}$	50
Network-Site Relationship	Street acclivity	Avg. arct(slope) along the street centerline	$E\ [arct(slope)_i]$	/

After computation of the indicators, they evaluate the spatial distribution of the streetscape morphometric indicators via a local spatial clustering technique. They utilize spatial autocorrelation through the implementation of the technique ILINCS (I statistics in Local Indicator of Network-Constrained Clusters). ILINCS is originated from the geostatistical technique Moran's Indicator (Moran's I). Later Anselin (1995) extended local scale of this global scale autocorrelation technique, which is called LISA (Local Indicators of Spatial Association). Further, Yamada and Thill (2007, 2010) developed ILINCS which is a network-constrained version of LISA and seeks network contiguity between street segments. Araldi and Fusco detect street segments and patterns with higher-than-average or lower-than-average values thanks to this comparative spatial analysis. So, they describe each street segment proximity band by the set of indicators examining whether the patterns with high-average-low values are statistically significant. As illustrated in Figure 3.4, the local spatial clustering of each street segment as statistically significant hotspots and cold-spots are in categories of High-High (red), High-Low (pink), Low-High (light blue), Low-Low (blue) and Not-Significant (grey). High-High values refer to high values surrounded by high values of a particular indicator; High-Low values are high values surrounded by low values; Low-High is low values surrounded by high; and Low-Low is low values surrounded by low values. Non-significant values refer to the condition where the values and their surrounding values are close to average value of the indicator in the whole study area (Fusco & Araldi, 2017a; Araldi, 2019).

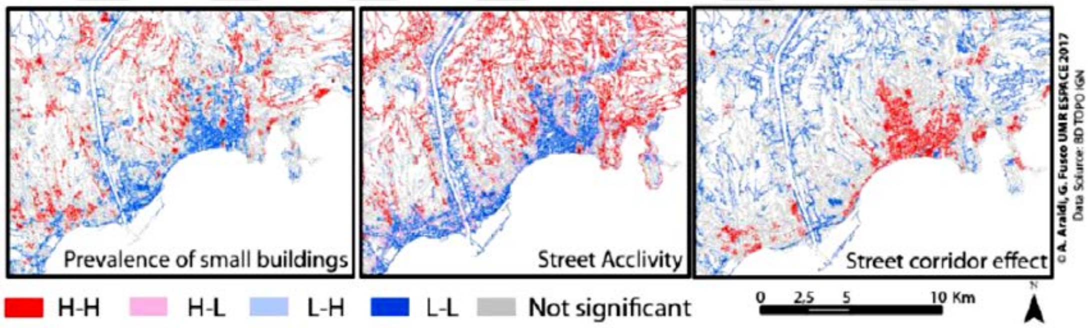


Figure 3.4 Geostatistical classification of three indicators (Araldi and Fusco, 2017)

The geostatistical analysis by the technique of ILINCS reveals 21 sets of significant patterns. In the final step, Araldi and Fusco identify clusters which are made up of combination of all sets of patterns via a Bayesian probabilistic model (Bayesian Network clustering). BN clustering was chosen because of two reasons. First, the model enables a clustering of different morphological sets even if they share few key common characteristics instead of homogeneity on all 21 morphometric descriptors. Second, BN tool is able to evaluate uncertain conditions like in hybrid street segments where probabilities of urban patterns are undefined. Moreover, MFA targets clustering street segments based on the statistical significance of morphological features instead of geometrical values of these features. That is why, it combines ILINCS technique and BN tool for clustering. As a result of the application in the French Riviera, MFA produced nine urban fabric families, defined as generalizations of more specific types. Figure 3.5 and Table 3.4 presents these generalized types and their weights in the whole study area.

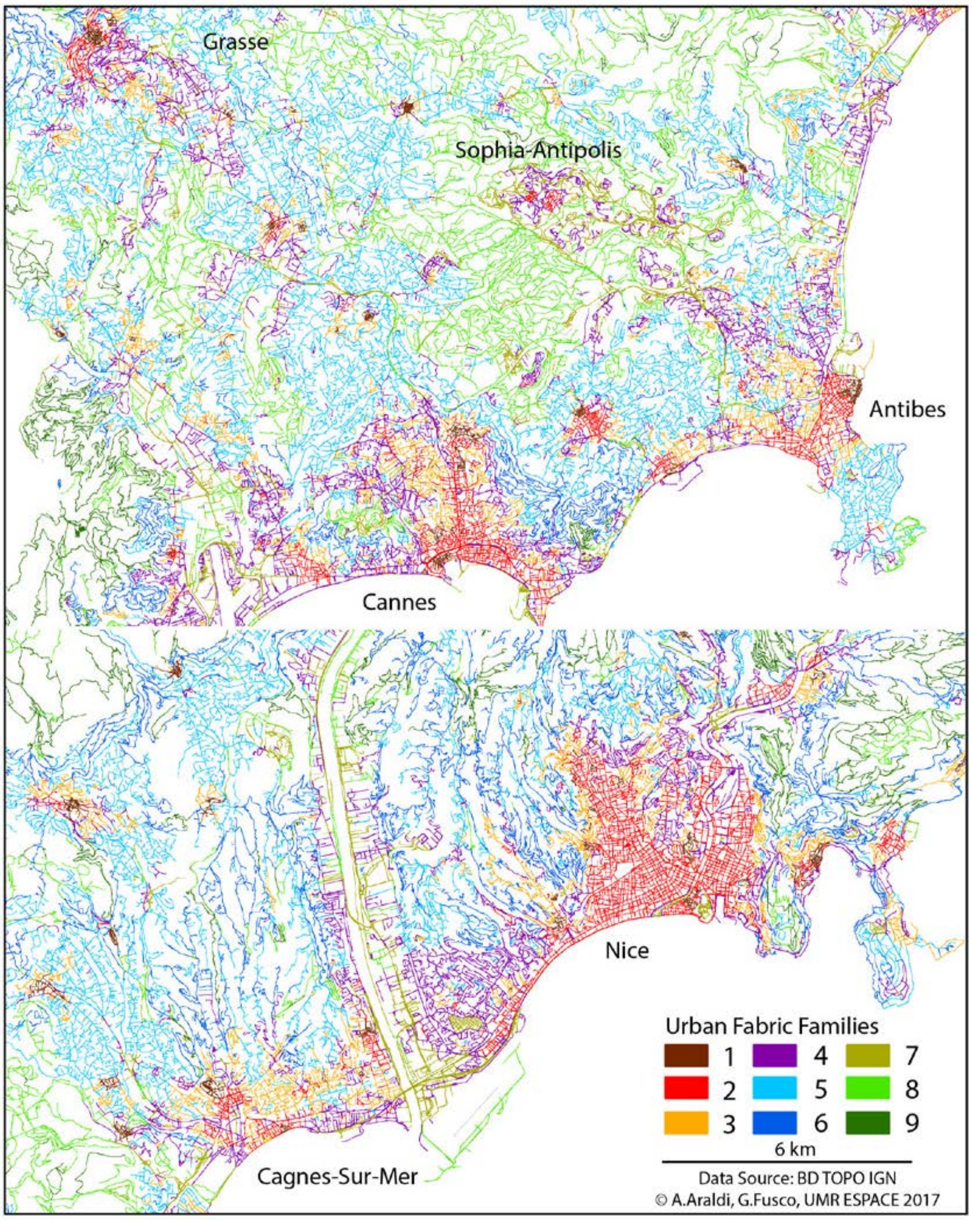
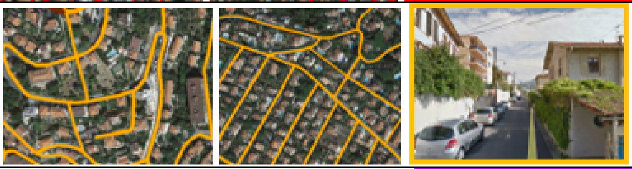
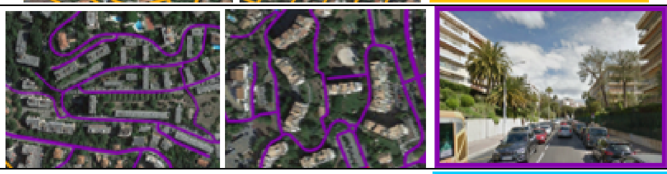
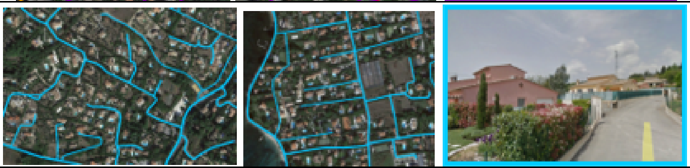
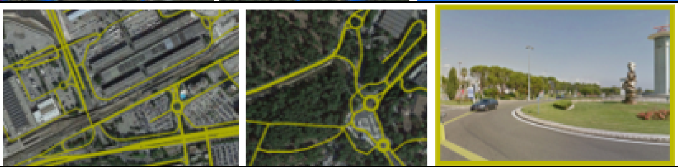
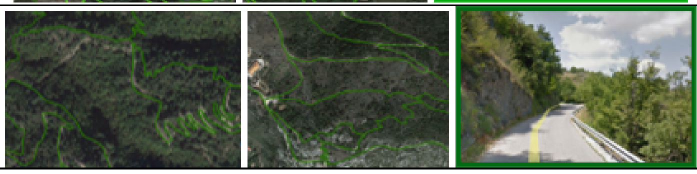


Figure 3.5 Urban fabric families found via MFA in the urban centers of the French Riviera (Fusco & Araldi, 2017b, p. 1322)

Table 3.4 Urban fabric families in the French Riviera (Fusco & Araldi, 2017b, p. 1323).

Urban Fabric Family		Weight in Study Area
1. Old constrained urban fabrics of town-houses		6.3%
2. Traditional urban fabrics of the plain with adjoining buildings		9.3%
3. Discontinuous and irregular urban fabrics with houses and buildings		8.1
4. Modern discontinuous urban fabrics with big and medium-sized buildings		15.5 %
5. Suburban residential fabrics in hills or plain		19.8 %
6. Small house constrained suburban fabrics		12.4%
7. Connective artificial fabrics with sparse specialized big buildings		7.7%
8. Non urbanized space in hills or plain with sparse homes and buildings		10.4%
9. Mountain natural space with sparse houses		10.8%

Among nine urban fabric families, six of them cover residential areas, the other three are mostly natural areas or artificial fabrics with specialized (non-ordinary) buildings. Formation of *the first family* dates back to the Medieval and Late-Medieval

Era. This family constitutes of dense adjoining buildings, where street pattern is irregular and connective. Also, street corridor effect, street acclivity and windingness are high. Street segments with this urban fabric family are mostly located in old towns and villages, but recently there are replications of this old fabric. *The second family* corresponds to traditional urban fabrics which were built between the XVIII century and the Second World War. This fabric shows a more regular, planned, and well-connected street network with larger buildings and plots. *The third family* has developed in the late XIX or early XX century. Small subdivisions, individual self-construction, building infilling are characteristics of this fabric. This fabric is also characterized by mix of denser traditional urban fabrics, modern discontinuous urban and suburban fabrics. *The fourth fabric* is the product of the post-war, where the development is modern and it has lost traditional plot, street, building relationship. Street network is irregular and discontinuity between large buildings can be observed. *The fifth and the sixth families* are irregular, and mainly heterogeneous suburban fabrics (large monotonous subdivisions like in North America are rare on the French Riviera) which were developed with the constrains of land fragmentation and topography. Low coverage ratio, prevalence of individual houses, irregular, tree-like or cul-de-sac streets are main characteristics of these families. In the fifth family, street acclivity is lower, slopes are less, and houses are larger such as villas and mansions in the prestigious capes, larger subdivisions belong to this class. The sixth family is characterized by steep winding roads and smaller houses in mountainous areas.

A general overview of urban history in the French Riviera helps to understand these fabrics better. These urban fabric families and urban development of the major towns in the French Riviera are presented synthetically following Araldi (2019), Fusco and Araldi (2017b), Graff (2000).

3.1.4.1 Nice and the Var Valley

The foundation of the Nice city dates back to 350 A.C. on the actual old city center by the Greek Phocean population (from Izmir) as the city of Nikaia. A second development emerged around 650 A.C. on the area Cimiez by Romans. During the Medieval Age, the city was at the edge of the Roman Empire and was a target of invasions.

By 1388, the dominion of the Duchy of Savoy who also played a very important role in urban planning of the city Turin (Italy) starts. New extensions of the city were planned at the south of the historical center between the 16th and 18th centuries by construction of churches, palaces, an opera, and aligned buildings on wider streets (pre-modern urban form). This urban form on a triangle form limited by the sea, the Paillon River and the Castle Hill remained until today.

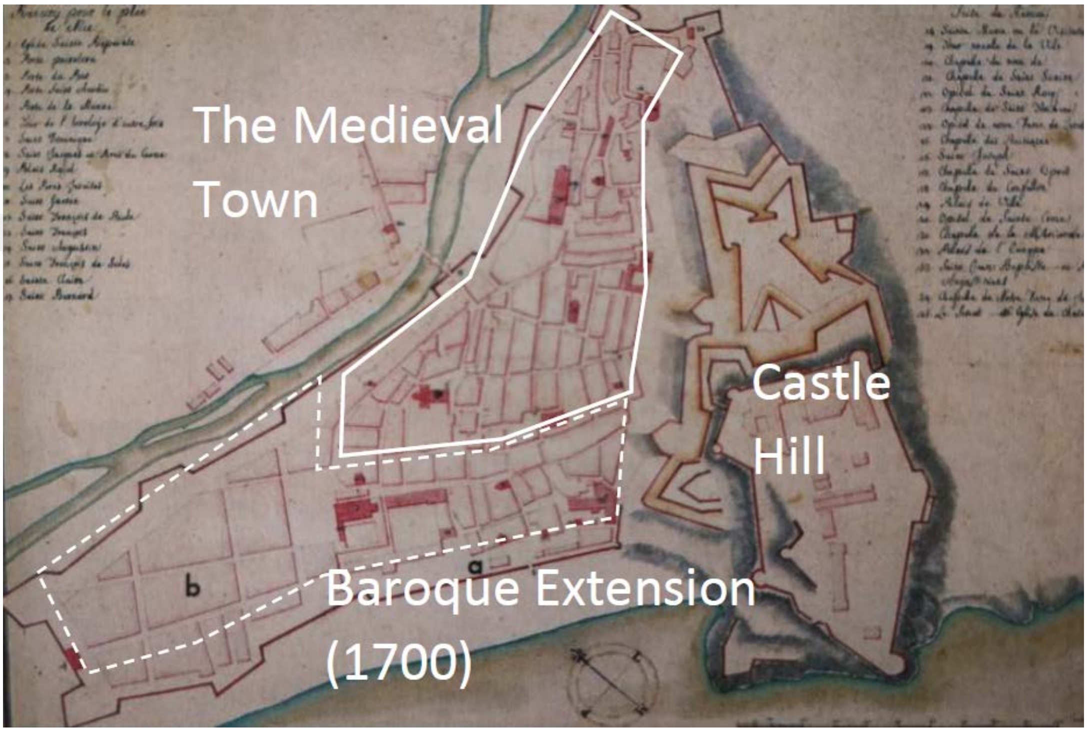


Figure 3.6 Plan of Nice in 1790 (Graff, 2013 cited in Araldi, 2019, p.262)

As the Duchy of Savoy developed Turin as the center of architecture, urban design and planning, they applied the new urban forms that they developed on Nice. Between the years 1830-1860, a new extension took place on the west side of the Paillon River by the architects Scoffier and Vernier following the Turin model. They applied the same grid-based geometrical model both between the train station and the sea and the east of the city center behind the Port Lympia, considering public places, gardens, squares the important for everyday life.

Figure 3.7 Old Nice Plan (grey) and the new Nice Plan of the Consiglio d'Ornato (orange) (Graff, 2013 cited in Araldi, 2019, p.263)

After the annexation of Nice city in France in 1860, the development relied on the original plan continued. Especially until the First World War (during La Belle Epoque), the French Riviera became a touristic destination of aristocracy, and thanks to the technological innovations in construction and transportation, Nice became one of the greatest cities of France. In addition to the high standard hotels in the center, residential areas on the hills grew with mansions and villas. A less regular grid form was replicated in three directions (east-west-north) as long as the morphological conditions allowed until the Second World War. Between 1920 and 1930 following the economic socioeconomic changes, these mansions and villas in large plots changed hand and divided into smaller plots for family houses of middle class.

After all these developments, at the end of 1950s, Nice had various expansions as a dense and regular fabrics on the plain areas towards north, dense but irregular fabrics on the surrounding hills, low density regular real-estate developments randomly distributed on the city, and low-density irregular fabrics on the periphery. In 1960s, a motorway connecting coastal cities and passing along the train line was constructed.

Between 1945 and 1973, Nice became one of the centers of mass tourism and faced urban sprawl, which resulted with the increase in secondary homes as if holiday homes with balconies and terraces. Also, in 1950s and 1960s around 100 thousand people immigrated from North African countries to the French Riviera, where 48 thousand settled in Nice. This population growth caused emergence of squatters on the west behind the airport and at the north-east periphery. This lead to social housing programs on these areas, which were isolated from the city.

Since 2000s, several projects were conducted to infill and qualify less compact areas, and to develop public spaces and transportation. In addition, a new urban development has been planned on the west of the city along the Var River and Valley. On the west bank of the river (the city of Saint-Laurent du Var), an urban growth (including residential areas) took place giving different urban fabrics along with the 20th century. However, on the east bank in the Nice city, the development was rather on transportation (airport and highway), functional large buildings and spaces like reginal administration offices, store agglomerations, the Nikaia Concert Hall, and Allianz Riviera Stadium. By 2008, the Eco-Valley Project aimed to develop a new urban model on the area.

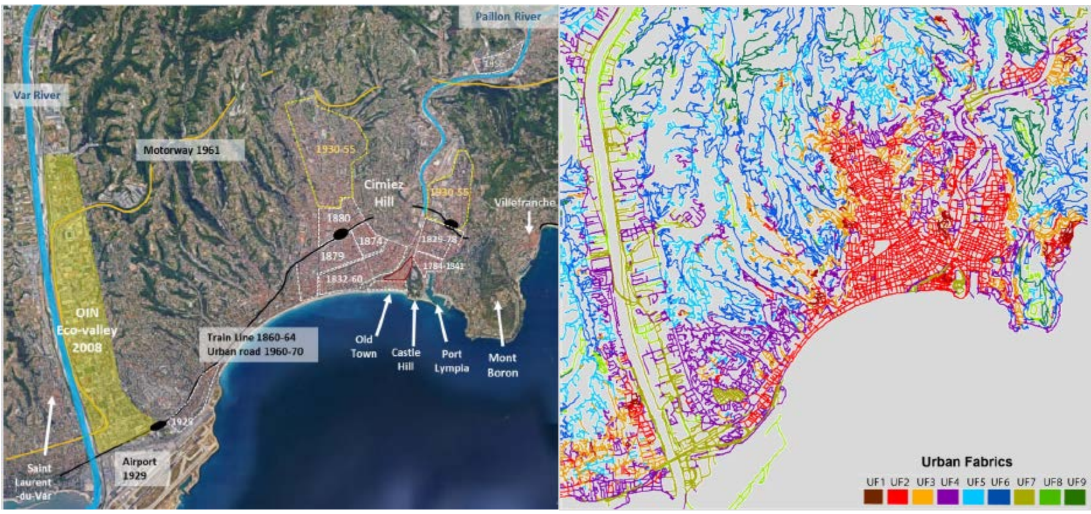


Figure 3.8 Urban development and MFA results of Nice and the Var Valley (Araldi, 2019, p.267)

3.1.4.2 Antibes and Sophia-Antipolis

Antibes was also founded in the IV. Century B.C. by again Phocaeans nearby a natural cape which was a protected natural port to develop maritime trade. Next Romans extended the settlement towards west. After the fall of the Roman Empire until the 19th century, the settlement converted from a trade center to walled military base to defend various attacks. In 1860, after Nice was annexed to the French Empire, Antibes lost its military characteristic, and started to develop as a touristic resort following the construction of the train station. For the strategy of development as a tourist center, in 1886, on the western coast Juan les Pins was planned with new villas and hotels; in 1895 military walls of old Antibes were removed and an urban expansion plan was applied. While these two urban centers were developing, on the south of the cape was occupied by the mansions of the aristocracy and wealthy merchants. Whereas on the north, greenhouses were growing.

The construction of the highway A8 in 1960 resulted with a demographic explosion and a new unplanned urban growth on agricultural areas on the north. By 1972, with the plan of the Sophia-Antipolis techno-park again on the north, a new demographic growth started, which made Antibes the second city of the French Riviera.

Sophia-Antipolis was planned with a modernist approach as a car-oriented techno-park with tree-like system roads and limited accessibility for pedestrians. After several plan proposals, Sophia-Antipolis became an urban laboratory and resulted with two urban aspects today. The first as being two village centers (Haut-Sartoux et Garbejaïre) with compact traditional urban fabric, and the second is the protection of the natural landscape.

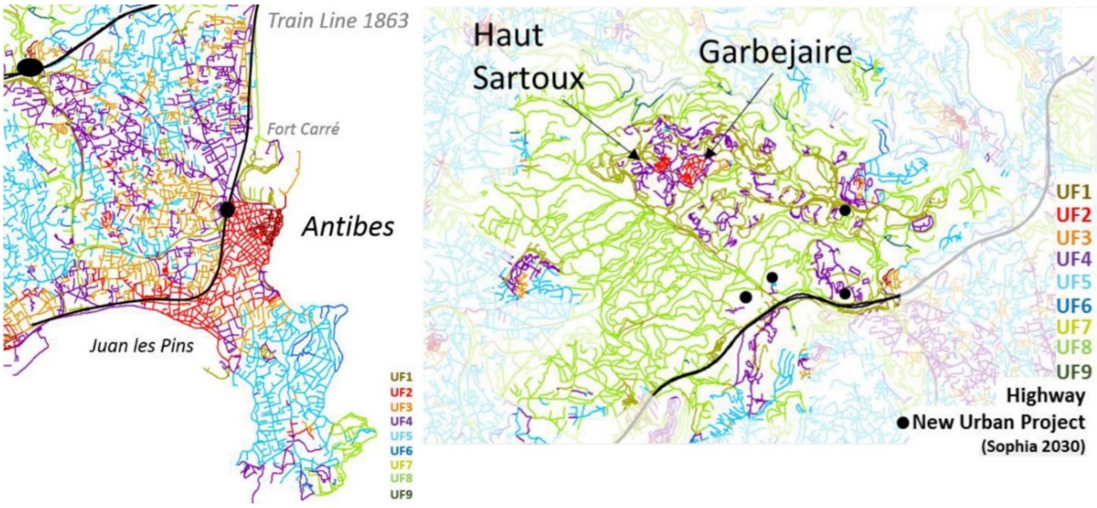


Figure 3.9 MFA results of Antibes and Sophia-Antipolis (Araldi, 2019, pp. 273, 277)

3.1.5 Matching Neighborhood Satisfaction with Urban Fabric

The information of two concepts urban morphology and neighborhood satisfaction are derived in two different scales. One, urban fabric classification (MFA results) is based on street segments. The other, neighborhood satisfaction (Household Mobility Survey data), is embedded in zone division. More precisely, the major problem in here relates to the absence of information about exact addresses of the households for HMS data. The zones where they live are known, however the exact locations of their dwellings are not known. Given that, the data gained from HMS should be reanalyzed to match the data to the related urban fabric in the zone. This missing information about the exact location of households who answer HMS has changed the whole methodological structure of this study and led it to use Bayesian Networks instead of statistical correlation to manage uncertainty and infer missing information.

In order to compare urban fabric (MFA results) and neighborhood satisfaction (the survey data), urban fabric classification map is overlapped with the zonal division that is used in the survey (Figure 3.10).

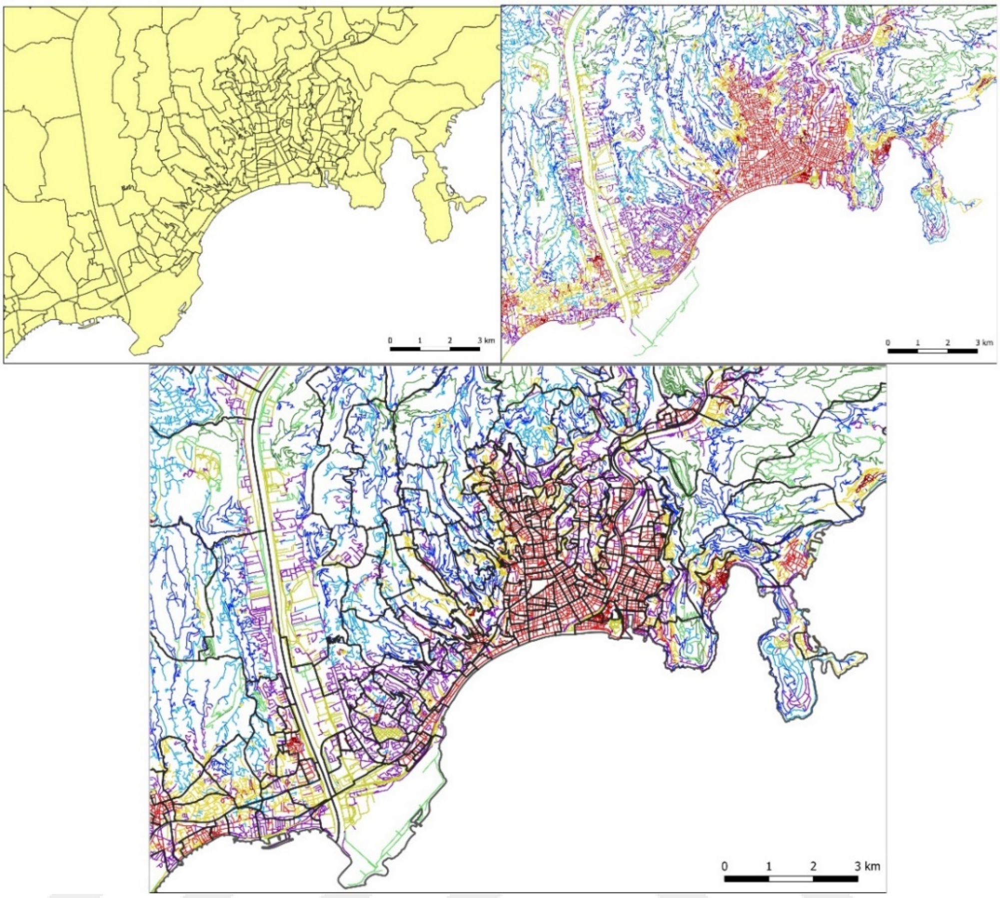


Figure 3.10 Merge of MFA results with zone division

The HMS zone division is in two levels, where the first level is sectors and the second is zones within the sectors. Neighborhood satisfaction questions in the HMS were asked in 94 sectors and 563 zones, MFA study area includes 96 sectors and 620 zones. In 94 sectors and 516 zones both the neighborhood satisfaction answers, and the MFA urban fabric clustering are available. However, the weakness here is the size of the zones as a spatial unit because the sizes range from 1.24ha to 6482.37ha (D1: 7.39ha, D5: 34.34ha, D9: 624.61ha). Yet in the related literature, a neighborhood unit is defined with maximum 0.4 km distance from center to border (Patricios, 2002) which makes the neighborhood size approximately 50 ha (See Chapter 2).

Therefore, while managing the neighborhood size in this study, the sizes of the zones below 50ha can be considered micro-level and the ones above macro-level. Neighborhood sizes in macro-level for HMS data can be inferred via geoprocessing by defining neighboring small zones together as a neighborhood. However, micro level information of large zones can never be reached, as it is not possible to divide HMS zones (Table 3.5).

Table 3.5 Evaluation of zone size

	Micro Level (< 50ha)	**Macro Level (50ha >)**
Small Zones	Exists	Can be calculated via geoprocessing
Large Zones	Cannot be inferred	Exists

Under these circumstances, knowing that it causes an important weakness in the study, the HMS zones are processed as they are. The weakness is that the categorization of the zones might give unfair results.

Furthermore, it is already highlighted the fact that the delineation of the subzones in HMS did not follow any morphological protocol: the superimposed map revealed that the urban fabric in some zones belong to several families. This made it even harder to make a cross-analysis of household satisfaction and form of the urban fabric. However, as HMS data consists of information about dwelling types, and as dwelling types are differently present in the urban fabric families, it is possible to conceive a Bayesian Network model where these relationships are modelled. Bayesian inference to assess the relationship between neighborhood satisfaction and urban form can be finally used.

3.1.6 Uncertainty and Bayesian Networks

3.1.6.1 Bayesian Networks

Bayesian Networks (BN - also called belief networks) are graphical models of casual knowledge in contexts of uncertainty (Fusco, 2010). Within a probabilistic framework, the model is based on Bayes Theorem. BN is able to manage a wide range of tasks such as prediction, detection, diagnostics, classification and decision making. To do that it builds probabilistic models by combining prior knowledge with observed data using the Bayes' rule:

$$P(H|D) = \frac{P(D|H)P(H)}{P(D)} , \qquad (3.1)$$

where P(D) is the prior probability of observing data D, P(D|H) (called likelihood) is the probability of observing D if hypothesis H holds, P(H) is the prior probability of hypothesis H, and P(H|D) is the posterior probability of H after observing data D (Wang, 2007).

Bayesian Networks combine graphical formalism (the model structure) with the mathematical formalism of conditional Bayesian probability tables (the model parameters). In the graphical models, rectangles, or circles that is to say nodes represent variables, and they are connected to each other with direct links. The links signify the relationship between the nodes. According to the direction of the link, the nodes turn out either parent or child nodes. The conditional probability table (CPT) of a child node depends on the values of its parent nodes. After the construction of the net, having the findings of certain variables, the BN model can be used to find beliefs for other variables through probabilistic inference. There are several commercial software tools used for Bayesian Networks such as Hugin, Netica, BayesiaLab. These tools allow the user to graphically enter the structure of the Bayesian Networks, enter the numerical details, and then make the inference. The results of the inference are then graphically represented using bar graphs (Nadkarni & Shenoy, 2001). In this research, the software Netica (Norsys Software Corp., 2018) is used to build and exploit the Bayesian Networks. The inferred knowledge and the beliefs can be observed from bar-graphs and probability tables (Figure 3.11).

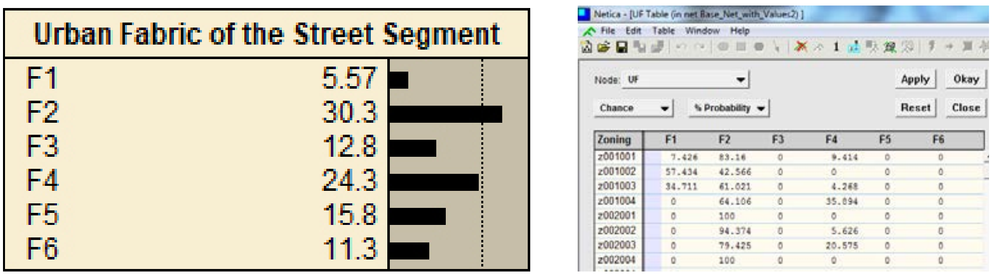


Figure 3.11 Bar graph and probability table in Netica

Bayesian Networks (BN) have been used in urban studies since the beginning of the 2000s (Fusco, 2004). For instance, it is used in scenario building and decision making in planning. De Santa Olalla et al. (2006) discuss planning of an aquifer in Iberian Peninsula. Fusco (2012) handles scenarios of metropolitan development in the

French Riviera. McCloskey et al. (2011) discuss compatibilities and conflicts between development and landscape conservation in a watershed. BN is also applied when examining relationship between two or more urban phenomena. Flint et al. (2000) argues the relationship between place and political behavior. Fusco (2016) explore interplay of spatial affordance and lifestyles making reference to built-up form and mobility.

3.1.6.2 Establishing the Relations and Running the Network

The French Riviera case is heavily hypothesis-driven, the model structure is not discovered from the data, but the model is imposed to the data. However, after building the model, its parameters are learned from the data thanks to geoprocessing in GIS and Bayesian learning algorithms in Netica. As the knowledge where people live is absent, a Bayesian Network is constructed to solve this uncertainty.

Variables and Links

In the Bayes net that is built in this study, there are 9 nodes and 15 links (Table 3.6 and Figure 3.12).

Table 3.6 Nodes and links

	Nodes	Parent Links	Child Links
1	Zoning	No parent links	Urban Fabric of Street Segment, Urban Form of the Zone
2	Urban Fabric of Street Segment (UF)	Zoning	Dwelling Type, Distance to the Sea, Dwelling Satisfaction, Neighborhood Satisfaction
3	Dwelling Type	Urban Fabric of Street Segment	Dwelling Satisfaction
4	Urban Form of the Zone (UF_ZF)	Zoning	Dwelling Satisfaction, Neighborhood Satisfaction
5	Distance to the Sea	Zoning, Urban Fabric of Street Segment	Neighborhood Satisfaction
6	Centrality of the Zone	Zoning	Neighborhood Satisfaction
7	Nature Inside the Zone	Zoning	Neighborhood Satisfaction
8	Dwelling Satisfaction	Dwelling Type, Urban Fabric of Street Segment, Urban Form of the Zone	-
9	Neighborhood Satisfaction	Urban Fabric of Street Segment, Urban Form of the Zone, Distance to the Sea, Centrality of the Zone, Nature Inside the Zone	-

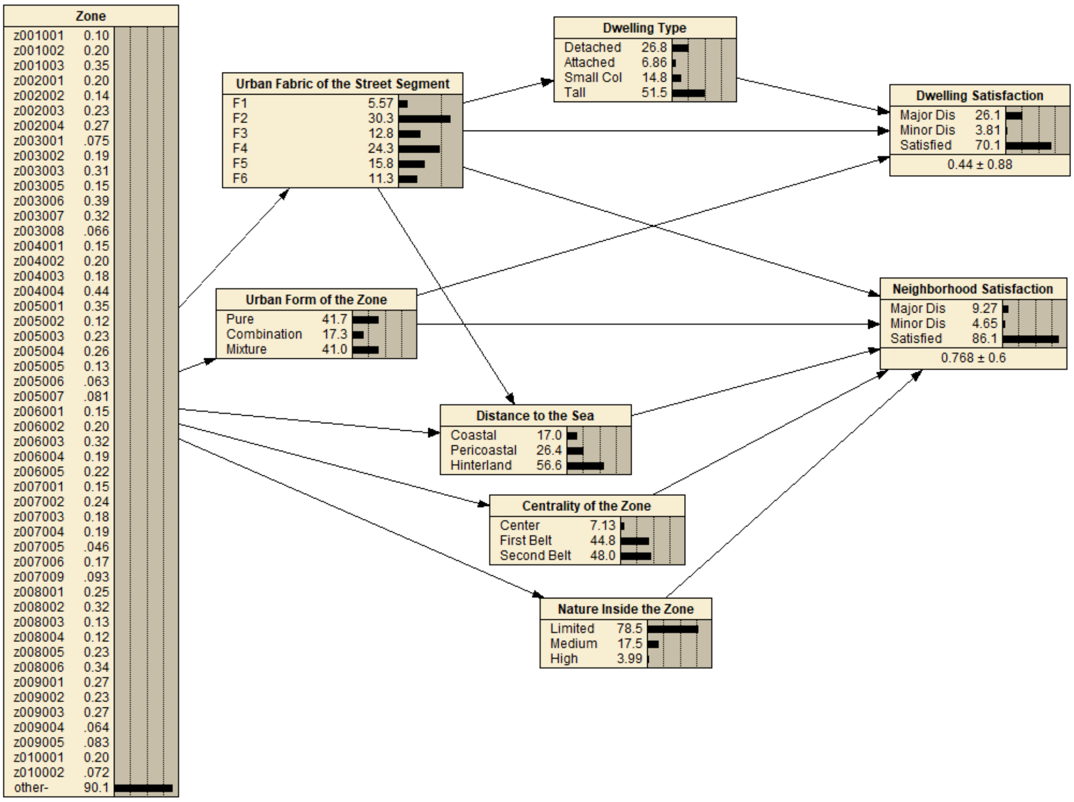


Figure 3.12 Bayesian Network in Netica

First nodes and links are created to infer the information of urban fabric where households live. That's why first the nodes *Zone*, *Urban Fabric of Street Segment (UF)* and *Dwelling Type* are created. *Zone* is linked to *Urban Fabric of the Street Segment*, as the urban fabrics are embedded in the zones. *Urban Fabric of the Street Segment* is linked to *Dwelling Type* to achieve aforesaid inference. Both *Dwelling Type* and *Urban Fabric of the Street Segment* are linked to *Dwelling Satisfaction* since both variables are effective in dwelling satisfaction. Next, to be able to evaluate neighborhood satisfaction better more control variables are added to the network which are *Urban Form of the Zone*, *Distance to the Sea*, *Centrality of the Zone* and *Nature Inside the Zone*. In brief, *Dwelling Satisfaction* is directly linked to *Dwelling Type*, *Urban Fabric of Street Segment*, *Urban Form of the Zone*. *Neighborhood Satisfaction* is directly linked to *Urban Fabric of Street Segment*, *Urban Form of the Zone*, *Distance to the Sea*, *Centrality of the Zone*, *Nature Inside the Zone*. But it has an indirect relationship with *Dwelling Type* and *Zones* (Figure 3.12).

Calculation of Variables

In this section, the nodes are presented by demonstrating how the survey and the MFA outputs are processed and inserted in the BN.

Node 1: Zoning. The first node is dedicated to the list of the zones. It is an independent variable, so it has no parent nodes and no conditional probability. The unconditional probabilities of the zones are computed based on the samples of households (weight of the samples) in each zone. This node is linked to the nodes *Urban Fabric of Street Segment* and *Urban Form of the Zone* in order to structure their Conditional Probability Table (CPT) (Figure 3.13).

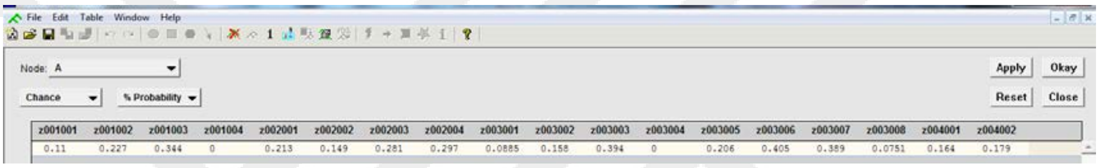


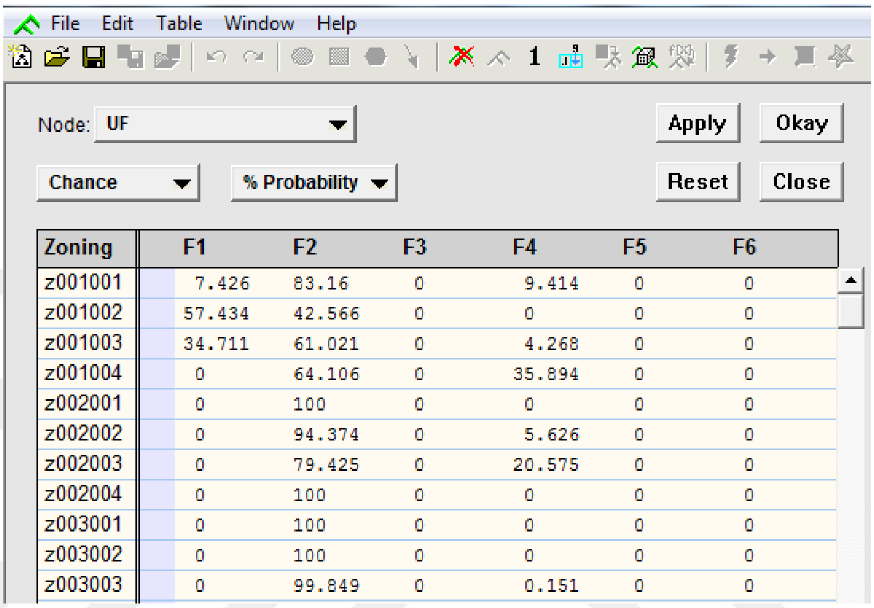
Figure 3.13 Probabilities of the zones (based on the weights of household samples)

Node 2: Urban Fabric of Street Segment. Form of the street segment is the urban fabric families which Araldi and Fusco have characterized in the French Riviera. The CPT of this node is learned from geoprocessing. While processing the whole data, first the families 7, 8 and 9 in which there are no residential areas, in other words no survey data are eliminated. Thus, this study has dealt only with six urban fabric families (Table 3.7).

Table 3.7 Recall of urban fabric families and their use

Urban Fabric Family	**UFF Use**
1. Old constrained urban fabrics of town-houses	UF1
2. Traditional urban fabrics of the plain with adjoining buildings	UF2
3. Discontinuous and irregular urban fabrics with houses and buildings	UF3
4. Modern discontinuous urban fabrics with big and medium-sized buildings	UF4
5. Suburban residential fabrics in hills or plain	UF5
6. Small house constrained suburban fabrics	UF6
7. Connective artificial fabrics with sparse specialized big buildings	Eliminated
8. Non urbanized space in hills or plain with sparse homes and buildings	Eliminated
9. Mountain natural space with sparse houses	Eliminated

The percentage of each urban fabric family are calculated in terms of street segment proximity band area in all zones. In several zones all the streets belong to one family, but in some zones, there were more urban fabric families. For example, in the zone 001003, 34.71% of the streets belong to UF1, 61.02% to UF2 and 4.27% to UF4 (Figure 3.14).



Zoning	F1	F2	F3	F4	F5	F6
z001001	7.426	83.16	0	9.414	0	0
z001002	57.434	42.566	0	0	0	0
z001003	34.711	61.021	0	4.268	0	0
z001004	0	64.106	0	35.894	0	0
z002001	0	100	0	0	0	0
z002002	0	94.374	0	5.626	0	0
z002003	0	79.425	0	20.575	0	0
z002004	0	100	0	0	0	0
z003001	0	100	0	0	0	0
z003002	0	100	0	0	0	0
z003003	0	99.849	0	0.151	0	0

Figure 3.14 CPT of the node form of street segment

Node 3: Dwelling Type. The probability of the urban fabric of the household is learnt through dwelling type and the relation between them are set based on a subset of purest zones. First the purest zones as possible are identified. Although for some urban fabric families there were numerous pure zones such as in UF2, it was challenging to find highly pure zones for every family like it is in UF1, UF3, UF6. Considering that there should be enough number of zones to calculate in a reliable way the probabilistic parameters linking urban fabric with dwelling type, in some cases the threshold of purity is lowered until 70% (Table 3.8 and Figure 3.15).

Table 3.8 Pure families to make an inference

Zone ID	U.F. Family	Purity
052 016	UF1	96.14
085 001	UF1	95.59
052 008	UF1	89.63
057 005	UF1	79.38
097 002	UF1	78.18
002 001	UF2	100.00
002 004	UF2	100.00
003 001	UF2	100.00
003 002	UF2	100.00
003 004	UF2	100.00
003 006	UF2	100.00
003 007	UF2	100.00
004 002	UF2	100.00
004 003	UF2	100.00
004 004	UF2	100.00
005 001	UF2	100.00
005 002	UF2	100.00
005 003	UF2	100.00
005 005	UF2	100.00
006 003	UF2	100.00
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007 002	UF2	100.00
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007 006	UF2	100.00
007 007	UF2	100.00
007 008	UF2	100.00
008 001	UF2	100.00
008 002	UF2	100.00
008 003	UF2	100.00
008 004	UF2	100.00
008 005	UF2	100.00
012 003	UF2	100.00
013 007	UF2	100.00
017 002	UF2	100.00
017 003	UF2	100.00
017 004	UF2	100.00
022 003	UF2	100.00
022 004	UF2	100.00
025 002	UF2	100.00
025 006	UF2	100.00
200 004	UF2	100.00
097 001	UF2	99.96
008 006	UF2	99.91
003 003	UF2	99.85
025 007	UF2	99.81
018 001	UF2	99.79
026 001	UF2	99.77
016 006	UF2	99.67
098 003	UF2	99.24
066 001	UF2	99.07
005 004	UF2	98.75
097 005	UF2	98.52
026 005	UF2	98.21
015 002	UF2	97.81
003 008	UF2	97.78
200 008	UF2	97.27
009 002	UF2	96.73
068 006	UF2	96.66
097 003	UF2	96.29
012 002	UF2	95.98
012 001	UF2	95.46
009 003	UF2	95.16
078 001	UF2	95.04
032 008	UF3	87.62
047 004	UF3	79.55
042 003	UF3	73.76
036 003	UF3	72.21
047 003	UF3	71.64
064 004	UF3	69.85
015 011	UF4	100.00
029 005	UF4	100.00
061 001	UF4	100.00
062 001	UF4	99.97
096 006	UF4	99.80
096 005	UF4	97.17
021 003	UF4	95.77
078 008	UF4	95.48
049 001	UF4	95.39
104 007	UF4	95.38
035 003	UF4	95.23
031 002	UF4	93.89
061 003	UF4	92.95
048 002	UF4	92.81
032 004	UF4	92.49
064 001	UF5	99.98
046 005	UF5	97.04
084 001	UF5	96.67
075 011	UF5	93.60
083 002	UF5	91.54
092 005	UF5	91.05
077 003	UF5	90.80
083 013	UF5	90.72
043 009	UF6	100.00
078 010	UF6	100.00
044 001	UF6	97.55
011 005	UF6	88.81
060 006	UF6	85.51
050 002	UF6	82.24
053 008	UF6	78.51

As seen in Figure 3.15, zones of pure families are not concentrated in one location only but are distributed across the study area. This provides a more reasonable base for the generalization of the typo-morphological relationships to the whole study area.

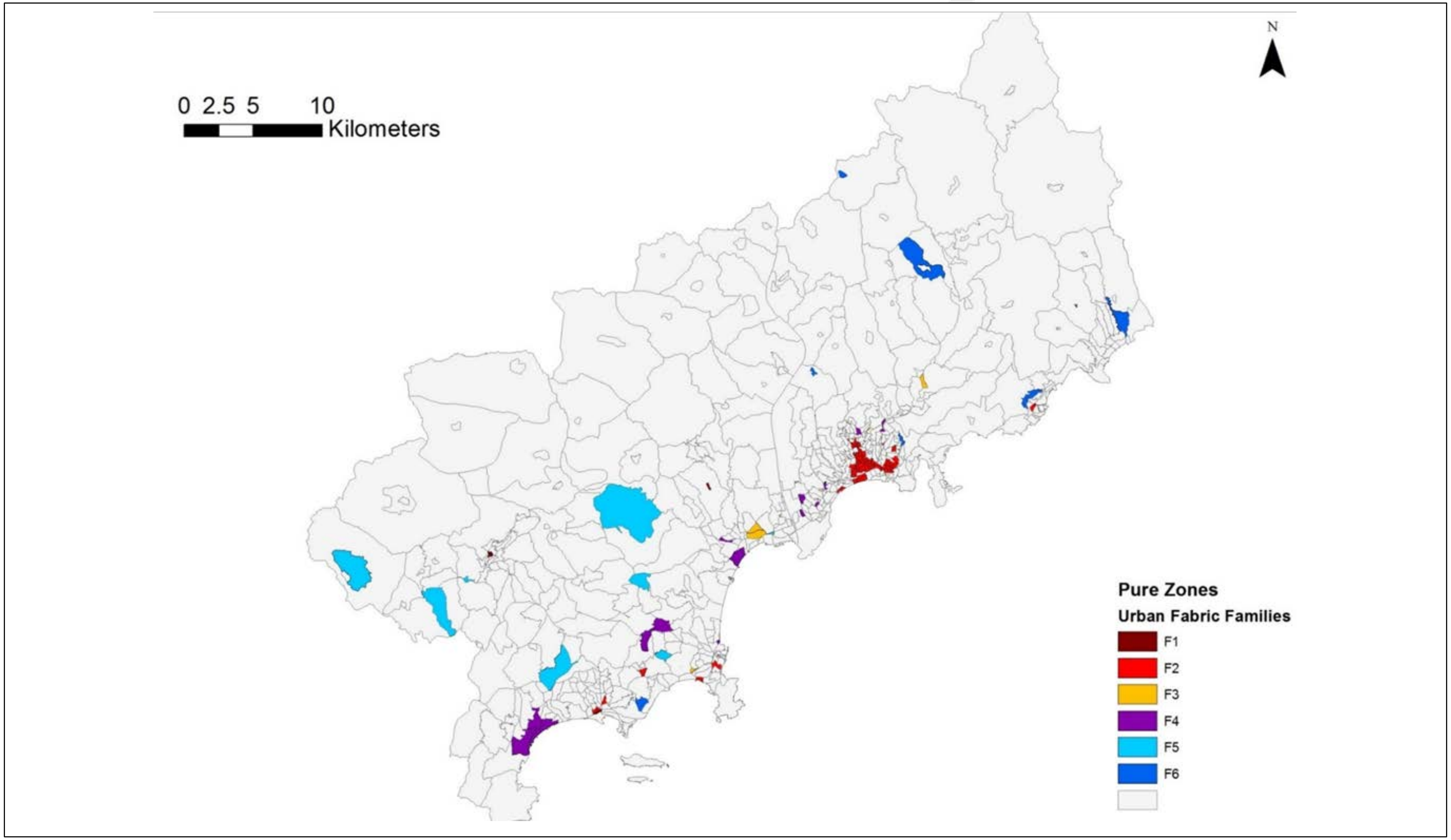
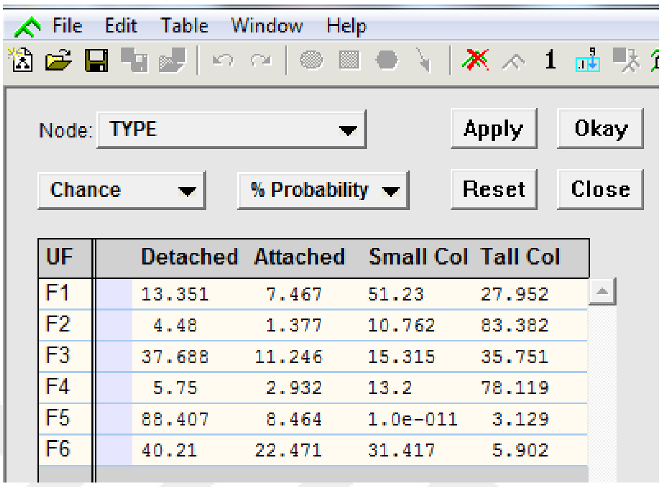


Figure 3.15 Pure zones to infer urban fabric families in BN

Next, the percentage of dwelling types in the aggregation of zones of a given pure urban fabric are computed. In the HMS the dwelling types were categorized as detached individual, attached individual, small collective, which is up to 3 stories, tall collective which are the buildings with more than 3 stories.



UF	Detached	Attached	Small Col	Tall Col
F1	13.351	7.467	51.23	27.952
F2	4.48	1.377	10.762	83.382
F3	37.688	11.246	15.315	35.751
F4	5.75	2.932	13.2	78.119
F5	88.407	8.464	1.0e-011	3.129
F6	40.21	22.471	31.417	5.902

Figure 3.16 CPT of the node dwelling type

Figure 3.16 reveals that UF1 (Old constrained urban fabrics of town-houses) is more likely to have small collective buildings (51.23%). In UF2 (Traditional urban fabrics of the plain with adjoining buildings) and F4 (Modern discontinuous urban fabrics with big and medium-sized buildings) there are mostly tall collective buildings (83.38% and 78.12%). In UF5 (Suburban residential fabrics in hills or plain) detached individual buildings are prevalent (88.41%). UF6 (Small house constrained suburban fabrics) has mostly detached (40.21%), but also small collective (31.42%) and attached individual buildings (22.47%). UF3 (Discontinuous and irregular urban fabrics with houses and buildings) is mixed, but mostly has detached individual (37.69%) and tall collective buildings (35.75%). It is assumed that these parameters, calculated on the 100 purest zones of Table 3.8 and Figure 3.15, can be used to model the urban fabric / dwelling type relationship in all the study area.

Node 4: Urban Form of the Zone. Next, overall characterization of urban form of zones is added to the BN. That is to say the general profile of the zones as pure (a single prevalent form), combination of two main forms and mixture of several urban fabrics. The hypothesis is made that the homogeneity/heterogeneity of the urban form around the place of residence can have an influence on neighborhood satisfaction. To have the general profile of precisely 524 zones, they are classified according to the weights of urban fabric families in each. The thresholds are defined as ratio of 1/3 and 2/3 to have a classification as below:

Table 3.9 Urban form classification of the zones

If $UF_1 > 2/3$	Single prevalent form
If $1/3 < UF_1 < 2/3$ and $UF_2 > 1/3$	Combination of two main forms
If $UF_1 < 1/3$	Mixed forms

*UF_1 and UF_2 corresponds to the first two overriding urban fabric families.

According to this classification there are 237 zones with a single prevalent form, 82 zones with combination of two main forms and 205 mixed zones in the study area. With the nodes that were built, neighborhood satisfaction related to the fabric on the street level can be observed. Nevertheless, the goal here was to observe neighborhood satisfaction also considering its relation with its immediate environment, in other words the zone it belongs to. That is why the profile of the zones is roughly classified (Figure 3.17).

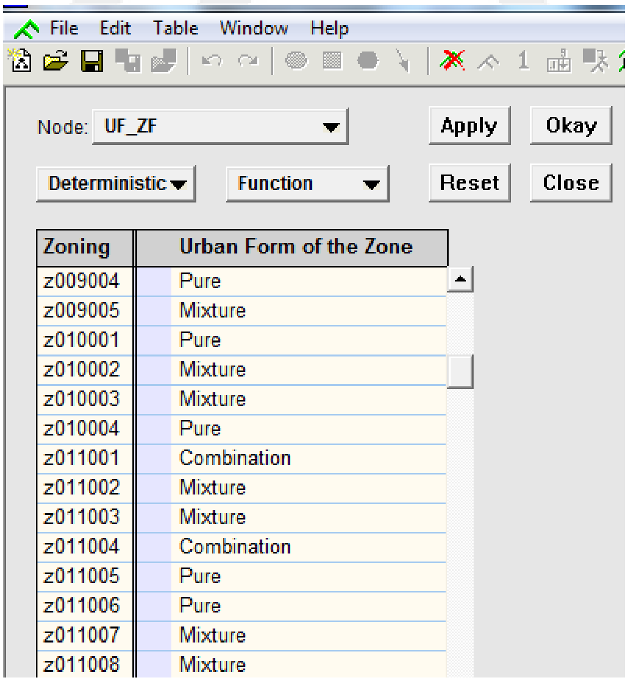
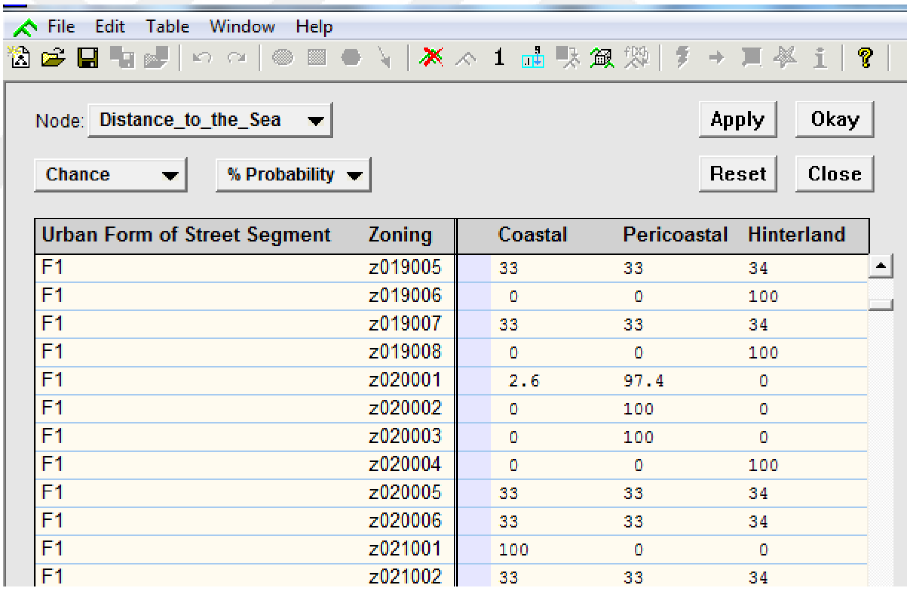


Figure 3.17 Deterministic table of the node urban form of the zone

Node 5: Distance to the Sea. As an additional factor of neighborhood satisfaction, location in respect to the seaside is an essential factor in the French Riviera. The seaside is a fundamental recreational area for French Riviera dwellers, all year long, but its use depends crucially from ease of access to it. Seaview, from the dwelling and from public space, can be considered as a further potential factor of neighborhood satisfaction, but could not be modelled with the available spatial information. The distance to the sea is measured by categorizing the region in three sectors. The first distance band is the area covering 500 m from the seaside (immediate pedestrian proximity), the second is between 500 m and 1500 m (further pedestrian accessibility) and the rest belongs to the third sector, needing motorized travel. This knowledge is also associated with the urban fabric families (Figure 3.18). The total street lengths in each zone, for each UF for each distance band to the sea are calculated and their percentages are found.



Urban Form of Street Segment	Zoning	Coastal	Pericoastal	Hinterland
F1	z019005	33	33	34
F1	z019006	0	0	100
F1	z019007	33	33	34
F1	z019008	0	0	100
F1	z020001	2.6	97.4	0
F1	z020002	0	100	0
F1	z020003	0	100	0
F1	z020004	0	0	100
F1	z020005	33	33	34
F1	z020006	33	33	34
F1	z021001	100	0	0
F1	z021002	33	33	34

Figure 3.18 CPT of distance to the sea

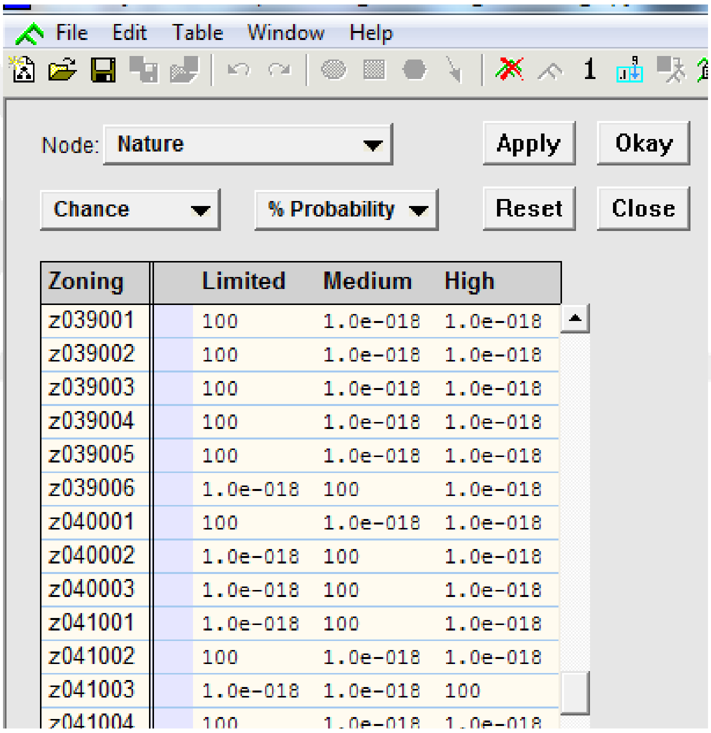
Node 6: Nature Inside the Zone. As an additional urban factor of neighborhood satisfaction, amount of nature inside the zone is measured and added to the net as another node. According to MFA clustering in the French Riviera, urban fabric family 8 and 9 are where green areas exist. Amount of family 8 and 9 are calculated in terms of street length and their ratios are classified in three categories up to 10%, between 10% and 50%, and more than 50%. These categories became three states of the node

Nature Inside the Zone node as limited, medium and high nature respectively (Table 3.10).

Table 3.10 States of the Node Nature Inside the Zone

0 - 10%	Limited
10% - 50%	Medium
50% <	High

According to this classification there are 388 zones with a limited amount of nature, 100 zones with medium level of nature and 36 zones with high amount of nature in the study area (Figure 3.19).



Zoning	Limited	Medium	High
z039001	100	1.0e-018	1.0e-018
z039002	100	1.0e-018	1.0e-018
z039003	100	1.0e-018	1.0e-018
z039004	100	1.0e-018	1.0e-018
z039005	100	1.0e-018	1.0e-018
z039006	1.0e-018	100	1.0e-018
z040001	100	1.0e-018	1.0e-018
z040002	1.0e-018	100	1.0e-018
z040003	1.0e-018	100	1.0e-018
z041001	1.0e-018	100	1.0e-018
z041002	100	1.0e-018	1.0e-018
z041003	1.0e-018	1.0e-018	100
z041004	100	1.0e-018	1.0e-018

Figure 3.19 CPT of nature inside the zone

Node 7: Centrality of the Zone. Neighborhood satisfaction can also be associated with ease of access to services and jobs within the metropolitan area. These are normally concentrated in central areas. Another important variable, centrality within the functional space of the metropolitan area, is thus added to the Bayesian Network. To be able to control this variable, locations of the zones are categorized as central, first belt and second belt. In their research "To understand the functioning of the

Riviera metropolitan by analysis of mobility practices" Fusco et al. (2013) studied the centrality of the sectors in the French Riviera (Figure 3.20).

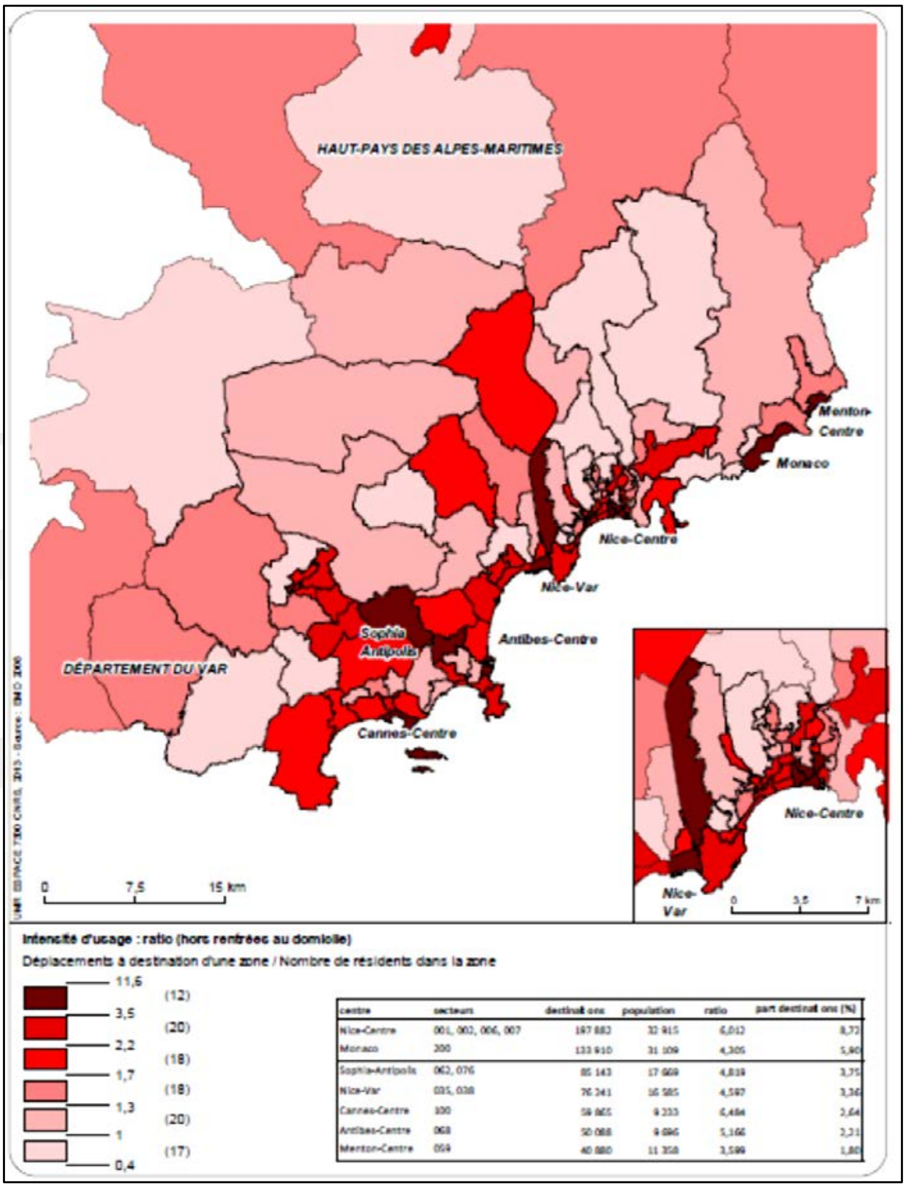


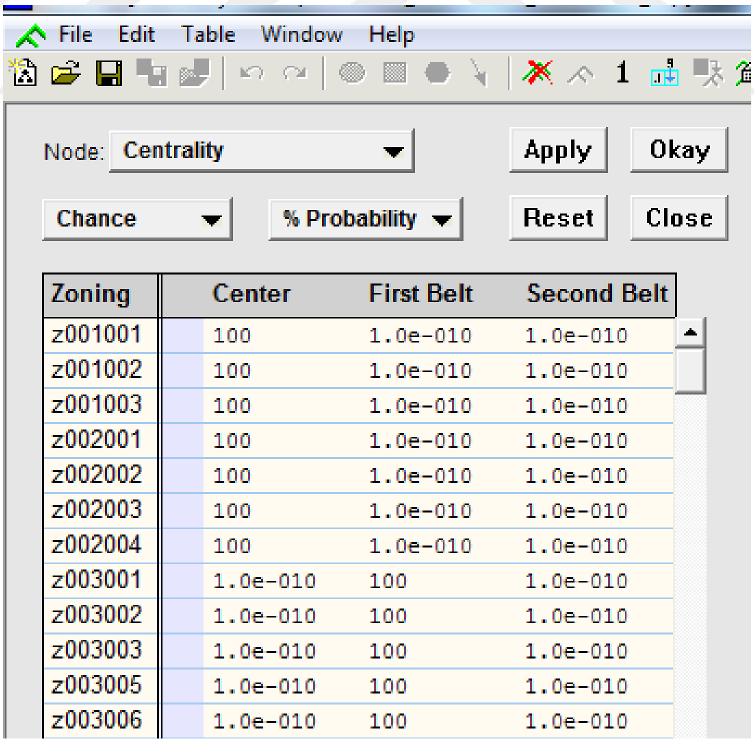
Figure 3.20 Centrality degrees in the French Riviera (Fusco et al., 2013)

According to their report, there are seven centers in the study area in terms of mobility flow, which are from east to west Menton-Centre, Monaco, Nice Center, Nice-Var, Antibes-Centre, Sophia Antipolis and Cannes-Centre. Nice-Var and Sophia Antipolis are lately developed emerging centers with new employment facilities and activities. However, in the scope of this study, only old traditional centers which did not lose their center characteristics with activities, job opportunities, public space life and urban flows are taken as centers. Thus, Menton-Centre, Monaco, Nice Center, Antibes-Centre, and Cannes-Centre happen to be the centers in the study area. Although Monaco is not a center inside the study area of HMS, it is an effective center regarding the centrality of its neighboring zones. Fusco et al. (2013) calculated the distance between sectors in minutes of driving by motor vehicles. In this study, their computation is taken and sectors with 20 minutes of distance to the centers are evaluated as first belt and the other zones as second belt (Table 3.11).

Table 3.11 Sector categorization of the node centrality

Menton-Centre, Nice Center, Antibes-Centre, and Cannes-Centre	Center
In 20 minute distance to Menton-Centre, Monaco, Nice Center, Antibes-Centre, and Cannes-Centre	First Belt
Other sectors	Second Belt

According to this classification there are 39 central zones, 266 zones in the first belt and 219 zones in the second belt in the study area (Figure 3.21).



Zoning	Center	First Belt	Second Belt
z001001	100	1.0e-010	1.0e-010
z001002	100	1.0e-010	1.0e-010
z001003	100	1.0e-010	1.0e-010
z002001	100	1.0e-010	1.0e-010
z002002	100	1.0e-010	1.0e-010
z002003	100	1.0e-010	1.0e-010
z002004	100	1.0e-010	1.0e-010
z003001	1.0e-010	100	1.0e-010
z003002	1.0e-010	100	1.0e-010
z003003	1.0e-010	100	1.0e-010
z003005	1.0e-010	100	1.0e-010
z003006	1.0e-010	100	1.0e-010

Figure 3.21 CPT of the node centrality

Node 8 and Node 9: Dwelling Satisfaction and Neighborhood Satisfaction. Having the indicators of urban morphology and location as the nodes in the network, two more nodes to observe satisfaction of residents are added to the net (1) dwelling satisfaction and (2) neighborhood satisfaction.

Aforementioned the answer options for questions “Currently, what does not satisfy you in your accommodation?” and “Which of these reasons do you think is the most important?” reveal dwelling dissatisfaction.

06 ... too big
07 ... too small
08 ... poorly arranged rooms
09 ... too old
10 ... badly equipped (WC, shower room, kitchen, heating ..)
11 ... without elevator
12 ... poorly isolated
13 ... poorly soundproofed
14 ... collective
15 ... without garden
16 ... without terrace or bigger balcony
17 ... without private parking

The answer options (18-29) for these questions reveal neighborhood dissatisfaction.

18 … Neighbors
19 … Too far from the workplace of a member (s) of the household
20 … Too far from the city center
21 … Too far from nature
22 … Too far from the facilities (schools, shops, leisure ...)
23 … Too insecure
24 … Lack of cleanliness of the neighborhood
25 … Difficulties in accessing public transport
26 … Difficulties of walking
27 … Difficulties to move by car
28 … Environment (silence, calm, pollution ..)
29 … View

In the BN dwelling satisfaction and neighborhood satisfaction are categorized in three states: main dissatisfaction, some dissatisfaction and satisfied. Answers to the survey question "Currently, what does not satisfy you in your accommodation? are associated to main dissatisfaction in the BN. Answers to the question "Which of these reasons do you think is the most important?" are inferred to some dissatisfaction. If “Nothing” is chosen as an answer, the answer is labeled as “satisfied” in the data of BN. Furthermore, the states of main dissatisfaction, some dissatisfaction and satisfied are weighted as -1, 0 and 1 respectively in order to have an average satisfaction score between -1 and 1. In other words percentage that is found for dissatisfaction is multiplied by -1. If there is some dissatisfaction its percentage is multiplied by 0. Lastly, the percentage of “satisfied” is multiplied by 1. The sum of all these gives the satisfaction score based on either neighborhood or dwelling.

$$(\textit{Dissatisfaction} \times (-1)) + (\textit{Some Dissatisfaction} \times 0) + (\textit{Satisfaction} \times 1) = \textit{Satisfaction Score} \quad (3.2)$$

Learning through Bayesian Network.

The use of Bayesian Network was necessary in this study because it was not possible to calculate neighborhood satisfaction and dwelling satisfaction directly through geoprocessing. First it was needed to infer the missing information 'the urban fabric of the household' and then learn neighborhood satisfaction and dwelling satisfaction through this knowledge (Figure 3.22).

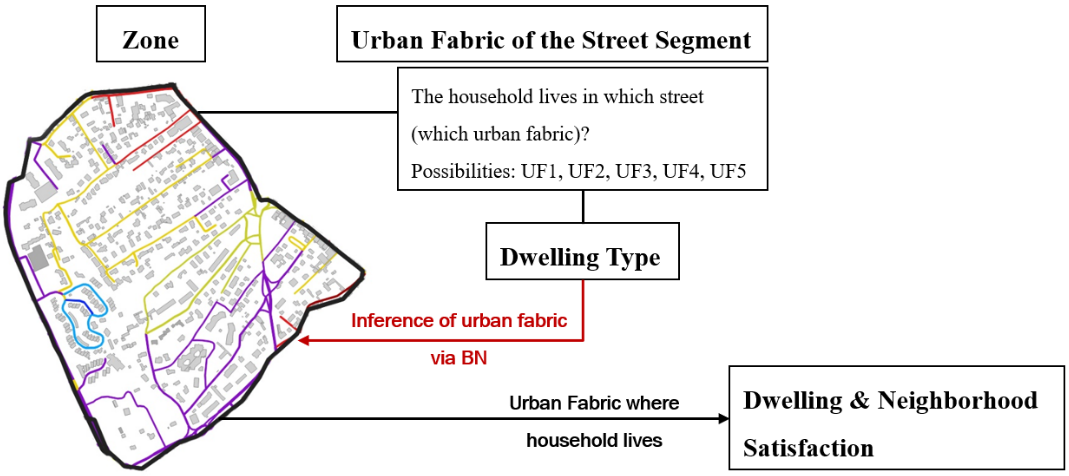


Figure 3.22 Inference of urban fabric of the street where household lives

This learning is realized with the Bayesian algorithm Expectation-Maximization. This algorithm helps to find maximum likelihood estimation of parameters, where the model depends on an unobserved variable which is urban fabric of the household in this case. The expectation-step constructs a log-likelihood expectation function using current estimates of the parameters. The maximization step updates the parameter values to maximize the log-likelihood expectation. Each of these two steps feeds on each other by calculating the input of the other. That is how current estimates of dwelling type probabilities in purest zones (pure in terms of urban fabric) help to observe marginal probabilities of urban fabric of the household. Once the highest probabilities of urban fabric where household lives inferred, estimating influence of urban fabric on dwelling and neighborhood satisfaction became possible.

3.2 Case Study 2: İzmir, Karşıyaka District

3.2.1 Urban Development of Karşıyaka District

This section introduces the urban characteristics and morphological evolution of the study area Karşıyaka District, İzmir. A part of the paper in progress entitled "The Urban Fabric of Turkish Cities: Lessons from Karşıyaka, İzmir." is derived from this section (Erin et al., 2021).

Izmir is the third largest metropolitan city of Turkey located on the western coast and it is regarded as an important tourism center with its natural and historical heritage. Karşıyaka is one of the 11 central districts of Izmir Province, located at the northern part of the Izmir Gulf (Figure 3.23). Karşıyaka is a densely urbanized district covering an area of around 50 km^2 and counting almost 347 thousand inhabitants (according to census of 2021, TUIK, n.d.). It is surrounded by Bayraklı and Bornova districts at the east, Çiğli at the west, Menemen at the north and the Aegean Sea (Izmir Gulf) at the south. With its own commercial, educational, and cultural services Karşıyaka represents one of the sub centers of the polycentric structure of Izmir Province.

Figure 3.23 Location of Karşıyaka in Izmir (Bing Map, Izmir Metropolitan Municipality)

Urban development of Karşıyaka can be better discussed in the context Tekeli's concept of urban development stages in Turkey (2009, 2010, 2015). The author describes four stages profoundly related to the evolution of the social and political situation of the country. Urbanization development in Turkey starts with the Westernization movement of the Ottoman Empire in the second half of the 19th century, with the *shy modernity* period. Beyond doubt, the foundation of the Turkish Republic in 1923 is an ultimate breaking point in every sense. From this year, the *radical modernity* period takes place until 1946 when the multi-party period began. This third period, called *populist modernity,* lasts until the military coup of 1980. Finally, the last period is after the 1980s and it is called *erosion of modernity*. Each period corresponds to a specific socio-political framework in which the central government follows a different agenda for housing production. Such agendas ultimately shaped the urban fabrics in many Turkish cities.

Karşıyaka was a small Turkish village around Soğukkuyu area until the second half of the 19th century. The development of transport infrastructures during the *shy modernity* period (railway in 1865, ferry service in 1884 and highway in 1892) improved its accessibility to the historical center of Izmir stimulating the urban development (Umar, 1992 and Ürük, 2003 as cited in Özkan, 2006). From 1880s, together with the Muslim Turk, Greek and Armenian populations, Western merchants (Italian, French, Dutch, Greek Levantines) established their residence/second home on the coastal area (Kiray, 2006). In 1889 new terrains were opened to settlement and new neighborhoods such as Alaybey, Soğukkuyu, Donanmacı rapidly developed. As the train station was built in Karşıyaka, the settlement of Soğukkuyu started to grow towards south in proximity to the railway (Figure 3.24). Thus, new urban forms began to emerge around this area. This settlement was partitioned by the railroad between the northern and southern regions. Formerly a small village well-known for its vineyards and orchards, Karşıyaka grew into a summer resort made of secondary houses with gardens towards the end of 19th century (Yetkin, 2004 as cited in Özkan, 2008).

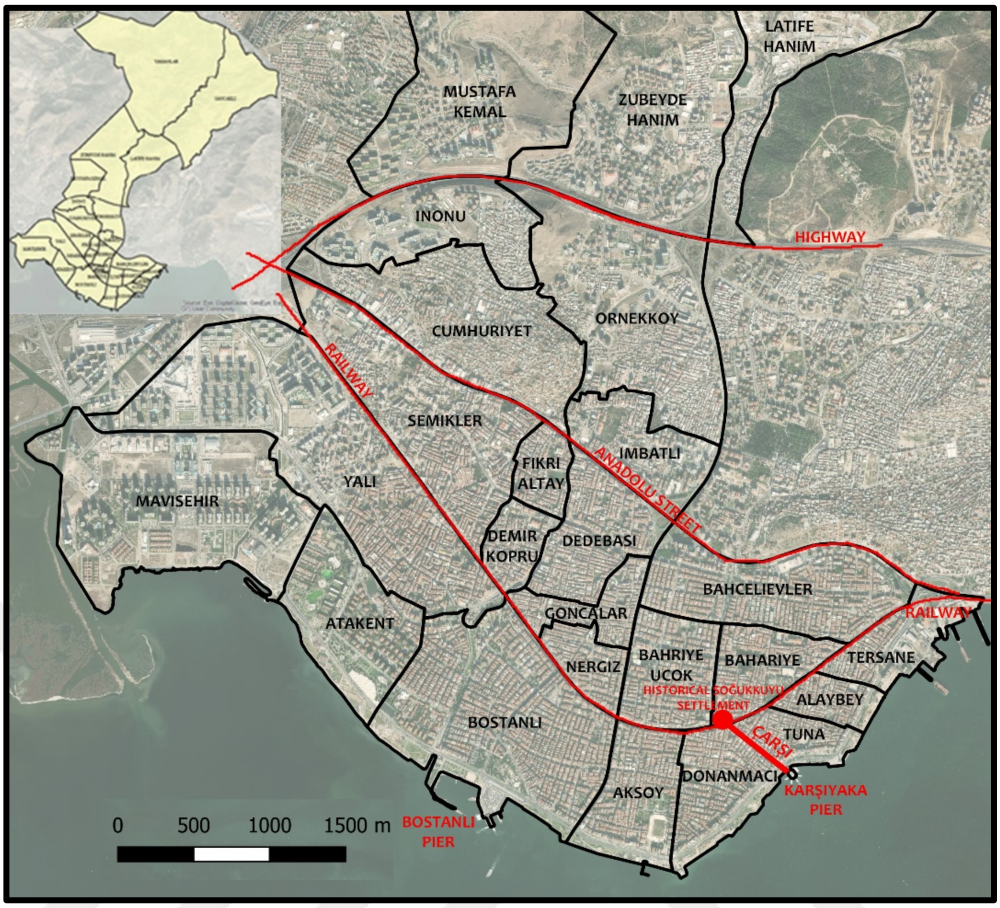


Figure 3.24 Karşıyaka District and its neighborhoods (Google Earth & Izmir Metropolitan Municipality)

The Turkish War of Independence (1922), ending the Greek occupation period, marked the beginning of the urban transformation process of the radical modernity period. In the case of Karşıyaka and Izmir, two significant events have profoundly determined the urban development of the following decades: The Great Fire of Izmir in 1922, and the Exchange of Greek and Turkish Populations in 1923 (Özkan, 2006). Although the fire did not physically damage Karşıyaka, the whole social and economic fabric of the Izmir province was negatively affected. Many of the survivors of the Great Fire resettled in Karşıyaka district. Moreover, during the population exchange, Greek and Armenian population in Izmir was replaced by more than 300,000 Turkish from Greece mostly choosing Karşıyaka (Gündüz and Kiray, 2006 as cited in Sormaykan, 2008). These two events caused rapid population growth in Karşıyaka, exceeding its housing capacity of the time. The housing problem became an important issue also for Izmir and Karşıyaka district. After 1930, the typical summer resort characteristics of Karşıyaka had definitively disappeared, replaced by a residential settlement with a fixed population. The development of a residential fabric, together with the increased connectivity to central Izmir and the establishment of a local market accelerated the welding process of the two-partitioned settlement into one coherent urban region. After 1922, and for all the radical modernity period, the south-eastern part of Karşıyaka was characterized by the highest population densities. Its urban fabric was made of mainly two-story buildings disposed on a regular grid layout with streets parallel to the coastline and perpendicularly disposed to Kemal Paşa Caddesi, the main historical market street. From this regular grid, the settlement expanded following the east-west direction (Figure 3.25). At the end of the radical modernity period, Karşıyaka was still conserving its original urban fabric (Özkan, 2006).

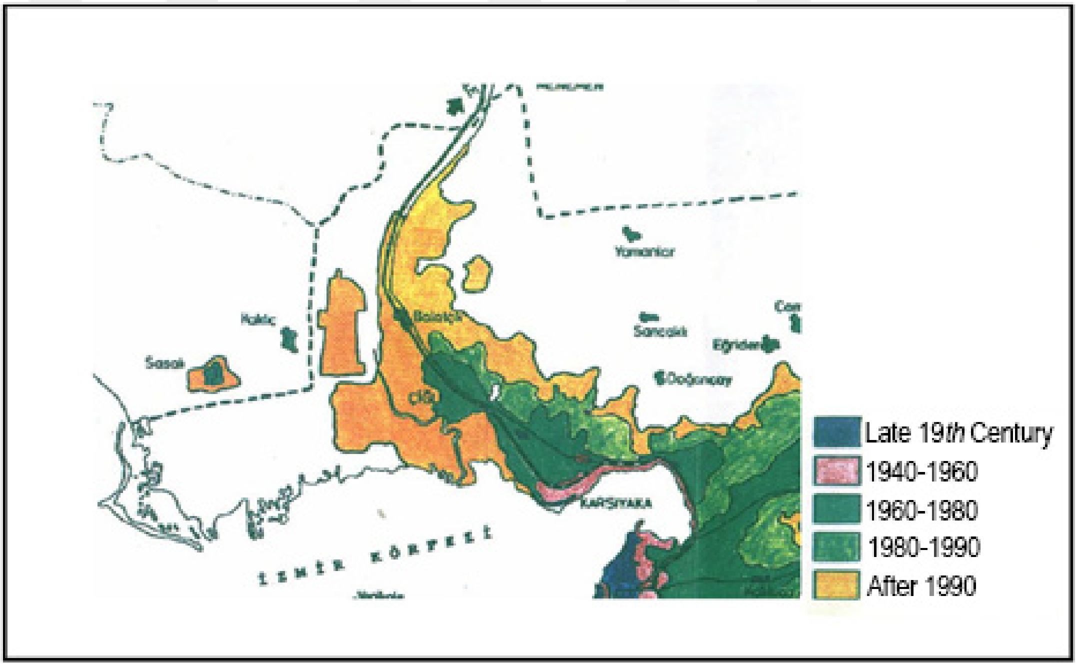


Figure 3.25 Urban development of Karşıyaka (Karadağ, 2000 cited in Özkan, 2006, p.143)

Along the *populist modernity* period, Karşıyaka underwent profound transformations: its center developed following the master plan of Kemal Ahmet Aru and his team (1953). According to the plan, building height along the coastal area was increased to 21.80m (7 stories) and to 12.80m (4 stories) for the inner sectors. For the eastern coastal neighborhood of Bostanlı, building height was established to 12.80m and increased to 15.80m in 1966. The plan included the development of Karşıyaka markets, and its surrounding area mainly dedicated to commercial activities but also to housing as an alternative. Other neighborhoods of the district were also planned as residential areas. In the Aru Plan, the traditional fabric south of the railway was preserved except for the building height regulations. On the contrary, the northern part of Soğukkuyu was redeveloped with a modernist approach of the epoch disregarding the existing fabric. Boulevards and streets were opened, creating a new system of city blocks and plots by dividing the original larger blocks and reorganizing the old organic fabric. Building heights were limited to 12.80m (Sormaykan, 2008). A generalized increase of building heights in the whole district triggered the transformation of the older building stock. Applications for demolishing the low-rise buildings and constructing tree or four-story buildings have increased until 1965. After 1965 with the Condominium Law (Kat Mülkiyeti Yasası), this trend further accelerated in the form of the 'build-and-sell' practice (Gündüz, 2006). In the meanwhile, another type of housing started to grow around the old fabric of Karşıyaka. The master plan of 1951 was not efficient in terms of housing demand as migration from rural areas was accelerating. Low-income migrants started thus to settle around the old fabric of Karşıyaka constructing their own housing by the 1960s (Figure 3.26). Karşıyaka had expanded as an informal settlement towards the north until topographic thresholds (Karadağ, as 200 cited in Sormaykan, 2008). The informal neighborhoods of Nergiz, Şemikler, Dedebaşı, Örnekköy, Cumhuriyet were later on legalized by zoning amnesties (Özsu, 2006). Constructions between the 1950s and 1970s damaged the old urban fabric of Karşıyaka, although they were in human scale and have a certain architectural quality. However, the district underwent a radical change after the 1970s and grew into an important sub-center. As the master plan of Aru was not efficient to supply to a rapidly increasing housing demand, buildings from the 1950s also began to be replaced by new high-rise apartment blocks. This period was also marked by the development of the first modernist planned expansions of the western Karşıyaka by housing cooperatives (such as Bostanlı Subay Evleri, Öğretmen Arsa Kooperatifi etc.) supported by the Emlak Kredi Bank (Real-Estate Credit Bank), targeting middle-income families (Zengin Çelik & Çilingir, 2017).

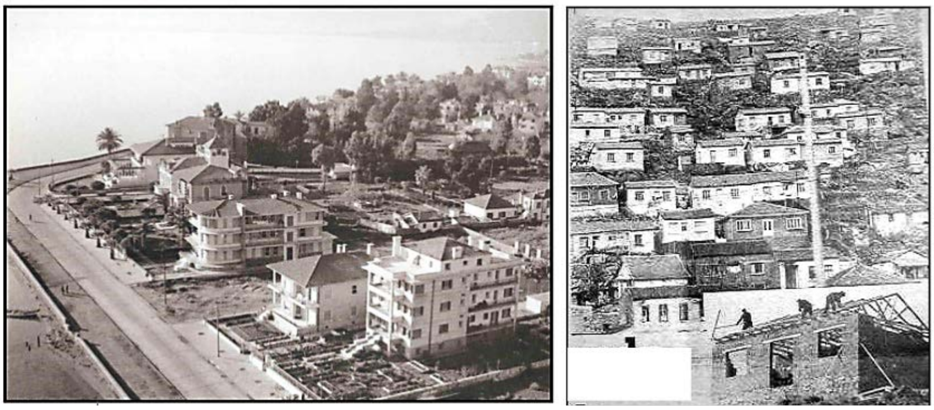


Figure 3.26 Large villas and mansions along Karşıyaka coastline in the 1950s (Sormaykan, p.81); Gecekondu settlement the 1960s (Kaya 2002, p.156)

With the sudden change in the national political and administrative framework and the beginning of the *erosion of modernity* period, a new master plan was developed in 1984 by the Metropolitan Municipality of Izmir. This new master plan allowed higher templates in buildings, stimulating once again the process of building substitution through the build and sell format. A second phase of building replacement within the old urban fabric of Karşıyaka followed the one of the previous periods (between 1950 and 1970) (Özkan, 2006). By the end of 1980, the development of Improvement Plans and mass housing projects in Karşıyaka as for the rest of the country resulted in a fragmented urban structure. Mass housing projects were planned on the periphery of slum areas as a strategy to limit informal expansion (Figure 3.27). After the construction of Atatürk Organize Sanayi Bölgesi (Atatürk Organized Industry Zone) at the west of the district (now in Çiğli) in 1990 and the completion of Mavişehir mass housing stage 1, housing investments at the west of Karşıyaka highly increased (Zengin Çelik & Çilingir, 2017). Mass housing began to target high-income groups with gated communities. These residential areas are self-enclosed entities surrounded by fences or walls, non-integrated to Karşıyaka urban fabric and usually guarded with private security (Ünverdi, 2006). This type of housing began to appear also at the northwest of the district, after the opening of the second highway in 2007. As the highway increased the accessibility of slum areas, it also paved the way to transformation of these neighborhoods (Zengin Çelik & Çilingir, 2017). Finally, to overcome the problem of traffic congestion caused by the poor connectivity of the district, the 80s and 90s plans proposed and implemented the transformation of the

Karşıyaka waterfront with operations of landfilling, hosting the coastal road, recreational areas, and light-rail (Yunuslar tramline, completed in 2017).

Figure 3.27 Mass housing projects in Mavişehir (Sormaykan 2008, pp. 57, 22)

3.2.2 Data Collection

Data collection in Karşıyaka also has two phases in relation to the two aspects of the thesis: neighborhood satisfaction and urban morphology. In order to measure neighborhood satisfaction, a survey was designed based on the related literature. The local characteristics of Karşıyaka and Turkish culture was also taken into consideration in survey development. The survey was then conducted at selected households in the district by a survey company (Pozitif Araştırma) via funding of BAP PROJECT NO 2018.KB.FEN.032. Spatially stratified random selection method was used to select the areas where the surveys will be held.

Morphological analyses (MFA) were done to detect different urban fabrics in Karşıyaka district. Same methodology was followed as in the first case (the French Riviera). Recall, data on building footprint, building height, building specialization (building utilization information), street length, street width, topography and plot was necessary to run MFA in the French Riviera. In Karşıyaka case, data on building footprint, building height and street centerline was achieved from Izmir Metropolitan Municipality - Department of Geographical Information Systems Data Base (İzmir Büyükşehir Belediyesi - Coğrafi Bilgi Sistemleri Şube Müdürlüğü – İBB CBS) thanks to the funding of the BAP PROJECT NO 2018.KB.FEN.032.

3.2.3 Neighborhood Satisfaction Survey

This thesis attempts to define a set of indicators, which are utilized to measure satisfaction in diverse neighborhoods and make a comparison between them. The indicators that are used to measure neighborhood satisfaction in literature were reviewed (see pages 23-25 for detailed information). Literature review reveals 8 categories of indicators: (1) participants' demographic characteristics, (2) general satisfaction with the neighborhood and satisfaction with issues related to (3) location/accessibility, (4) physical characteristics, (5) dwelling attributes, (6) social relations, and (7) safety. The survey to be used in this study was designed based on these categories as this literature suggested. In addition, this survey was revised and achieved its final and original form after accounting for the significant local and cultural characteristics. For example, in their study with Turkish undergraduates in Korkut, Altuna et al. (2016) found that the results with 5- and 7-point likert scale did not differ significantly. Also, 7-point likert scale is not a good choice in terms of comprehension and differentiation, unless the education level of the participant is high. As 3 point is not a comprehensive measure, 5-point likert scale was chosen in this study while preparing the survey (Cubukcu, 2015). Likewise, in Turkey rating clarified statements gets more reliable responses than mentioning and rating the concepts in general. For example, instead of asking to rate "*maintenance of the neighborhood*", it is better to ask the rate of agreement with a statement like "*My neighborhood is clean and well-maintained"*.

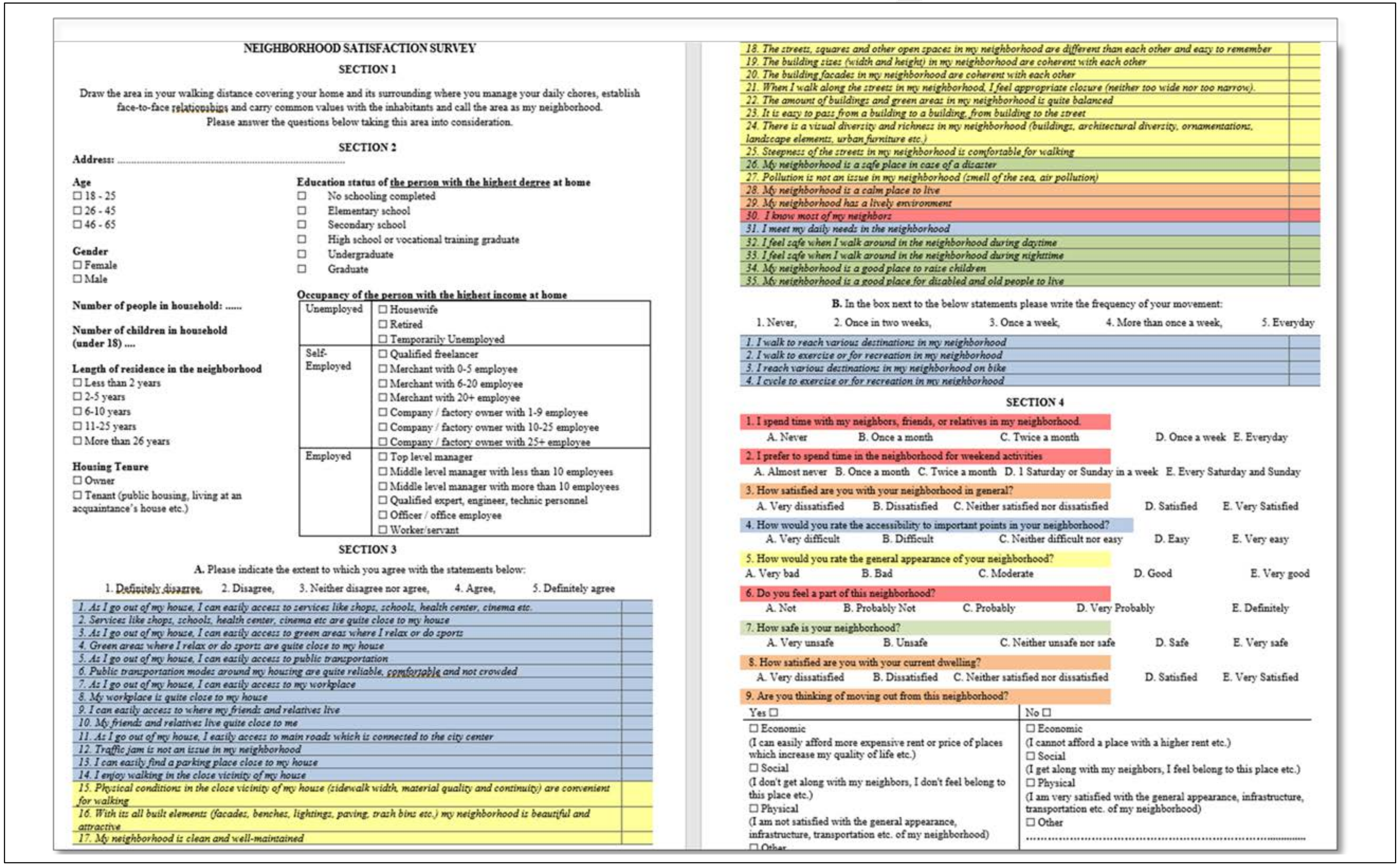
The survey has four sections (Figure 3.28). The first section was designed to get information about the area the participant would evaluate in the next sections. Participants were asked to draw/show the boundaries of where they think their neighborhood is on a map. The following definition was given to each participant to describe the term neighborhood comprehensively.

> "The neighborhood can be defined as the area in your walking distance covering your home and its surrounding where you manage your daily chores, establish face-to-face relationships and carry common values with the inhabitants."

The second section of the survey includes questions related to personal and social characteristics of participants. This information was collected to control and see if responses on neighborhood satisfaction questions differ based on only urban fabric, location or building type, or if they differ based on personal and social characteristics. There are 8 questions in this section (gender, age, number of people and number of children in household, length of residence in the neighborhood, housing tenure, education, and occupation).

Third section contains two parts. Part A has 35 statements about neighborhood satisfaction in 6 dimensions; (1) general satisfaction with the neighborhood and satisfaction with issues related to (2) location/accessibility, (3) physical characteristics, (4) social relations, and (5) safety. Participants were asked to rate their agreement with each statement on a 5-point likert-scale where some statements like A28 and A29 describe opposite qualities of a neighborhood (if the neighborhood is perceived as calm it could not be perceived as alive). Part B involves 4 questions to gather information about lifestyle and tendency to experience recreative activities in the neighborhood and their tendency to use sustainable forms of urban transportation modes (walk and bike) in the neighborhood.

Fourth section involves multiple choice questions to cross check their generalized evaluations various issues in the neighborhood (such as accessibility, appearance, safety, and willingness to move). This section also contains questions on overall satisfaction of the neighborhood and the dwelling. In addition, the questions in this section examined their feeling of attachment and belonging, and the activities they experience in the neighborhood.



NEIGHBORHOOD SATISFACTION SURVEY

SECTION 1

Draw the area in your walking distance covering your home and its surrounding where you manage your daily chores, establish face-to-face relationships and carry common values with the inhabitants and call the area as my neighborhood. Please answer the questions below taking this area into consideration.

SECTION 2

Address: ……………………………………

Age
☐ 18 - 25
☐ 26 - 45
☐ 46 - 65

Gender
☐ Female
☐ Male

Number of people in household: ……

Number of children in household (under 18) ….

Length of residence in the neighborhood
☐ Less than 2 years
☐ 2-5 years
☐ 6-10 years
☐ 11-25 years
☐ More than 26 years

Housing Tenure
☐ Owner
☐ Tenant (public housing, living at an acquaintance's house etc.)

Education status of the person with the highest degree at home
☐ No schooling completed
☐ Elementary school
☐ Secondary school
☐ High school or vocational training graduate
☐ Undergraduate
☐ Graduate

Occupancy of the person with the highest income at home

Unemployed	☐ Housewife ☐ Retired ☐ Temporarily Unemployed
Self-Employed	☐ Qualified freelancer ☐ Merchant with 0-5 employee ☐ Merchant with 6-20 employee ☐ Merchant with 20+ employee ☐ Company / factory owner with 1-9 employee ☐ Company / factory owner with 10-25 employee ☐ Company / factory owner with 25+ employee
Employed	☐ Top level manager ☐ Middle level manager with less than 10 employees ☐ Middle level manager with more than 10 employees ☐ Qualified expert, engineer, technic personnel ☐ Officer / office employee ☐ Worker/servant

SECTION 3

A. Please indicate the extent to which you agree with the statements below:

1. Definitely disagree, 2. Disagree, 3. Neither disagree nor agree, 4. Agree, 5. Definitely agree

1. As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	
2. Services like shops, schools, health center, cinema etc are quite close to my house	
3. As I go out of my house, I can easily access to green areas where I relax or do sports	
4. Green areas where I relax or do sports are quite close to my house	
5. As I go out of my house, I can easily access to public transportation	
6. Public transportation modes around my housing are quite reliable, comfortable and not crowded	
7. As I go out of my house, I can easily access to my workplace	
8. My workplace is quite close to my house	
9. I can easily access to where my friends and relatives live	
10. My friends and relatives live quite close to me	
11. As I go out of my house, I easily access to main roads which is connected to the city center	
12. Traffic jam is not an issue in my neighborhood	
13. I can easily find a parking place close to my house	
14. I enjoy walking in the close vicinity of my house	
15. Physical conditions in the close vicinity of my house (sidewalk width, material quality and continuity) are convenient for walking	
16. With its all built elements (facades, benches, lightings, paving, trash bins etc.) my neighborhood is beautiful and attractive	
17. My neighborhood is clean and well-maintained	
18. The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	
19. The building sizes (width and height) in my neighborhood are coherent with each other	
20. The building facades in my neighborhood are coherent with each other	
21. When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	
22. The amount of buildings and green areas in my neighborhood is quite balanced	
23. It is easy to pass from a building to a building, from building to the street	
24. There is a visual diversity and richness in my neighborhood (buildings, architectural diversity, ornamentations, landscape elements, urban furniture etc.)	
25. Steepness of the streets in my neighborhood is comfortable for walking	
26. My neighborhood is a safe place in case of a disaster	
27. Pollution is not an issue in my neighborhood (smell of the sea, air pollution)	
28. My neighborhood is a calm place to live	
29. My neighborhood has a lively environment	
30. I know most of my neighbors	
31. I meet my daily needs in the neighborhood	
32. I feel safe when I walk around in the neighborhood during daytime	
33. I feel safe when I walk around in the neighborhood during nighttime	
34. My neighborhood is a good place to raise children	
35. My neighborhood is a good place for disabled and old people to live	

B. In the box next to the below statements please write the frequency of your movement:

1. Never, 2. Once in two weeks, 3. Once a week, 4. More than once a week, 5. Everyday

1. I walk to reach various destinations in my neighborhood	
2. I walk to exercise or for recreation in my neighborhood	
3. I reach various destinations in my neighborhood on bike	
4. I cycle to exercise or for recreation in my neighborhood	

SECTION 4

1. I spend time with my neighbors, friends, or relatives in my neighborhood.
A. Never B. Once a month C. Twice a month D. Once a week E. Everyday

2. I prefer to spend time in the neighborhood for weekend activities
A. Almost never B. Once a month C. Twice a month D. 1 Saturday or Sunday in a week E. Every Saturday and Sunday

3. How satisfied are you with your neighborhood in general?
A. Very dissatisfied B. Dissatisfied C. Neither satisfied nor dissatisfied D. Satisfied E. Very Satisfied

4. How would you rate the accessibility to important points in your neighborhood?
A. Very difficult B. Difficult C. Neither difficult nor easy D. Easy E. Very easy

5. How would you rate the general appearance of your neighborhood?
A. Very bad B. Bad C. Moderate D. Good E. Very good

6. Do you feel a part of this neighborhood?
A. Not B. Probably Not C. Probably D. Very Probably E. Definitely

7. How safe is your neighborhood?
A. Very unsafe B. Unsafe C. Neither unsafe nor safe D. Safe E. Very safe

8. How satisfied are you with your current dwelling?
A. Very dissatisfied B. Dissatisfied C. Neither satisfied nor dissatisfied D. Satisfied E. Very Satisfied

9. Are you thinking of moving out from this neighborhood?

Yes ☐	No ☐
☐ Economic (I can easily afford more expensive rent or price of places which increase my quality of life etc.) ☐ Social (I don't get along with my neighbors, I don't feel belong to this place etc.) ☐ Physical (I am not satisfied with the general appearance, infrastructure, transportation etc. of my neighborhood) ☐ Other	☐ Economic (I cannot afford a place with a higher rent etc.) ☐ Social (I get along with my neighbors, I feel belong to this place etc.) ☐ Physical (I am very satisfied with the general appearance, infrastructure, transportation etc. of my neighborhood) ☐ Other ……………………………………………

Figure 3.28 Neighborhood satisfaction survey

In total there are 20 questions on location and accessibility (Figure 3.28 blue lines); 13 questions on physical characteristics (yellow); 4 questions on social relations (red); 6 questions on safety (green); and 5 questions on satisfaction in general (orange). Questions on location and accessibility were derived from the literature on neighborhood satisfaction (Hur & Morrow-Jones, 2008; Rioux & Werner, 2011; Lee et al., 2016; Dassopoulos & Monnat, 2011). Accessibility and distance were examined separately, because closeness does not correspond to an easy access and vice versa. Questions on physical characteristics were derived from environmental psychology studies (environmental perception and walkability) and MFA assessment parameters (Nasar, 1983; Cubukcu, 2003; Hur et al., 2010; Stamps III, 2011; Hur & Nasar, 2014; Cetintahra et al., 2015; Cubukcu et al., 2015; Araldi & Fusco, 2019). Aesthetics, upkeep, tidiness, imageability and legibility, coherence of building size, coherence of building height, coherence of facades, density, identity, linkage, street acclivity, complexity, surface slope were assumed to be indicators of physical characteristics. Questions on social relations were derived from neighborhood satisfaction and place attachment studies (Williams & Roggenbuck, 1989; Vaske & Kobrin, 2001; Semken and Piburn, 2004; Najafi & Kamal, 2012). Other sections (safety, neighborhood satisfaction in general) were mainly based on previous neighborhood satisfaction and place-making studies (Hur & Morrow-Jones, 2008; Lee et al., 2016; Dassopoulos, 2012).

3.2.4 Multiple Fabric Assessment in Karşıyaka

As mentioned in the first case study, MFA assessment classify urban form from pedestrians' point of view. So that it focuses on street segments. Considering that a pedestrian can perceive a limited area in an urban setting, the units of analysis of MFA are defined as proximity bands around street segments. Indicators of the assessment are guided by the concept of urban fabric developed by urban morphology theory but are developed in each study (Araldi&Fusco, 2017; Guyot et al., 2018; Perez et al., 2018; Perez et al., 2019, Fusco et al., 2022) based on the available raw data. In the dataset of Karşıyaka which is gathered from the Izmir Metropolitan Municipality building footprint, building height, utilization of some buildings, and street centerline exist, but data on plot and topography were not available in that dataset. The information of plot could not be found in other sources. The information of topography was exported from certain sources such as Google Earth, but the data was not adaptable to the existing dataset and most importantly the slopes were not specified in built areas. Given that; two parameters (topography and plot) were dropped from the MFA in Izmir case. Yet, leaving out those parameters from the MFA in Karşıyaka did not produce ill-defined morphological clusters for two reasons: 1) according to the previous applications of MFA in different cases (Araldi & Fusco, 2019; Perez et al., 2019; Guyot et al., 2020) "plot" was found to be the least effective element in urban fabric classification; 2) although topography is an important element in urban fabric classification according to the previous applications of MFA, when the final clusters in Karşıyaka were investigated by local planners of the area, it was found that the hilly areas in the district were already clustered as a different urban fabric.

The dataset contains 6083 street segments, where the longest street segment is 6919.81m the shortest 1.77m (D1: 17.76m, D5: 51.08m, D9: 136.48m). The longest segments are located in rural neighbors at the north and then in the highways which are not included in MFA assessment, as they do not give direct access to buildings and are not used by pedestrians. The longest segment that is included in MFA is the coastline with 664.36m. There are 26124 buildings in the dataset with the largest perimeter of 1003.63m, the smallest perimeter 3.30m (D1: 28.00m, D5: 47.83m, D9: 77.77m), the largest coverage area of 52468.04 m^2 and 0.67m^2 (D1: 42.15m^2, D5: 124.36m^2, D9: 318.85m^2). Here the largest polygons that were registered as buildings are construction areas and the smallest ones are some booths. Indeed, the largest building is Bostanlı Market Area with 691.39m^2, other market areas and shopping centers follow that. Maximum number of stories above ground level is 36 stories, which is in construction area, the second is a housing with 25 stories. The smallest number of stories is 0. Although they are in building layer, these entities are not buildings but tennis courts, construction areas or transformers. Lastly, names of 10906 buildings are labeled in the raw data. These names reveal the function of the building such as Mavibahçe Shopping Center, Gazi Anadolu High School or Mevlana Mosque. For the application of MFA in Karşıyaka, first the raw data is treated and adapted to the analysis (Table 3.12).

- *Building footprint* information of the raw data was applicable in MFA without any treatment. Small or very large polygons which were registered in the dataset as buildings. These entities were kept even if they do not correspond to a building but an enclosed entity with a height rather than an empty space. For example, Bostanlı Market Area is not a building, but its area is surrounded by elevated and continuous separation which gives a perception of a building for the pedestrian rather than an empty space.

- *Building height* information in the raw database was based on number of floors and this information was also directly taken in the analysis after removing the entities with 0 number of stories.

- *Building specialization* is a qualitative variable of MFA protocol and refers to building type considering presence or absence of ordinary dwellings. This attribute was not given in the raw dataset of Karşıyaka. Therefore, a procedure is needed before adding this attribute to the analysis as a variable. In the raw data, use of some buildings especially public buildings and services were stated with their names. Thus, first all the education, religion, administration (including institutions and centers), health, museum, library buildings are identified as being specialized. Next, regarding commercial buildings shopping malls and the buildings which do not include a residential area are also stated as specialized. In addition to these, individual hotel, market / bazaar, restaurant / café, bank, and sport center buildings are also labeled as specialized. Later, buildings with large footprints, and those with one or two stories are checked through street views to see if they are anything else than residential or not. Unless they include dwellings or they have ordinary structures, they are registered as specialized. In fact, specialized buildings do not refer to building utilization, but voluminous and different building forms. As all the building utilizations that are mentioned have voluminous and different geometry, building utilization information helps to categorize specialized and ordinary buildings.

- Before dealing with the street attributes, missing street centerlines including major paths of parks and gated communities are drawn via superposing the data with OpenStreetMap and Google Earth base-maps. In addition to these, double lanes and roundabouts are modified concerning the pedestrian movement and perception. When there is a separator (physical barrier, public space) between two lanes of a road, double lane roads are preserved as two lanes in the drawing. If not, the lanes are reduced to one lane. Roundabouts with a radius less than 25m are converted to T-junctions.

- *Street length* is calculated by geoprocessing.

- *Street width* was a missing information and estimated via certain GIS operations. At the beginning streets in parks are set as 3 meters and other streets as 10 meters by default. Next, larger, or more narrow streets are detected via the help of buffer tool to see if they intersect the buildings or too narrow than the openness between buildings on both sides of the street. Then their widths are modified by manual measurements.

Table 3.12 Data Source of Urban Morphology Indicators

MFA data (needed for the analysis)	**İzmir Data (gathered in this study)**
building footprint	IBB – CBS department
building height	IBB – CBS department [no. of storeys]
building specialization	IBB – CBS department [after a treatment]
street centerline / length	IBB – CBS department
street centerline / width	IBB – CBS department [estimation through geoprocessing]

Further, the steps of MFA which is described in the Section 3.1.1 is followed. Recall, (1) defining the proximity bands, (2) calculation of urban morphometric indicators within them, (3) identification of significantly spatial patterns based on the spatial distribution of the urban morphometric indicators, (4) clustering of these patterns (Figure 3.29).

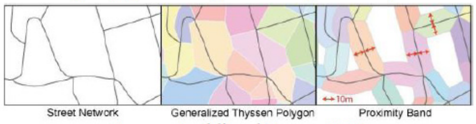
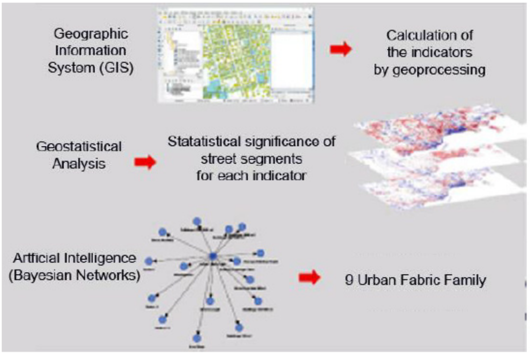
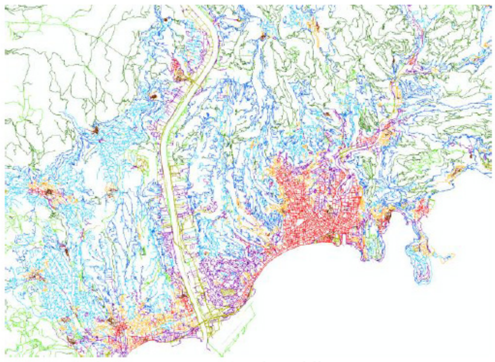
data	**spatial unit of the analysis**
buildings number of stories plots land use streets topography in ArcGIS platform	street segments (limited with Thyssen polygon and proximity bands)  Source: Araldi and Fusco, 2017
processing	**result**
 Source: Fusco, 2017	 Source: Fusco and Araldi, 2017

Figure 3.29 Stages of MFA Protocol

In Karşıyaka case urban morphometric indicators are slightly different than the French Riviera case. In this case, 19 morphology indicators on three main dimensions (Network Morphology, Built-up Morphology, Network-Building Relationship) are measured via geoprocessing on ArcGIS. Building classification is attained via six indicators and it is integrated to urban fabric clustering process as an indicator of “Building Frequency” (Table 3.13).

Table 3.13 List of the urban morphometric indicators

	Indicator Name	Definition	Abbrv.
Network Morphology	1. Street Length	Street segments length between two intersections	L
	2. Windingness	Euclidean distance / Network distance between two intersection	Wind
	3.4.5. Local Connectivity	Average presence nodes of degree 1 (cul-de-sac) Average presence nodes of degree 4 Average presence nodes of degree 3, 5+	ND1, ND4, ND35+
Built-up morphology	6. Coverage Ratio PB50meters	Built-up Area / PB50 Area	CR50
	7. Footprint Surface (Building)	Building Type prevalence (4 types identified through Footprint Surface, Elongation, Convexity, Height, Continuous Built-up Entity, Specialization) Area of Building Types (B1, B2, B3, B4) / Total Built-up Surface	B1, B2, B3, B4
	8. Elongation (Building)		
	9. Convexity (Building)		
	10. Building Height		
	11. Continuous Built-up Entity		
	12. Building Specialization		
Network-Building Relationship	13. Average Open Space	Average width of open space (perpendicular sightlines) along the street	OS
	14. Open Space Variability	Standard Deviation of Open Space	SDOS
	15. Average Setback	Average width of open space (perpendicular sightlines) along the street	SB
	16. Building Facades Misalignment	Standard Deviation Setback	SdSB
	17. Street Corridor Effect	Length of Parallel Facades / Street Length	CorrEff
	18. Average Height-Width Ratio	Building Height / Open Space Width	HW
	19. Average Building Height	Average building height along the street (in PB20)	H
	20. Height Misalignment	Standard Deviation Building Height	SDH
	21.Building Frequency	Number of buildings / Street Length	FrBuild

3.2.4.1 Network Morphology

Network morphology is measured with indicators *length, windingness* and *local connectivity,* where;

1. Length (L_{street}) is simply the length of the street segment.

2. Windingness is the inverse of linearity and measured by the ratio of street segment length to the Euclidean distance between its junctions (Table 3.14).

3-4-5. Local Connectivity of the street network is measured by presence and absence of degrees of nodes based on street junctions. For example, node degree one corresponds to cul-de-sacs, degree four to crossing. The average of the nodes on endpoints of street segments are included as a parameter (Table 3.14).

Table 3.14 Measurement of *windingness* and *local connectivity*

Windingness	**Local Connectivity**
$1 - L_{eucl}/L_{street}$ (3.3)	$\sum ND_i[0,1]/2$ (3.4)
	

3.2.4.2 Built-up Morphology

Built-up morphology is measured via the indicators *building coverage ratio* and *building prevalence* within a proximity band of 50 m wide.

6. Building Coverage Ratio Index is the traditionally known index, but in MFA the proximity band is taken into account. That is to say, the ratio of the building footprint area inside the PBs to the total area of the PBs is calculated (Table 3.15).

Table 3.15 Measurement of *building coverage ratio* and *building prevalence*

Building Coverage Ratio Index	Building Prevalence
$\Sigma A_{tot} / \Sigma A_{PB50}$ (3.5)	For B1: $\Sigma A_{B1} / \Sigma A_{PB50}$ (3.6) For B3: $\Sigma A_{B3} / \Sigma A_{PB50}$

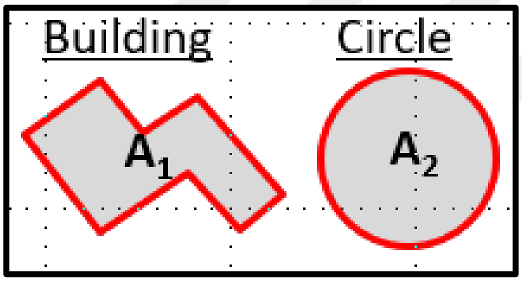
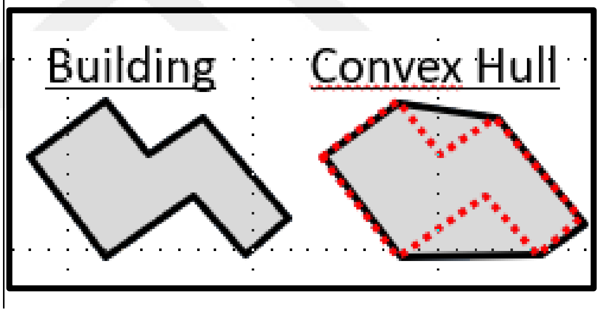
7-8-9-10-11-12. Building Prevalence corresponds to built-up type of buildings and their prevalence along the street segment (Table 3.15). In order to classify building types via a geostatistical analysis, six indicators are calculated: Footprint surface, Number of Floors, Elongation, Convexity, Continuous built-up entity, Specialization (Table 3.16).

Table 3.16 List of building classification ındicators

Indicator Name	Definition	Abbrv.	Unit
Footprint Surface	Ground-floor area of the target building	S	m^2
Elongation	Ratio between the building perimeter and the one of the circles of equivalent surface	E	Ratio
Convexity	Ratio between the building footprint surface and the area of the minimal convex hull	C	Ratio
Height	Number of Floors	H	Count
Continuous Built-up Entity	Number of continuously adjoining buildings within a single built-up entity	Cbe	Count
Specialization	-	Spe	Binary

- Footprint Area (A) is area of the target building's footprint. It is a continuous variable and generally it has a wide range.
- Elongation (E) presents the ratio of the perimeter of the target building to the perimeter of most compact equivalent shape, to be precise the circle perimeter. Elongation is a continuous variable. Its values are above 1 with a narrow range. Low values of elongation indicate a more compact building typology (Table 3.17).

Table 3.17 Measurement of elongation and convexity

Elongation	**Convexity**
$P / P' = P / 2\sqrt{(\pi S)}$, (3.7) *where* $A_1 = A_2$; where P = perimeter of the target building, P' = perimeter of the circle which have the same area with the target building	*Footprint Area / Convex Hull Area* (3.8)
	

- Convexity (C) is the ratio of the footprint area to the building envelop area. It is a continuous variable with the range up to 1. While high values of convexity describe denser and more compact buildings, low values specify tangled or hole structures (Table 3.17).
- Height (H) is the descriptor of the third, namely vertical dimension of the building. As a discrete variable number of floors indicates information on low-, mid- and high-rise.
- Continuous Built-up Entity (Cbe) provides the information related to continuity of adjoining buildings, in other words relation of buildings with its neighbors. It is a numeric discrete variable. Cbe value of 1 corresponds to detached buildings,

value of 2 to semi-detached buildings, and higher values to multiply adjoining buildings (Figure 3.30).

Figure 3.30 Measurement of continuous built-up entity

- Specialization (Spe) describes the ordinariness of the building structure. It is the only qualitative indicator regarding building typology. Caniggia and Maffei (2008) highlight that specialized buildings such as public, industrial, or commercial buildings have different structures compared to ordinary residential or mixed buildings (as cited in Perez et al. 2018).

After calculation of indicators, Bayesian Network is utilized to cluster buildings. BN produced four building clusters. Next the prevalence of each building type (B1, B2, B3 and B4) in terms of their area within the proximity the band is calculated (Table 3.15).

3.2.4.3 Network-Building Relationship

Network-Building Relationship describes the building geometry analysis in relation to the street segment. It is measured based on 20m of proximity band with the indicators Average space Open Space, Open Space Variability, Average Setback, Building Facades Misalignment, Corridor Effect, Average Height-Width Ratio, Average Building Height, Height Misalignment, Building Frequency.

For the calculation of the first four indicators, sightlines are utilized. For each street segment perpendicular sightlines are drawn every 3 meters from the street centerline to buildings on both left and right side.

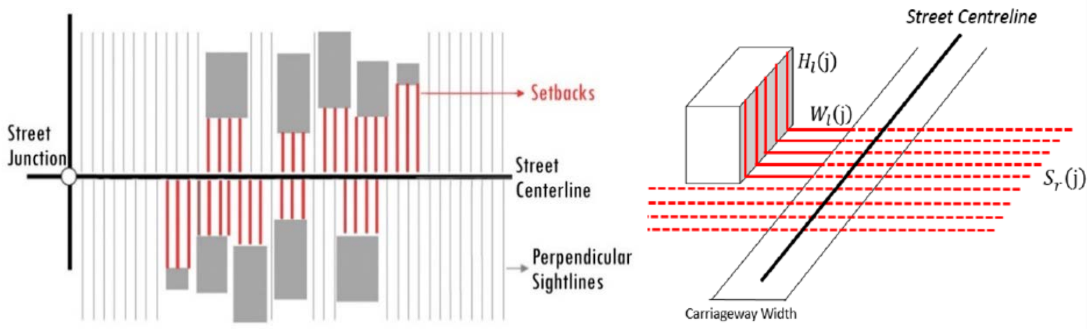


Figure 3.31 Perpendicular sightlines (Araldi, 2019, p.228 and p.230)

13. Average Open Space signifies the average open space width, namely average of sightlines along the street segment within the 20m proximity band.

$$Average\ Open\ Space = \frac{1}{N}\sum_{j=1}^{N} Sr(j) + Sl(j) \tag{3.9}$$

14. Open Space Variability can be defined as the regularity of open spaces. Standard deviation of open space gives open space variability.

$$Open\ Space\ Variability = \sqrt{\frac{\left(\sum_{j=1}^{N}\left(S_r(\mathrm{j})-\overline{S_r(\mathrm{j})}\right)+\sum_{j=1}^{N}\left(S_l(\mathrm{j})-\overline{S_l(\mathrm{j})}\right)\right)}{N-1}} \tag{3.10}$$

15. Average Setback concerns only setbacks of buildings as an open space. Therefore, it is the average width of sightlines which touch building facades along the street.

$$Average\ Setback = \frac{1}{N}\sum_{j=1}^{N} W_r(j) + W_l(j) \tag{3.11}$$

16. Building Facades Misalignment is related to setbacks of buildings and associated with the standard deviation of setbacks.

$$Building\ Facades\ Misalignment\ (i) = \sqrt{\frac{\left(\sum_{j=1}^{n}\left(W_r(j)-\overline{W_r(j)}\right)\right)}{n_r-1}+\frac{\left(\sum_{j=1}^{n}\left(W_l(j)-\overline{W_l(j)}\right)\right)}{n_l-1}} \quad (3.12)$$

17. Street Corridor Effect signifies the continuity and alignment of the building facades as if there is a corridor. It is the ratio between the total length of parallel facades and the street segment.

$$Street\ Corridor\ Effect = \frac{L_{parallel\ facades}}{L_{street}} \quad (3.13)$$

18. Average Height-Width Ratio is the ratio between average building height and open space width within the proximity band.

$$Average\ Height\ Width\ Ratio = \frac{Average\ Building\ Height}{Average\ Open\ Space\ Width} \quad (3.14)$$

19. Average Building Height is the average of the building height within 20m proximity band of the street segment.

20. Height Misalignment is the regularity of building heights along the street and associated with the standard deviation of heights.

21. Building Frequency is the occurrence of buildings along the street. In other words, it the rate of building quantity in terms of street width.

$$Building\ Frequency = \frac{N_{build}}{L_{street}} \quad (3.15)$$

For the next two steps the identification of spatial significance of the urban morphometric indicators through ILINCS, and the clustering of these patterns via Bayesian Networks same procedures that is used in the first case are followed.

3.2.5 Conducting Neighborhood Satisfaction Survey in Different Urban Fabrics

3.2.5.1 Defining Survey Zones

Application of MFA gave eight urban fabrics in Karşıyaka District (see results section pages 111-126 for more detailed information). These fabrics were named according to their characteristics as following (Figure 3.32):

- Traditional Meshed Hyper-Compact Fabric (F1),
- Planned Compact Aligned Continuous/Discontinuous Urban Fabric (F2),
- Irregular Hyper-Compact Fabric (F3),
- Open-worked and Heterogeneous Fabric (F4),
- Informal Low-Rise Compact Fabric (F5),
- Discontinuous Heterogeneous Irregular Fabric (F6),
- Discontinuous Spaced-out Modernist Fabric (F7),
- Empty and/or Connective Spaces (F8).

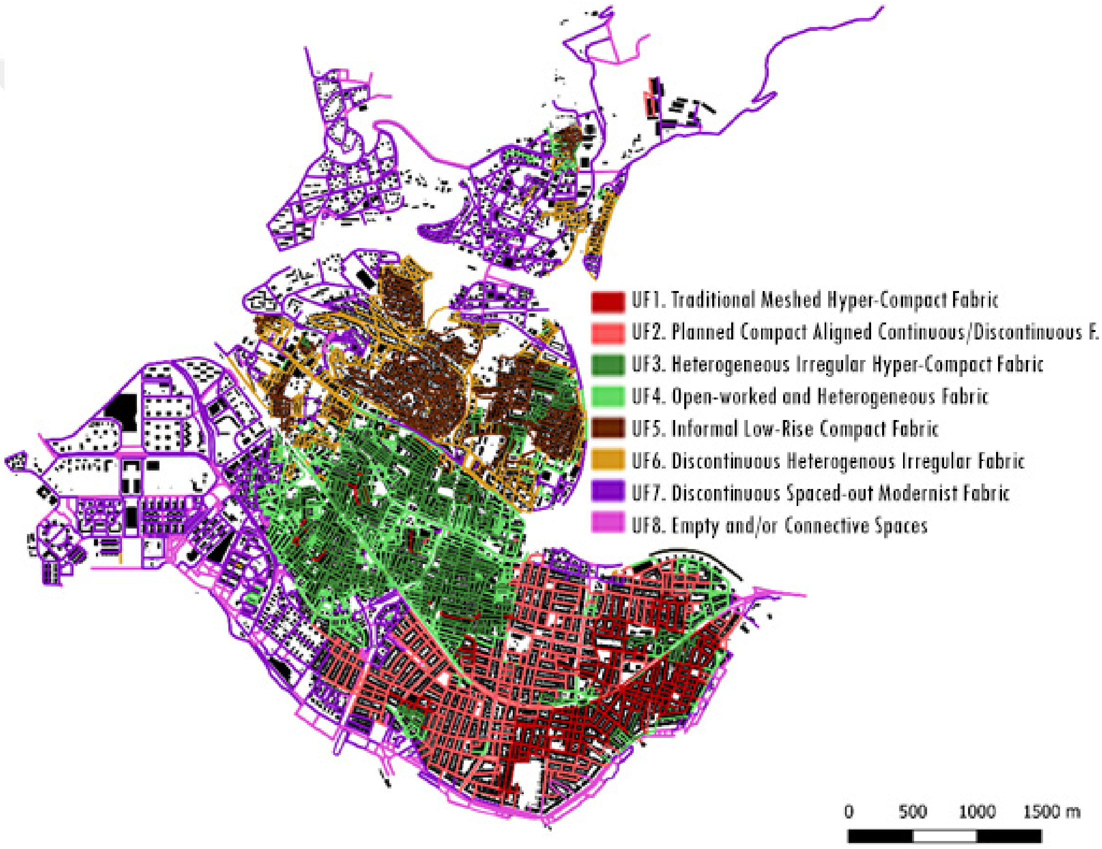


Figure 3.32 Urban fabrics in Karşıyaka

The objective of this thesis is to observe neighborhood satisfaction in different urban fabrics. However, the 8 urban fabrics derived from MFA needs to be investigated by a native planning expert to see whether these classes represent the actual situation. In other words, the necessity to combine or separate some urban fabrics needs to be discussed. Irregular Hyper-Compact Fabric (F3) and Open-worked and Heterogeneous Fabric (F4) are similar fabrics. F4 is a variation of F3. It is found in between the streets of F3, where this hyper-compact fabric got spacious. So F3 and F4 were clustered together (see Figure 3.32). Empty and/or Connective Spaces (F8) is a fabric where housing do not exist. Given that, it is not possible to apply the survey in that fabric (F8). A highway or a railway is a physical barrier and can also be considered as a social barrier. In other words, the same urban fabric on two different sides of such barriers cannot be considered as the same morphological region. Similarly, in the French Riviera location was considered as an important factor in neighborhood satisfaction. In Karşıyaka case, the railway (IZBAN) and a four-lane major Street (Anadolu Street) are considered as two main separators in the district in addition to 8 urban fabrics. These two separators are also indicators to distance to the sea (as they are parallel to the coastline) which was also handled in the French Riviera. Thus, in Karşıyaka case, the district was separated into three sections: Coastal area: the area between the sea and the railway, Semi-coastal area: the area between the railway and the Anadolu Street, Hinterland: the area at the north of the Anadolu Street.

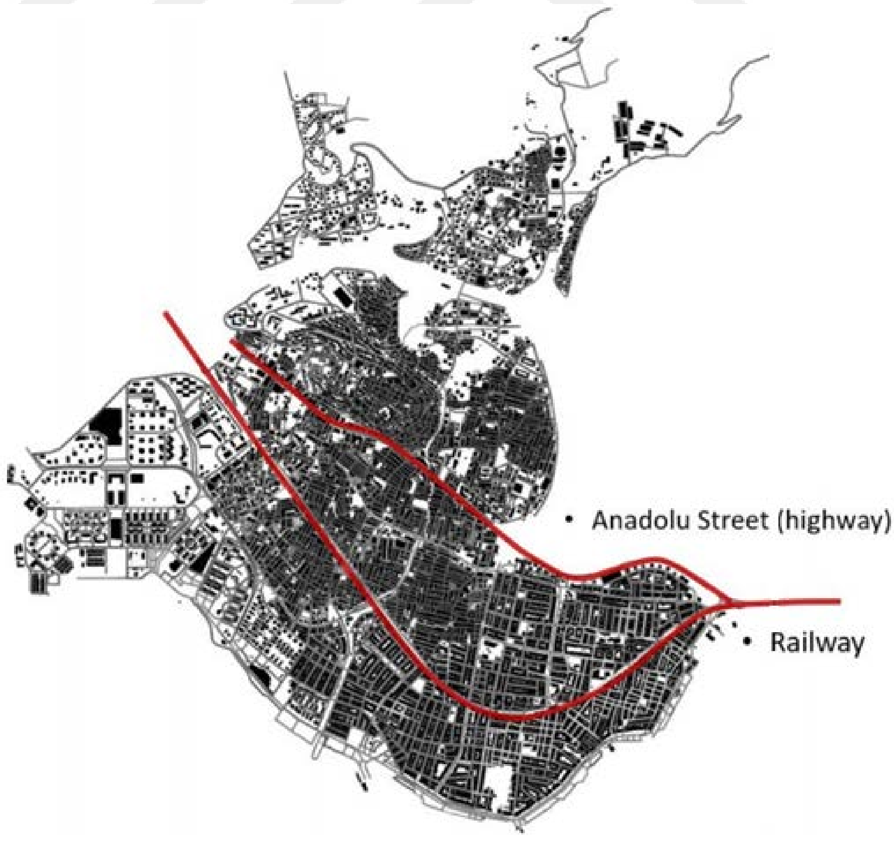


Figure 3.33 Locational separation in Karşıyaka

When these three sections were overlayed with the urban fabric produced by MFA 10 urban fabrics were classified as follows:

1. coastal F1 (Traditional Meshed Hyper-Compact Fabric),
2. semi-coastal F1 (Traditional Meshed Hyper-Compact Fabric),
3. coastal F2 (Planned Compact Aligned Continuous/Discontinuous Urban Fabric),
4. semi-coastal F2 (Planned Compact Aligned Continuous/Discontinuous Urban Fabric),
5. coastal F3 (Irregular Hyper-Compact Fabric) and F4 (Open-worked and Heterogeneous Fabric),
6. semi- coastal F3 (Irregular Hyper-Compact Fabric) and F4 (Open-worked and Heterogeneous Fabric),
7. hinterland F5 (Informal Low-Rise Compact Fabric),
8. hinterland F6 (Discontinuous Heterogeneous Irregular Fabric),
9. coastal F7 (Discontinuous Spaced-out Modernist Fabric),
10. hinterland F7 (Discontinuous Spaced-out Modernist Fabric).

In addition to urban fabrics and geographical partition in three, the peculiarity of the waterfront was highlighted. In other words, even though urban fabric of the waterfront is similar to other areas, special characteristics of this area may result with different neighborhood satisfaction level. Thus, this area was added as the 11th zone.

Considering the applicability and the accuracy of the survey, in each of these morphological regions were re-determined to define where the household surveys will be held. First of all, it was known that although the urban fabrics on street level were clustered through MFA, all streets in a certain zone were not associated with the same and unique urban fabric. Therefore, to have more precise results, purest zones (streets having the same urban fabric in an area) were selected. In conclusion in 11 zones 15 subzones were selected to conduct the surveys (Figure 3.34).

Figure 3.34 Survey zones

3.2.5.2 Selection of Dwellings and Participants (Determining Sample Size and Location)

Within 11 survey zones, the number, and the location of dwellings where the surveys will be held were selected via stratified random sampling method. In stratified random sampling method, population should be divided into smaller groups which have common attributes which are called strata. In Karşıyaka, the strata were defined based on three parameters: (1) urban fabric (F1, F2, F3+F4, F5, F6, F7) and (2) location (coastal, semi-coastal, hinterland) and (3) building type. In the survey design, building typology is an important information as being the last stratum. First, as a parameter of neighborhood satisfaction, it allows to interrogate dwelling satisfaction. Second, this question and information draw some correspondence to the first case in the French Riviera, in which building typology was considered both as a parameter and a stratum. Third, in the survey zones of Karşıyaka, where one type of building is prevalent, it is beneficial to select participants from that prevalent building in order to have a more accurate sample characterizing that urban fabric. In case the survey zone has considerably more building types, perceptions of participants from different building types should be included. Recall, through MFA assessment four types of buildings are found in Karşıyaka. Building type B1 is mid-to-large size, mid-to-high-rise, often isolated and sometimes not so compact ordinary buildings. B2 is made of large, low-rise, isolated and often specialized buildings. B3 is small-to-mid size, mid-rise, contiguous, compact ordinary buildings. B4 is made up of small, low-rise, often contiguous, compact ordinary buildings. The building clusters and urban fabrics found via MFA will be discussed in results section. Among four building type, B2 refers often to specialized buildings which do not contain housing in it. Therefore, the survey cannot be held in this building type and such building type is eliminated.

The distribution of the surveys is determined as follows. 400 surveys were targeted to be conducted (and funding for those surveys were achieved via BAP PROJE NO 2018.KB.FEN.032). The following protocol was followed to determine the sample size distribution across various urban fabrics, locations and building types. Presence of different building types (B1, B3 and B4) in 11 zones (combining 8 urban fabrics and 3 locations) are detected. For example, in some zones there is only one type of building which is dominant, in other zones two or more types of buildings can be observed. 400 surveys were tried to be distributed evenly for each urban fabric with the constraints (1) in each zone at least 30 surveys will be held to run statistical analyses (2) for sub-zones 15 surveys are acceptable (3) in terms of geographical diversity and building type survey numbers are balanced. In other words, to get more accurate results, diverse combinations of different conditions are included for fair representations, and the surveys are distributed evenly in terms of location and building type. However, all combinations of urban fabric, location and building type are not included in the surveys. Some conditions are eliminated, when the number of a certain building type is negligible, or the fabrics does not exist in certain location. Under these constrains the surveyors were free to choose the building type (or the participant). Table 3.18 shows the number of surveys that was designed for each urban fabric, location and building type.

Table 3.18 Number of surveys

Urban Fabric		Location	B1	B3	B4	Total
F1	Traditional Meshed Hyper-Compact F.	Coastal	-	30	-	30
F1	Traditional Meshed Hyper-Compact F.	Semi-coastal	-	30	-	30
F2+F7	Planned Compact Aligned Continuous/Discontinuous F.	Waterfront	30	-	-	30
F2	Planned Compact Aligned Continuous/Discontinuous F.	Coastal	15	15	-	30
F2	Planned Compact Aligned Continuous/Discontinuous Fabric	Semi-coastal	15	15	-	30
F3 + F4	Heterogeneous Irregular Hyper-Compact F. + Open-worked F.	Coastal	15	15	15	45
F3 + F4	Heterogeneous Irregular Hyper-Compact F. + Open-worked F.	Semi-coastal	15	15	15	45
F5	Informal Low-Rise Compact F.	Hinterland	-	-	35	35
F6	Discontinuous Heterogenous Irregular F.	Hinterland	-	-	35	35
F7	Discontinuous Spaced-out Modernist F.	Coastal	30	-	30	60
F7	Discontinuous Spaced-out Modernist F.	Hinterland	30	-	-	30
			150	120	130	400

In each sub-zone a map was prepared to guide surveyors how to select buildings and interviewees in that zone. Figure 3.35 is an example from the fabric F2 in the coastal area. In this area two building types (B1 and B3) are present, and the surveyors were expected to conduct 15 surveys in building type B1 (blue), and 15 surveys in B3 (yellow), to have 30 surveys in total. There were also some spatial restrictions on how to select buildings randomly. More than 5 surveys on the same street segment and more than 2 surveys in the same building were not allowed. The surveyors were also informed to verify the building in case it was destroyed and/or reconstructed.

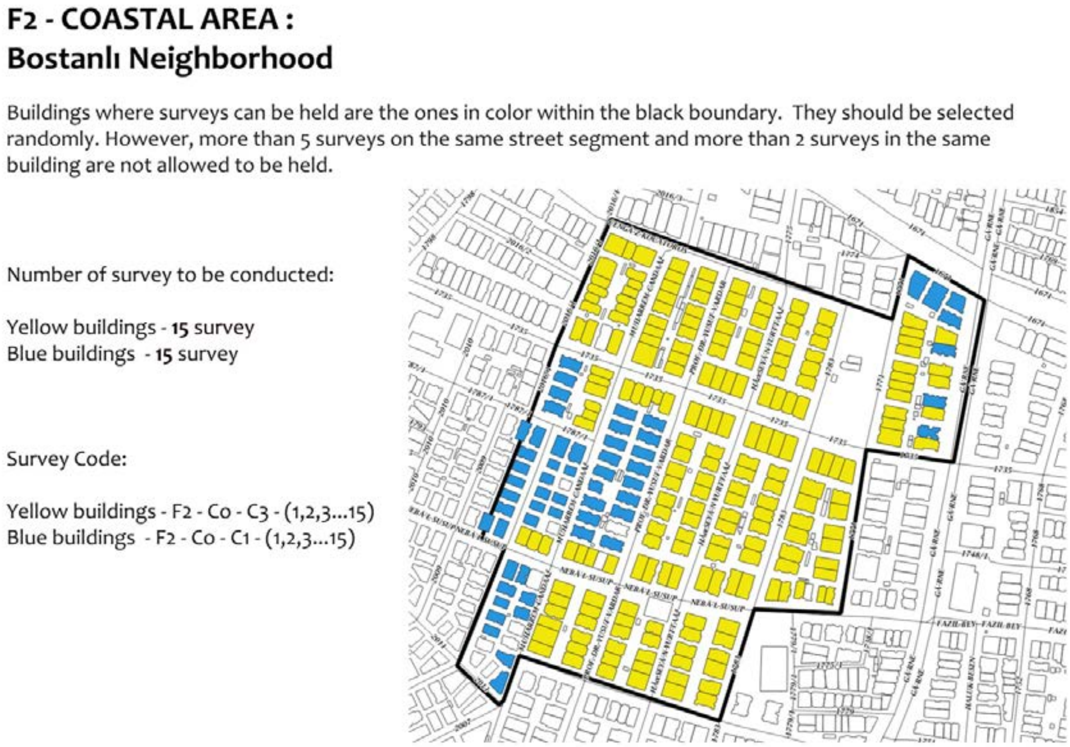


Figure 3.35 An example of guiding map for surveyors

The second constraint was about demographical variation in each zone. The surveyors were asked to apply the survey to same number of females and males. In addition, it was important to balance the weight of age groups of participants where the first group was between 18-25, the second was 26-45 and the last was 46-65.

3.2.5.3 Conducting the Survey

The procedure about how surveys are conducted can be explained in 5 steps.

Step 1: Buildings that could be surveyed in 11 different zones are defined based on urban fabrics, location and building types. The surveyor selects the determined number of households from these buildings randomly (For example, in the F2-Coastal Zone, 15 B3, and 15 B1). Three points to pay attention here are: (1) confirmation of the building typology in case the building has changed, (2) balancing the gender and age groups in each zone, (3) not to pick more than 5 buildings on the same street segment and not to choose more than 2 households in the same building.

Step 2: The surveyor records full address of the selected buildings.

Step 3: In the first section of the survey, the participants are asked to show / draw the boundaries of their neighborhood on the Karşıyaka map. One map is allocated for each participant. On behalf of the participants the surveyor draws the area shown by the participant. At the first stage, the code of the participant is noted and the building on which the participant resides is marked on the map by the surveyor. The map reading level of each participant may not be the same. It is important for the participant to understand how to read the map, for example where s/he is located, and where important streets and references are on the map. So, his building, transportation nodes (piers and metro stations), commerce areas (Çarşı Avenue and shopping malls), main streets are shown and explained to the participant. Then, the participant is asked to show his neighborhood boundaries according to the neighborhood definition specified in the survey. The participant shows and explains the boundaries of his neighborhood verbally and the surveyor draws the border with the participant. The borders are asked to pass through the boulevards or streets, not through the city blocks. This section is highly important, because it shows the area where answers to questions are related.

Step 4: The second part of the survey contains the personal information of participants. The surveyor asks these questions orally and mark the participant's answers on the survey form.

Step 5: Sections 3 and 4 of the survey contain the views of the participants about their neighborhood. Questions are answered taking into consideration the neighborhood boundaries drawn on the map. In the pilot survey that was conducted earlier, when the questions were asked orally in this section, it was observed that the participants could not remember the questions and their answer options at the same time. When the participant was asked to fill in the form, it was observed that some participants refrained from reading and answering all questions one by one. For the participant to understand the questions and their answers at the maximum level and to answer them correctly, a form with the answer options is given to the participant. The surveyor reads the questions one by one and marks the survey form according to the given answers.

3.2.5.4 Effect of the Covid-19 Pandemic on the Survey

The Covid-19 virus has spread in Turkey, while conducting the survey in Karşıyaka, and it did not let to continue more after the 322nd survey. Since it does not give accurate results to compare the surveys before and after the confinement period, the first 322 surveys are analyzed separately from the rest of the survey. Recall the first part (322 surveys) that was conducted in March 2020 was held in 11 zones, 7 fabrics, 4 locations, 3 dwelling types, and in all socio-economic classes (Figure 3.36).

Figure 3.36 Survey zones before Covid-19 pandemic

In the second round, after the first wave of the pandemic in August 2020, another strategy is developed by controlling more variables. As gated community development (modern fabric F7) is a hot topic nowadays, this urban fabric is compared to an older and compact fabric (F2) in which socio-economic status is similar. In this comparison, location (coastal), dwelling type (B1), and socio-economic status (high SES group) are kept the same to observe the impact of urban fabric more precisely. Thus, in the coastal area 38 survey in the fabric F7, and 38 in F2 are designed (Figure 3.37). For the conduction and evaluation of the new 76 surveys, the same methodology of the first round is followed.

Figure 3.37 Survey zones after Covid-19 pandemic

CHAPTER 4

RESULTS

This chapter presents the results of both cases, first the French Riviera in France and then the Karşıyaka District in Izmir, Turkey.

4.1 Results in the French Riviera

In this section, the survey results which are implemented to the urban fabrics found through MFA in the French Riviera will be discussed in two sections. In the first section, the inference of urban fabric of the households through the information of the dwelling type will be presented. In the second section, neighborhood satisfaction in the urban fabrics considering the purity of zones, distance to the sea, centrality and amount of nature, also the dwelling satisfaction based on dwelling type will be discussed.

4.1.1 Urban Fabric Classification and Solving Uncertainty Multiple Fabric Assessment in French Riviera

As mentioned in the methodology chapter the exact addresses of the households were missing in the dataset. Thus, the street segment where the household live was unknown, whereas urban fabric form was calculated by MFA at the street segment level. Yet, the dwelling type of the households were known and the probabilities of urban fabric families in each zone were computed. Knowing that dwelling type is an effective indicator in defining the form of the urban fabric, street segment form where the household lives is inferred from the information of dwelling type through Bayesian Network.

Going through some examples in the Bayes net, it can be understood how the inference in the model runs. For instance, in the zone 035001, the probability of the street segment form UF4 is 100.00%. Apparently in this case, no matter the dwelling type is, all the households in this zone are living in the street segment form UF4 (Figure 4.1).

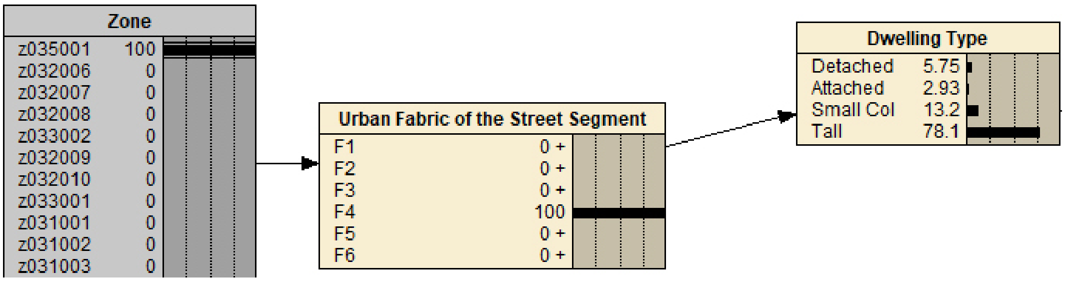
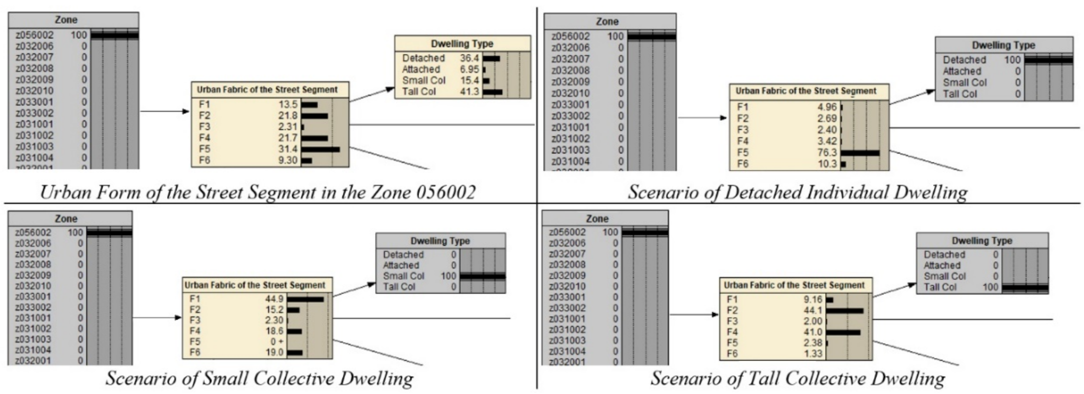


Figure 4.1 Inference of urban form of street segments (Case of Zone 035001)

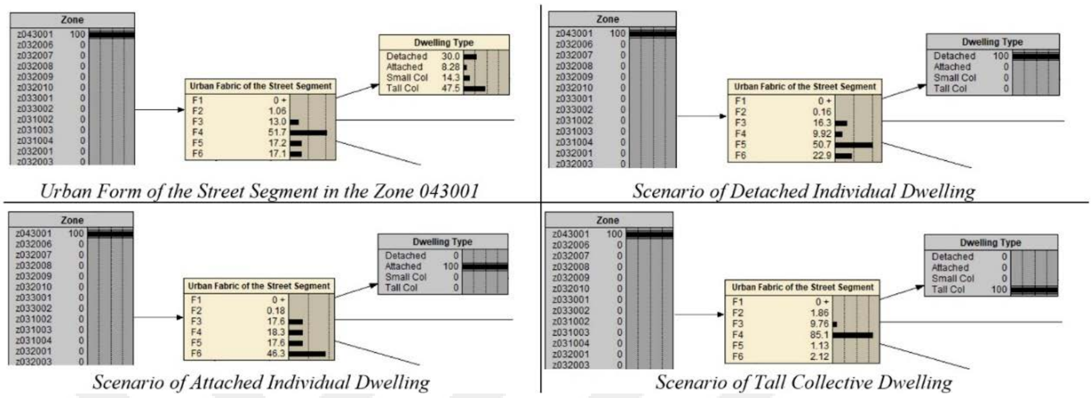
On the contrary, in the zone 056002 the urban forms of the street segments vary. The knowledge uncertainty of the urban form where the household live can be reduced by entering additional information in the model. When it is known that the dwelling type of the household is detached individual, the probability of the UF5 becomes 76.3%, whereas it was 31.4% before. In the zone 056002 13.5% of the streets are belong to the urban fabric family UF1. However, if the dwelling type is small collective, then the urban fabric is most probably in UF1 (44.9%). Likewise, when the dwelling type is tall collective, urban form of the street segment is more likely to be either UF2 (44.1%) or UF4 (41.0%), whereas their probabilities were 21.8% and 21.7% before in the absence of dwelling type knowledge (Table 4.1).

Table 4.1 Inference of urban form of street segments (Case of Zone 056002)



In another case, in the zone 043001, there is no street segment of the form UF1, and UF4 is the prevailing urban form (51.7%). UF5 and UF6 follow it by percentages 17.2 and 17.1 respectively. Nevertheless, when it is known that the household lives in a detached individual dwelling, then the urban form of the street segment he lives in is more likely to be UF5 (50.7%). If the dwelling type is attached individual, the urban form of the street is more likely to be UF6 (46.30%). If the dwelling type is small or tall collective, the form is more likely to be UF4 (47.80% and 85.10% respectively) (Table 4.2).

Table 4.2 Inference of urban form of street segments (Case of Zone 043001)



4.1.2 Neighborhood Satisfaction and Its Relation to Urban Fabric

After the data learning process, the Bayes net calculates the probability of major dissatisfaction, minor dissatisfaction, and satisfaction as well as their scores (which is the expected value between -1 and 1) both at dwelling and neighborhood levels. Table 4.3 shows these values as a function of each factor, without combining them. The average global profile neighborhood satisfaction on the French Riviera is quite high with the satisfaction level 86.10% and the score 0.768. Looking at the percentage of satisfied households and satisfaction scores, it is seen that among all morphological and locational attributes, neighborhood satisfaction is the highest in UF1-Old constrained urban fabric of town-houses (92.00% satisfied and score: 0.875). This urban fabric describes the Medieval/Late Medieval villages and old towns and villages of the French Riviera with high coverage ratio of attached town-houses and small buildings, and strong street corridor effect of its highly connected and irregular street network (Fusco and Araldi, 2017). Although the neighborhood satisfaction level is still high, UF2-Traditional urban fabrics of the plain with adjoining buildings have the least values (82.60% satisfied and score: 0.705) in the region. Situated on flatlands with regular street pattern of larger buildings and large parcels this fabric corresponds to the urban expansion of the period between early 18th century and World War II. UF2 is usually an expansion of old towns in city centers, but sometimes social housing projects and high-rise new developments are also included in this family (Fusco and Araldi, 2017). Despite of the fact that both UF1 and UF2 are historical fabrics, the urban fabric family UF1 has the most positive influence on neighborhood satisfaction and UF2 the most negative. In UF3-Discontinuous and irregular urban fabrics with houses and buildings which are closer to traditional fabrics display slightly higher neighborhood satisfaction in terms of the score but also slightly lower satisfaction in terms of the percentage of the households who are satisfied with the neighborhood. This means that in this fabric, dissatisfaction with the neighborhood is rarely the major dissatisfaction of the households, they have some other concerns on residential dissatisfaction such as the high rents or charges. The modern urban fabrics, UF4-Modern discontinuous urban fabrics with big and medium-sized buildings, UF5-Suburban residential fabrics in hills or plain show higher neighborhood satisfaction levels that the traditional compact fabrics, but lower than the old town fabrics. UF6-Small house constrained suburban fabrics have high neighborhood satisfaction both in terms of the score and the percentage of the households.

The Table 4.3 also presents neighborhood satisfaction as a function of variables. The score difference with respect to urban fabric was 0.17 between UF1 and UF2, whereas it is just 0.02/0.04 for many other variables. The variables dwelling type, purity of the zone, distance to the sea, centrality, and amount of nature solely do not show a great contribution to neighborhood satisfaction. Yet, the households living in a neighborhood where two prevailing fabrics coexist, in the hinterland (further from 1500m of the sea), in the second belt (more than 20 minutes to the center) and with medium level of nature (between 10-50%) have higher neighborhood satisfaction compared to others. Also, central zones display a fair decrease in satisfaction level. The score difference between the center and the second belt is 0.08. Dwelling Type is indeed an indicator of the urban fabric, even so the households living in the attached individual buildings are satisfied the most with their neighborhood.

Table 4.3 Influence of urban form on neighborhood satisfaction

NEIGHBORHOOD SATISFACTION	Score	Maj. Dis.	Minor Dis.	Satisfied
Global Profile	0.768	9.27	4.65	86.10
Urban Fabrics				
UF1: Old constrained urban fabric of town-houses	0.875	4.53	3.49	92.00
UF2: Traditional urban fabric	0.705	12.10	5.30	82.60
UF3: Discontinuous and irregular urban fabric	0.786	6.70	8.00	85.30
UF4: Modern discontinuous urban fabric	0.784	8.40	4.80	86.80
UF5: Suburban residential fabric	0.776	10.02	1.95	87.80
UF6: Suburban fabric with constrained small houses	0.819	7.49	3.15	89.55
Dwelling Type				
Detached Individual	0.785	8.96	3.60	87.40
Attached Individual	0.796	8.05	4.26	87.70
Small Collective	0.793	8.02	4.68	87.30
Tall Collective	0.749	9.95	5.24	84.80
Urban Form of the Zone (Purity of the Zone)				
Pure	0.753	9.98	4.77	85.30
Combination	0.795	8.25	4.05	87.70
Mixed	0.773	8.97	4.79	86.20
Distance to the Sea				
Coastal	0.773	9.01	4.64	86.40
Peri-coastal	0.746	10.10	5.24	84.70
Hinterland	0.777	8.96	4.38	86.70
Centrality				
Center	0.708	11.30	6.62	82.10
First Belt	0.757	10.00	4.31	85.70
Second Belt	0.788	8.28	4.68	87.00
Nature Inside the Zone				
Limited Nature	0.765	9.26	4.98	85.80
Medium Nature	0.786	9.16	3.09	87.70
High Nature	0.750	9.96	5.11	84.90

In order to understand the influence of urban form on neighborhood satisfaction more comprehensively, it is important to observe urban fabric families with diverse conditions. Generating different cases by combining two conditions, the interplay between urban morphology and neighborhood satisfaction can be examined better. To do that, simulations conditioning two variables are operated on the Bayes net. In other words, certain states of urban form nodes are selected, and it is observed how the levels of neighborhood satisfaction vary under certain conditions. The comparison of the global profile with the conditional probabilities of certain variables shows more in detail which variables or indicators of urban morphology influence neighborhood satisfaction positively or negatively.

The *Old constrained urban fabric of town-houses (UF1)* is the fabric where the households are satisfied the most with their neighborhood (Table 4.4). Therefore, in all conditions, neighborhood satisfaction scores are considerably high. It is the highest in the peri-coastal areas and in the hinterland, it is observed as high as the peri-coastal, too. However, it decreases and is the lowest in the coastal area. Further, UF1 in the second belt and combination of UF1 with another fabric are the conditions where the neighborhood satisfaction scores are high. *Traditional urban fabric of the plain with adjoining buildings (UF2)* is the fabric where the households are satisfied the least with their neighborhood compared to other fabrics (0.592). Not just the global profile, but UF2 in different conditions have lower scores compared to other urban fabrics. The lowest scores are observed when UF2 appears in the mixed zones or in the hinterland area. The highest scores of UF2 which are not that high in comparison to other fabrics are in the pure zones UF2 and UF2 in the coastal area. Neighborhood satisfaction in the *Discontinuous and irregular urban fabrics with houses and buildings (UF3)* is slightly higher than the global profile. Yet, some conditions of UF3 reveals pretty high and some reveals pretty low scores of neighborhood satisfaction scores. On one hand, UF3 in the first belt has the highest score among all urban fabrics in all conditions (0.941). It is followed by UF3 in the coastal area, also in the peri-coastal area. On the other hand, pure zones of UF3, UF3 with medium level of nature, and UF3 in the second belt have considerably lower scores among all conditions of each fabric. Neighborhood satisfaction in the *Modern discontinuous urban fabrics with big and medium-sized buildings (UF4)* is almost the same with UF3, but the scores in different conditions of UF4 are more stable then UF3 within the range of 0.863 (combination of UF4 with another fabric) and 0.730 (pure zones of UF4 similar to the case in UF3). As in UF3, UF4 in the coastal area has a high score; and unlike UF3, UF4 in the second belt has also a high score. The neighborhood satisfaction score of the *Suburban residential fabric in hills or plain (UF5-0.776)* is the one closest to the mean/global profile (0.768). In this fabric neighborhood satisfaction is the highest when the amount of nature is in medium level. It is the lowest in high amount of nature or in the peri-coastal area. In the *Small house constrained suburban fabrics (UF6),* the neighborhood satisfaction score is the highest right after UF1. Therefore, in different states of UF6 the scores are high, too. The highest scores are observed in the hinterland and in pure zones made of UF6. The lowest ones are observed in the coastal and peri-coastal areas.

Table 4.4 Scores of neighborhood satisfaction based on urban fabrics in different conditions

UF1: Old constrained urban fabric of town-houses	**0.875**	**UF2: Traditional urban fabric**	**0.705**
UF1 in Pure Zones	0.845	UF2 in Pure Zones	0.738
Combination of UF1	0.905	Combination of UF2	0.697
UF1 in Mixed Zone	0.873	UF2 in Mixed Zones	0.592
UF1 in Coastal Area	0.713	UF2 in the Coastal Area	0.745
UF1 in Peri-coastal Area	0.918	UF2 in the Peri-Coastal Area	0.706
UF1 in Hinterland	0.908	UF2 in the Hinterland	0.671
UF1 in Center	0.815	UF2 in the Center	0.714
UF1 in First Belt	0.829	UF2 in the First Belt	0.702
UF1 in Second Belt	0.909	UF2 in the Second Belt	0.706
UF1 with Limited Nature	0.880	UF2 with Limited Nature	0.713
UF1 with Medium amount of Nature	0.816	UF2 with Medium Nature	NA
UF1 with High Level Nature	NA	UF2 with High Level Nature	NA
UF3: Discontinuous and irregular urban fabric	**0.786**	**UF4: Modern discontinuous urban fabric**	**0.784**
UF3 in Pure Zones	0.632	UF4 in Pure Zones	0.730
Combination of UF3	0.779	Combination of UF4	0.863
UF3 in Mixed Zones	0.826	UF4 in Mixed Zones	0.800
UF3 in the Coastal Area	0.935	UF4 in the Coastal Area	0.820
UF3 in the Peri-Coastal Area	0.855	UF4 in the Peri-Coastal Area	0.765
UF3 in the Hinterland	0.712	UF4 in the Hinterland	0.782
UF3 in the Center	NA	UF4 in the Center	NA
UF3 in the First Belt	0.941	UF4 in the First Belt	0.756
UF3 in the Second Belt	0.685	UF4 in the Second Belt	0.818
UF3 with Limited Nature	0.810	UF4 with Limited Nature	0.787
UF3 with Medium Nature	0.645	UF4 with Medium Nature	0.777
UF3 with High Level Nature	NA	UF4 with High Level Nature	NA
UF5: Suburban residential fabric	**0.776**	**UF6: Suburban fabric with small houses**	**0.819**
UF5 in Pure Zones	0.800	UF6 in Pure Zones	0.865
Combination of UF5	0.766	Combination of UF6	0.837
UF5 in Mixed Zones	0.762	UF6 in Mixed Zones	0.787
UF5 in the Coastal Area	NA	UF6 in the Coastal Area	0.645
UF5 in the Peri-Coastal Area	0.681	UF6 in the Peri-Coastal Area	0.687
UF5 in the Hinterland	0.796	UF6 in the Hinterland	0.867
UF5 in the Center	NA	UF6 in the Center	NA
UF5 in the First Belt	0.705	UF6 in the First Belt	0.809
UF5 in the Second Belt	0.804	UF6 in the Second Belt	0.833
UF5 with Limited Nature	0.726	UF6 with Limited Nature	0.835
UF5 with Medium Nature	0.859	UF6 with Medium Nature	0.790
UF5 with High Level Nature	0.669	UF6 with High Level Nature	0.835

* Global Profile = 0.768

In brief, in the UF1 the households are satisfied the most with their neighborhood. The satisfaction level is the highest in the peri-coastal areas, but it decreases in the coastal area. In the UF2 the households are satisfied the least with their neighborhood compared to other fabrics. Satisfaction with the neighborhood decreases even more when UF2 is mixed with other fabrics, but when UF2 is found in the coastal areas it increases. The households of UF3 are more satisfied with their neighborhood if they live in the first belt (within 20 minutes distance to the center) and less satisfied when the neighborhood is composed of the fabric UF3 predominantly (pure zones of UF3). The neighborhood satisfaction level of the households in UF4 is similar to the ones in the UF3. They are more satisfied when their neighborhood is made of combination of two fabrics including UF4, but less satisfied when the neighborhood is made of the fabric UF4 predominantly. The households living in the fabric UF5 are more satisfied with their neighborhood when the amount of the nature is in medium level, and they are less satisfied in the peri-coastal area. UF6 is a fabric where the households are highly satisfied with their neighborhood and their satisfaction increases when they live in the hinterland, it decreases when they live in the coastal area (Table 4.4).

The variables except for the urban fabric of the street segment seem like not having a great contribution to neighborhood satisfaction, but when they are considered/combined with the urban fabric of the street segment they are effective on the issue. For example, the households living in the UF3 have a moderate neighborhood satisfaction level compared to other fabrics. Yet, when UF3 is in the first belt or in the coastal area it is the highest in the region among all other conditions. The households of the same fabric are the ones least satisfied when their neighborhood is composed of predominantly UF3 or when the amount of nature is in the medium level. This shows the significance of the composition of urban fabrics in the neighborhood, centrality, distance to the sea and amount of nature in neighborhood satisfaction (Table 4.4).

The distance to the sea is a highly effective variable when inspected together with the urban fabric of the street segment. Neighborhood satisfaction levels in UF1 when located in the peri-coastal and hinterland area are remarkably high, while it is inverse on the coast (500m from the sea). Like the case of UF1, neighborhood satisfaction in UF6 on the coast is the lowest and, in the hinterland, it is the highest among other UF6 conditions. Contrary to UF1 and UF6, UF2 in the coastal area has the highest satisfaction level and it is quite low in the hinterland. Also, UF3 on the coast and in the peri-coastal area, which corresponds to the periphery of city centers, displays high neighborhood satisfaction. Yet, it is much less in the hinterland (Table 4.4).

In the global results of centrality, central areas are found to have relatively less neighborhood satisfaction. When it is crossed with urban fabric of street segment, centrality does not make a huge difference across urban fabrics except for UF3. UF3 in the first belt has the highest satisfaction level among all other conditions and it is quite higher than it is the second belt. The fabrics UF3-4-5-6 either do not exist in the center or have not enough observation, so they are eliminated. UF1 in the center is much less than it is in the second belt. Namely, neighborhood satisfaction in old towns such as Grasse, Vence, Valbonne is quite higher than the costal and central old towns of Nice, Cannes, Antibes, Menton etc. Since the centers in the French Riviera are located on the coast, the results of distance to the sea and centrality are more or less parallel to one and other. The difference is that coastal zone is limited up to 500 meters from the sea, whereas centers cover wider surfaces. Also, the whole coastal area is not included in the center (Table 4.4).

The global rates of neighborhood satisfaction concerning the amount of nature in the zone do not differ efficiently either. The zones of UF1-2-3-4 either do include high level of nature or there are not enough observations with these combinations, so they are eliminated. In UF3 and UF5, the effect of nature is considerable. Medium level of nature decreases the level of neighborhood satisfaction in UF3, yet it increases the neighborhood satisfaction in UF5 (Table 4.4 and Figure 5.2).

Further analysis can be made by simulating the combination of three variables in the Bayes net. However, working with three conditions does not give very accurate results, because the dataset is not large enough to insure statistical significance.

All in all, the fabrics where the neighborhood satisfaction is the highest are F3 in the first belt, F3 on the coast, F1 in peri-coastal area, F1 in second belt and F1 in the hinterland; the ones where it is the least are F2 in mixed zones, F3 in pure zones, F3 with medium nature, F6 on the coast. However, the differences between the highest and lowest neighborhood satisfaction scores (Figure 4.2).

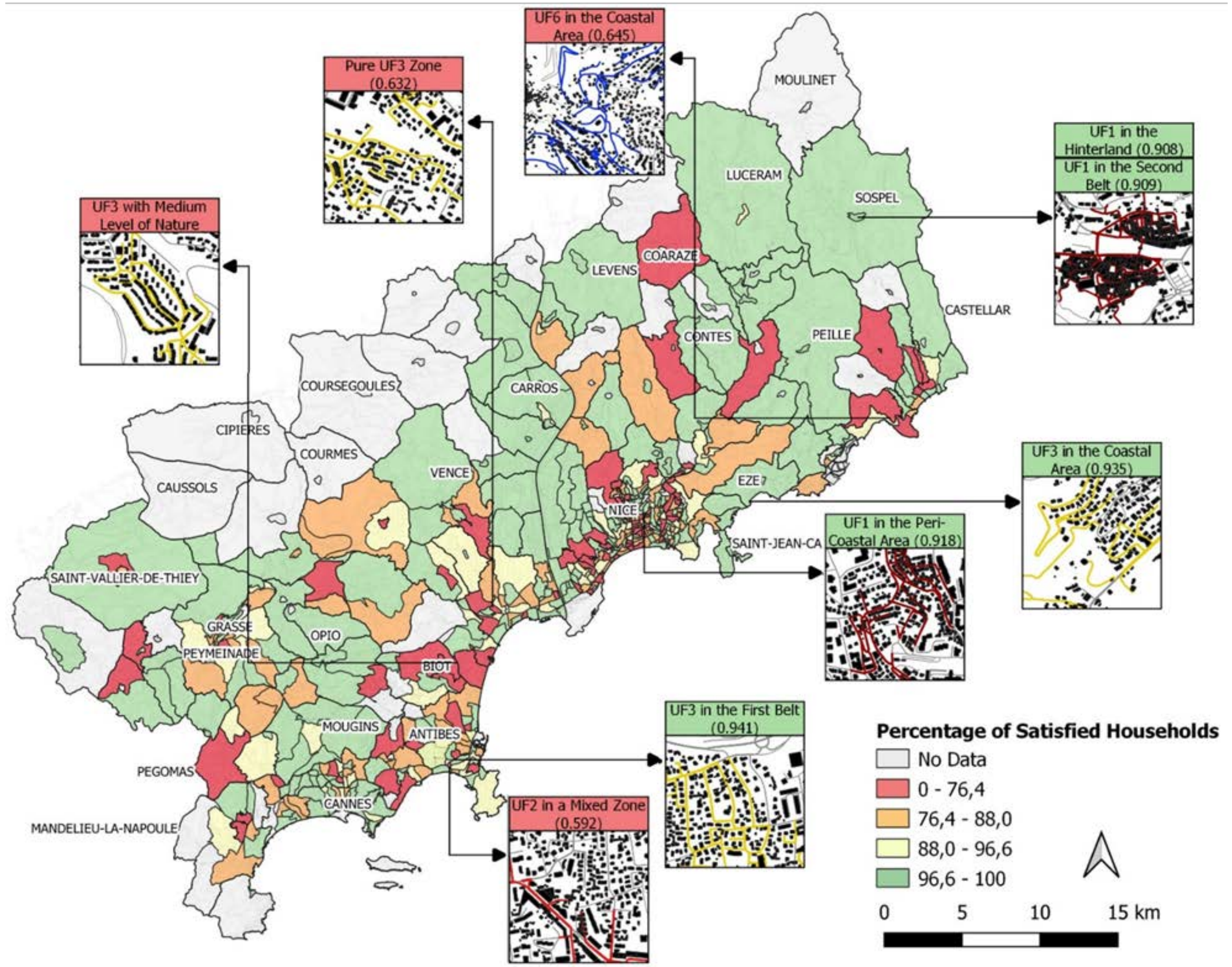


Figure 4.2 Percentage of satisfied households, the most and the least satisfying fabrics

Although it is not as high as neighborhood satisfaction, most of the households in the French Riviera are satisfied also with their dwellings with the percentage of 70.10. However, it is also a major dissatisfaction for 26.10% of the households. So that its score is low 0.440 (Table 4.5). Neighborhood satisfaction is the highest for the households living in attached individual dwellings (Table 4.3). In the study area, a particular urban form (the old town and village) mainly, but not exclusively, made of attached townhouses and this form is associated with the UF1. In many cases these townhouses have become small collective buildings with several dwellings in the course of time. Unlike neighborhood satisfaction, concerning dwelling, satisfaction is the highest for the households living in detached individual houses (Table 4.5).

Table 4.5 Influence of urban morphology on dwelling satisfaction

	Score	Maj. Dis.	Minor Dis.	Satisfied
Global Profile	0.440	26.10	3.81	70.10
UF1: Old constrained urban fabric of town-houses	0.019	45.70	6.61	47.70
UF2: Traditional urban fabric	0.392	28.10	4.53	67.30
UF3: Discontinuous and irregular urban fabric	0.413	27.50	3.73	68.80
UF4: Modern discontinuous urban fabric	0.383	28.80	4.14	67.10
UF5: Suburban residential fabric	0.764	11.10	1.45	87.50
UF6: Suburban fabric with constrained small houses	0.474	24.70	3.20	72.10
Detached Individual	0.657	16.20	1.88	81.90
Attached Individual	0.478	23.70	4.93	71.40
Small Collective	0.284	33.20	5.25	61.60
Tall Collective	0.367	29.50	4.25	66.20

The households living in UF5 are satisfied the most with their dwellings, whereas the ones in UF1 are quite dissatisfied with their dwellings. It is apparent that in the old fabric of UF1, the buildings are much older than the other fabrics, so not all are in good condition, and some need a restoration. For 45.70% of the households, the dwelling is the major dissatisfaction reason in UF1. In brief, in the old constrained urban fabric of town-houses the neighborhood satisfaction is the highest and the dwelling satisfaction is the lowest. This outcome shows that old urban fabric tends to generate high neighborhood satisfaction, but its old houses are insufficient to satisfy households' needs. As the urban fabric evolves to regular traditional urban fabrics with larger buildings, neighborhood satisfaction decreases dramatically, but dwelling satisfaction rises relatively. Moreover, recall dwelling type is an indicator of the urban fabric. Small collective buildings in which the dwelling satisfaction level is the lowest appear mostly in UF1, while the urban fabric UF5 where the dwelling satisfaction is the highest is made up of detached individual buildings (Table 4.5).

A cross-analyze of urban fabric with dwelling type reveal more in detail where the dwelling satisfaction gets higher or lower (Table 4.7). The highest dwelling satisfaction is observed in detached individual dwellings of the fabrics UF3 and UF5. Contrary to high neighborhood satisfaction scores, in the level of dwelling dissatisfaction is found with the scores under 0 in tall collective dwelling of UF1 and small collective dwellings of UF3. In all fabrics except for UF6, detached individual dwellings are the ones that are the satisfaction is found the most. In the UF6, in tall collective dwellings which is rare in this fabric, the households revealed the most satisfaction with the dwelling. Dwellings in small collective buildings are scored the lowest in terms of dwelling satisfaction in the whole study and also in the fabrics UF2, UF3 and UF6. The ones in tall collective buildings are scored the lowest in the fabrics UF1 and UF4, lastly attached individuals are the lowest in UF5.

Table 4.6 Scores of dwelling satisfaction based on dwelling types in urban different fabrics

	Detached Individual	Attached Individual	Small Collective	Tall Collective
All Fabrics	0.657	0.478	0.284	0.367
UF1: Old constrained urban fabric of town-houses	0.584	0.282	0.051	-0.378
UF2: Traditional urban fabric	0.606	NA	0.359	0.388
UF3: Discontinuous and irregular urban fabric	0.870	0.305	-0.019	0.597
UF4: Modern discontinuous urban fabric	0.662	NA	0.413	0.345
UF5: Suburban residential fabric	0.799	0.646	NA	NA
UF6: Suburban fabric with small houses	0.468	0.501	0.452	0.533

* Global Profile = 0.440

4.2 Results in the Karşıyaka District

In this section, MFA, and survey results in Karşıyaka will be discussed in four sections. In the first section, building and urban fabric clustering found through MFA will be discussed. In the second section, the results of the survey before the Covid-19 outbreak, in the third section the results after the first wave of the pandemic, and in the fourth section the comparison of the surveys before and after the pandemic will be presented.

Survey results are analyzed via Statistical Package for the Social Sciences (SPSS) Software using descriptive statistics, T test, chi-square test and ANOVA test (analysis of variance). The survey was planned to be conducted to 400 households as described in the methods section. However, the outbreak of the virus Covid-19 while carrying the survey caused an interruption. As a result, 322 households were surveyed in 11 zones before the spread of the virus. After the first wave period, 76 households were surveyed in two zones.

4.2.1 Results of the MFA Protocol: Urban Fabric Clustering in Karşıyaka

This section presents the MFA results in Karşıyaka, in particular building type classification of 26,098 buildings and urban fabric clustering of 6,180 street segments in the district.

4.2.1.1 Building Typology Clustering

With six indicators (Footprint surface, Number of Floors, Elongation, Convexity, Continuous Built-up Entity, Specialization) and the best contingency table fit (51.1%) Bayesian clustering found four clusters in Karşıyaka District. As the description of building morphologies such as style, façade, roof coverage increase, more precise clustering can be performed.

Figure 4.3 presents the global profile of the Bayesian clustering results. According to the results in Karşıyaka District one third of the buildings has five floors. Around half of the buildings (51.56%) have a surface between 100 and 300m^2. 27.79% of the buildings are detached, but number of continuously adjoining buildings varies. The amount of specialized buildings (schools, mosques, shopping malls etc.) is low (7.05%). Lastly the high convexity percentages and low elongation percentages show that the building footprints are quite compact.

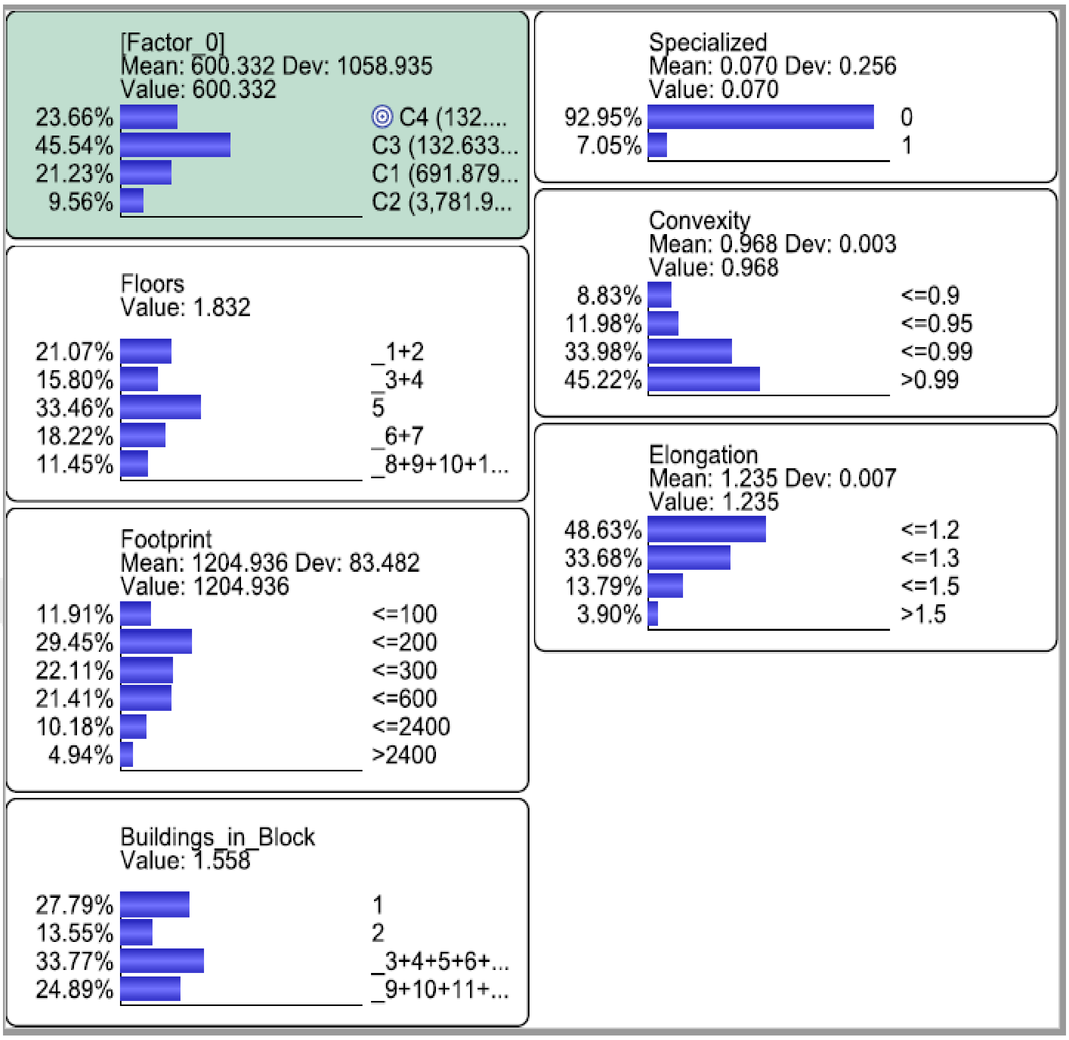


Figure 4.3 Global results of Bayesian clustering

Building Type 1 (B1), which accounts for 21.2% of the total footprint area, is made of mid-to-big size, mid-to-high-rise, often isolated and sometimes not so compact ordinary buildings. However, some of these buildings are contiguous and most of them are compact (Table 4.7).

Building Type 2 (B2) is the smallest cluster accounting for 9.6% of the total footprint area. It is made of big, low-rise, isolated and often specialized buildings. These can be either compact or non-compact buildings. It should be highlighted that only 81% of these buildings are specialized, the rest are ordinary (Table 4.7).

Building Type 3 (B3) is the largest cluster with 45.5% of total footprint area. B3 is made up of small-to-mid size, mid-rise, contiguous, compact ordinary buildings (Table 4.7).

Building Type 4 (B4) accounts for 23.7% of the total footprint area. It is made up of small, low-rise, often contiguous, compact ordinary buildings. It also includes some isolated houses (Table 4.7).

As building clusters are mapped, it is seen that in the slum area and the villages are B4 (also cluster 4 - red) is predominant. The areas which were formerly slums and currently under urban regeneration are mixed but mostly made up of B4. It can also be seen that B4 is disappearing gradually in these areas. Oldest neighborhoods consist of mainly B3 (cluster 3 - yellow) as expected, but it also contains B1 (cluster 1 - blue). Recently developed areas, which mostly involve gated communities, mostly contains B4 (single family houses/villas) and B1 (high rise buildings). Other than that, specialized buildings in the study area are visibly B2 (cluster 2 - purple) (Figure 4.4).

Table 4.7 The four main families of building types in Karşıyaka. (S: Surface, E: Elongation, C: Compacity, H, Height, Cbe: Contiguity, Spe: Specialization) Image Source: Google Street View 2020

Building Types	Examples	Descriptors	*Q1*	*Q2*	*Q3*
B1 [21.2%]: mid-to-large size, mid-to-high-rise, often isolated ordinary apartment buildings	 	**S**	245	392	520
		E	1.16	1.22	1.30
		C	0.93	0.97	1
		H	5	6	9
		Cbe	0	0	0
		Spe	18%		
B2 [9.6%]: large, low-rise, isolated and often specialized buildings	 	**S**	293	521	975
		E	1.15	1.23	1.40
		C	0.89	0.99	1
		H	1	2	3
		Cbe	0	0	0
		Spe	81%		
B3 [45.5%]: small-to-midsize, mid-rise, contiguous, compact ordinary apartment buildings	 	**S**	122	180	242
		E	1.16	1.20	1.26
		C	0.97	0.99	1
		H	5	5	6
		Cbe	1	2	2
		Spe	0%		
B4[23.7%]: townhouses and small, low-rise, often contiguous, compact ordinary buildings	 	**S**	53	90	115
		E	1.15	1.18	1.24
		C	0.96	0.99	1
		H	1	2	3
		Cbe	0	1	2
		Spe	1%		

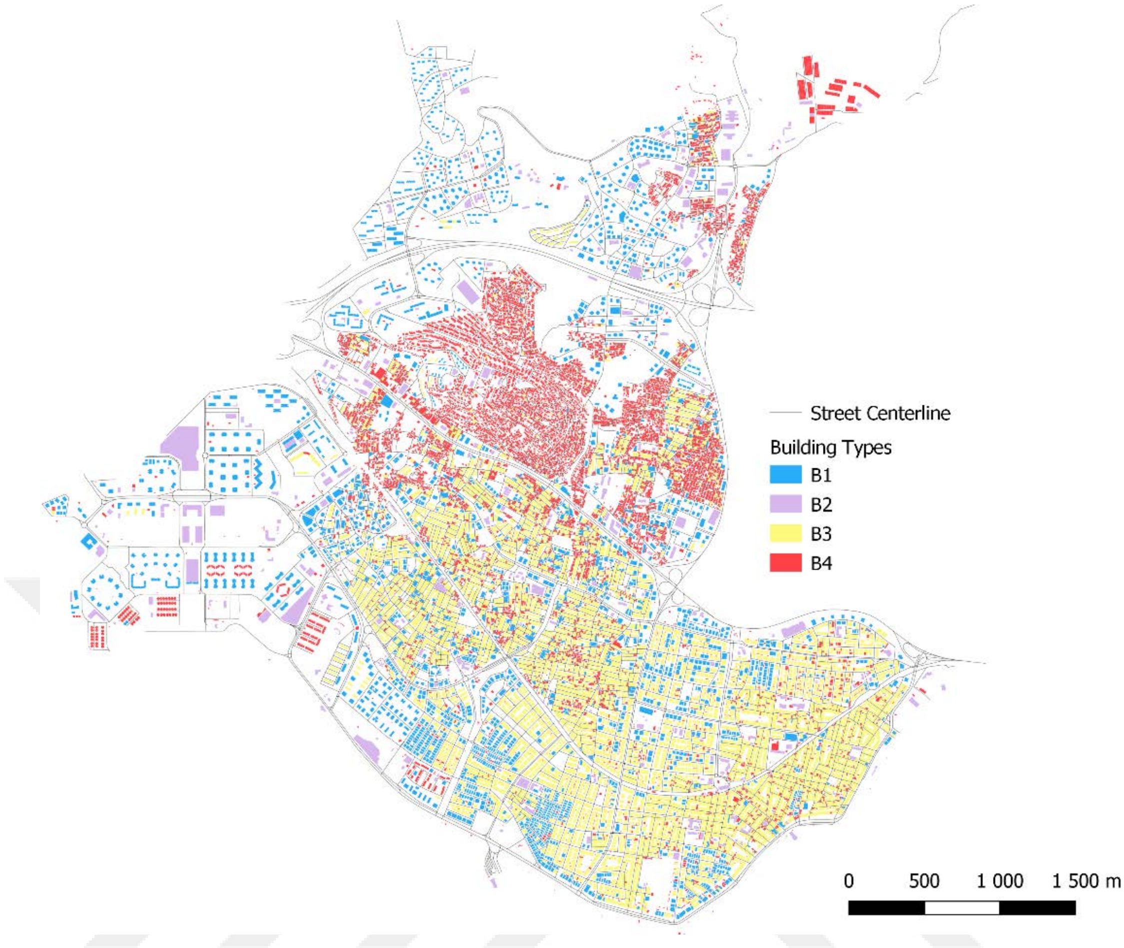


Figure 4.4 Location of building clusters in Karşıyaka District

4.2.1.2 Urban Form of Karşıyaka

With fourteen morphological indicators eight urban fabric clusters are found to be the optimum in Karşıyaka District with the best contingency table fit score of 50.7%. Like in the building clustering, with more information such as slope, plot, vegetation more a precise urban form clustering could be obtained.

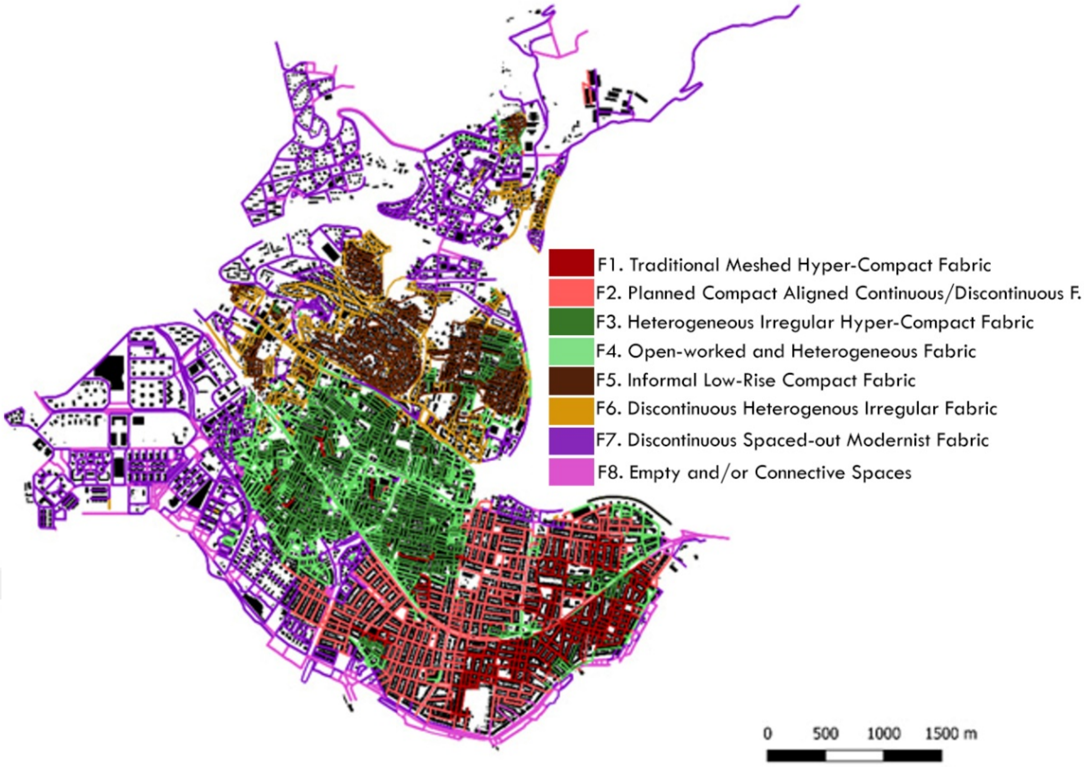


Figure 4.5 The spatial organization of urban fabrics in Karşıyaka

Recall, the MFA protocol has three major steps to define urban fabrics: defining the spatial unit (street segment), calculating the morphometric indicators, geostatistical categorization (ILINCS), clustering of patterns (Bayesian clustering).

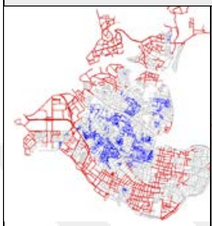
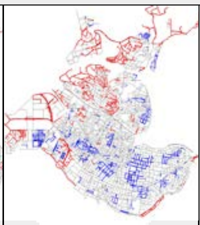
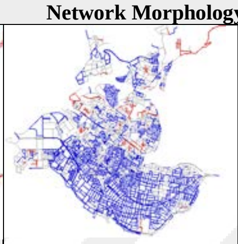
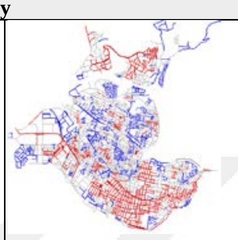
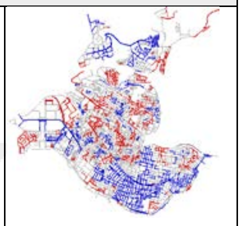
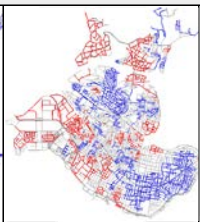
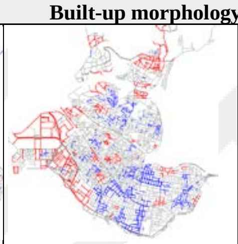
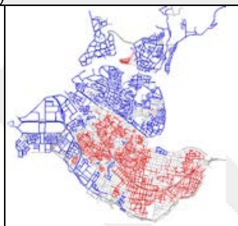
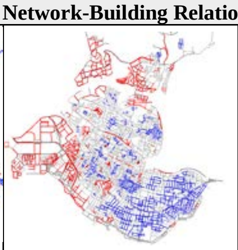
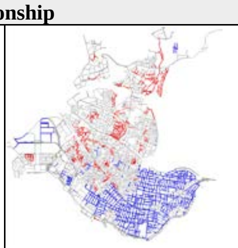
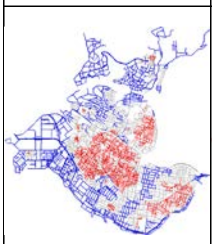
The results of the geostatistical categorization phase describe the morphological profile of the Karşıyaka district by considering each morphological descriptor at a time. In Table 4.8, red lines are the street segments whit HH and LH values of each indicator, namely the areas where the values are significantly higher than the average of the whole study area, with possibly only minor exceptions. The blue lines are the street segments with LL and HL, namely the areas where the values are significantly lower than the average of the study area. Lastly the grey lines are where these values are not significantly different than the average of the values of the district.

Seen in Table 4.8, street lengths are significantly higher than the average of the district in the fabrics F2 and F7, in other words the planned extension of the historical urban fabric and lately developed planned areas. It is significantly lower in inner zones that are associated with the fabrics F3, F4, F5 and F6. Windingness is higher in some long streets of the fabric F7-F8 and some streets of slum areas (F5-F6). Low values of windingness are distributed in the area regardless of the urban fabric, but mostly in replanned areas. In the district there are mostly four nodes, and they are usually located in the fabrics F2 and F7. 3-5 nodes are observed mostly in the unevenly developed fabrics, namely F3-F4-F5-F6.

Building coverage ratio is an effective parameter in defining urban fabrics. It is evident that low values of the parameter are found in outer zones of the district in the fabrics F7 and F8. High values are observed in inner zones, in the dense fabrics F1, F3 and F5. Building prevalence, it is seen that B3 is the most predominant building type in the district and usually found in the fabrics F1, F2, F3, F4. On the contrary, B4 is located in the fabrics F5, F6, and partially F7. B1 is found in the recently developed or regenerated fabrics, F2, F3, F7. B2 which is specialized building seems like mostly found in F7. In fact, B2 is spread in other fabrics too, but in F7 they cover larger areas (e.g. shopping malls) thus when attributed to the street segment they look more predominant in the fabric F7 (Table 4.8).

Average open space and street corridor effect values are almost like inverse of each other. Average open space is usually low when the corridor effect is significantly high. In addition, corridor effect ILINCS categorization map is similar to the one for coverage ratio. Yet there is a wider area in F2 where the street corridor effect is strong, whereas the coverage ratio was not significantly high. Open Space Variability is generally significantly low in the fabrics F5, F7 and F8 and not significant in other fabrics. Average setbacks are significantly higher in the fabric F7. However, its standard deviation (misalignment of facades) is not significantly different than the study area, that is to say, it is regular. The misalignment is observed generally in the regenerated fabrics F3 and F4. Having significantly low standard deviation of setbacks, the facades in the fabrics F1 and F2 are almost completely aligned. Average height-width ratio also quite corresponds to street corridor effect and coverage ratio, but here significant high or low values are more. Especially in the fabrics F3 average height-width ratio is high also in the areas where corridor effect is not strong. Average building height information more or less corresponds to the prevalence of B1, but not all buildings of B1 are high enough to be significantly different. In addition, there are building belong to B3 which are significantly higher than the average height of the study (e.g. south-east coast). Height misalignment (standard deviation of building height) is high in F3 and F4, which contain building types. It is low in F7, except for the zone where villas and high building blocks coexist. Building frequency is significantly high in dense fabrics like F1, F3, F5, it is significantly low especially in F7 where there are voluminous buildings (Table 4.8).

Table 4.8 ILINCS geostatistical categorization of morphometric indicators (HH, HL, LH, LL, NS)

Network Morphology				
 Length	 Windingness	 Nodes 1	 Nodes 4	 Nodes 3-5
Built-up morphology				
 Coverage Ratio	 Building Type 1 (B1)	 Building Type 2 (B2)	 Building Type 3 (B3)	 Building Type 4 (B4)
Network-Building Relationship				
 Average Open Space	 Open Space Variabilit	 Average Setback	 Building Facades Misalignment	 Street Corridor Effect
 Average Height-Width Ratio	 Average Building Height	 Height Misalignment	 Building Frequency	

The mutual information table shows the importance of each indicator for each urban fabric type. Average open space is the most dominant indicator to define all of the fabrics (39.61%). Street corridor effect and building frequency follow it. The least effective in defining all fabrics is the presence of cul-de-sacs (Node 1) (3.01%). This table also highlights the most salient characteristics of the fabric being either high or low values of that indicator. For example, average setback and building façade misalignment which have very low values in F1 are the most dominant indicators defining this fabric. Building façade misalignment and average open space which also have low values follow average setback. For F2 low values of building façade misalignment is the most significant indicator. In defining F3 high values of coverage ratio and average height-width ratio are the most salient indicators. For F4 there are three dominant indicators low values of building frequency and corridor effect, and high values of average open space. High prevalence of building type B4 and low values of average building height well define F5. High prevalence of building type B4 and low values of average open space define F6. Being a distinctive urban fabric F7 is strongly defined by four indicators: high average open space, low corridor effect, building frequency and coverage ratio. Very low building frequency, low open space variability, and high average open space are the dominant indicators which define F8 (Table 4.9).

Table 4.9 Mutual indicator information of each urban fabric

	All Fabrics	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**
OS: Average Open Space	39.61%	25.86%	15.45%	36.98%	26.31%	31.05%	25.09%	55.24%	36.91%
CorrEff: Street Corridor Effect	35.48%	25.24%	14.37%	28.94%	27.90%	24.17%	**16.97%**	54.80%	33.79%
FrBuild: Building Frequency	33.29%	13.17%	12.36%	27.19%	29.65%	29.31%	11.73%	49.44%	37.44%
CR50: Coverage Ratio PB50meters	32.06%	14.70%	18.73%	41.90%	19.19%	11.43%	12.87%	49.07%	33.13%
HW: Average Height-Width Ratio	26.51%	11.27%	12.61%	46.37%	14.46%	7.05%	12.69%	29.21%	29.74%
B3: Building prevalence B3	24.31%	23.58%	8.28%	23.33%	10.26%	24.31%	19.31%	21.29%	30.41%
B4: Building prevalence B4	22.37%	22.68%	22.38%	5.65%	8.58%	44.90%	29.40%	1.10%	25.61%
SDOS: Standard Deviation Open Space (Open Space Variability)	21.11%	6.63%	10.40%	17.64%	9.45%	18.87%	7.29%	30.68%	37.29%
SB: Average Setback	19.66%	39.66%	9.81%	8.70%	9.46%	5.47%	9.72%	41.43%	12.01%
H: Average Building Height	18.93%	6.93%	5.67%	14.60%	14.53%	37.73%	12.39%	15.08%	13.88%
SdSB: Standard Deviation Setback (Building Facades Misalignment)	15.09%	33.66%	47.63%	6.40%	1.67%	9.74%	7.31%	2.18%	6.58%
B1: Building prevalence B1	14.47%	24.64%	1.48%	3.59%	6.88%	19.55%	1.87%	22.57%	19.56%
Length: Street length	14.16%	7.76%	20.70%	17.07%	10.99%	7.73%	6.88%	12.10%	5.94%
B2: Building prevalence B2	5.82%	4.16%	7.06%	1.30%	2.78%	3.95%	1.25%	11.35%	7.68%
Nodes4	5.08%	10.52%	16.06%	2.07%	1.07%	0.44%	7.02%	0.36%	0.76%
Wind: Widingness	4.68%	3.70%	6.71%	4.52%	3.77%	3.05%	2.42%	4.34%	1.05%
Nodes35	4.52%	9.71%	14.60%	1.80%	1.42%	0.78%	4.41%	0.50%	0.67%
SDH: Standard Deviation Building Height (Height Misalignment)	4.51%	3.69%	4.66%	0.32%	0.09%	4.87%	7.56%	3.43%	7.60%
Node1 (cul-de-sac)	3.01%	2.15%	5.63%	0.65%	1.97%	2.18%	6.62%	1.15%	0.40%

This section introduces the urban fabric clustering that is found through MFA in the study area Karşıyaka District, İzmir. A part of the paper in progress entitled "The Urban Fabric of Turkish Cities: Lessons from Karşıyaka, İzmir." is derived from this section.

F1. Traditional Meshed Hyper-Compact Fabric and *F2. Planned Compact Aligned Continuous/Discontinuous Fabric*

The *Traditional Meshed Hyper-Compact Fabric* (F1) is characterized by patterns of high built density values. In this fabric type, the prevalence of small-to-mid size, mid-rise, contiguous, compact and ordinary buildings (B3) results in patterns of high building frequency along the streets. The high building density along the street edges corresponds also to patterns of low setbacks and open-space ratios. Consequently, patterns of high street corridor effect and high cross-sectional ratios describe the narrow streets of F1. The high intensity of built-up fabric is arranged on a well-meshed regular street grid with a prevalence of four-ways intersections. This urban fabric corresponds to the south-western part of Karşıyaka where the street layout has been defined mainly before 1926 according to Özkan (2006). Indeed, the settlement started to evolve in the mid-19th century. The original historic fabric developed along the *shy modernity* period and made up of small-size, low-rise buildings (2-3 stories) with deep setbacks and high open space ratios has known the most intense process of transformation of Karşıyaka. The increase in population and housing demand, the consequent intensification of the urbanization process, together with a weak conservation consciousness led to the almost complete substitution of the original built-up environment. The single-family houses with gardens developed along the *radical modernity* period were replaced by apartment-blocks through the "build-and-sell" (yapsatçı) format of the *populist modernity* period. Unlu and Bas (2017) observe the same transformation process in another coastal district of Mersin. F1 corresponds to those urban areas where the urban development reached its climax phase. Although the built-up form has profoundly changed, the original street grid remained almost the same and it has influenced the evolution of the urban fabric of the last century. F1 is mostly found in the historic neighborhoods of Tuna, Alaybey, Tersane, Bahariye Aksoy characterized, today, by a high functional mix mainly commercial and residential (Figure 4.5).

Figure 4.6 Old (1940s) and new fabric (Karşıyaka Blog and Tripadvisor, 2020)

Figure 4.7 F1. Traditional meshed hyper-compact fabric (Google Street View & Map, 2020)

The *Planned Compact Aligned Continuous/Discontinuous Fabric* (F2) is mainly found in the neighborhoods of Bahriye Üçok, Bahçelievler and, partially, Bostanlı surrounding F1 (Figure 4.5 and Figure 4.8). It corresponds to those areas, planned mostly in the mid-20th century (reorganized by the Aru Plan in 1953) during the *radical modernity* and completed during the *populist modernity* periods. F2 has been conceived as an extension of the original settlement, with a regular-grid urban fabric. These extensions are characterized by the prolongations of the main streets in the west-east direction along the coast, and towards the old center of Soğukkuyu. F2 shares similar characteristics with F1 but with some modifications. Firstly, a more regular street grid layout with longer streets compared to F1 is observed. This fabric is made up of small-to-mid-size contiguous buildings (B3), similarly to F1 but it also involves some mid-to-high rise apartment buildings (B1) as well. Similar to F1, the majority of the low-rise traditional buildings are replaced with higher ones in F2. Nonetheless, buildings in F2 are often detached and sometimes less compact; thus, street corridor effect, building coverage ratio and building frequencies are less and open spaces are more compared to F1. Relatively higher setback distances in F2 compared to F1 indicates a more residential-oriented characteristics. As the streets are wider in this fabric, cross-sectional ratio becomes lower (less narrow streets).

Figure 4.8 F2. Planned compact aligned continuous/discontinuous fabric (Google Street View & Map, 2020)

In her thesis Özkan analyzes the old (1926) and new street pattern (2005) of Karşıyaka center. As seen in the Figure 4.9, the street pattern of 1926 corresponds mostly to F1, and newer fabric which is an extension of the old one and surrounding the old one mostly associated with F2. Some older small fragments within F1 preserving the original irregular street layout are classified as F3 and F4. In the next section these heterogeneous fabrics which are transformed fabrics are gone through in detail.

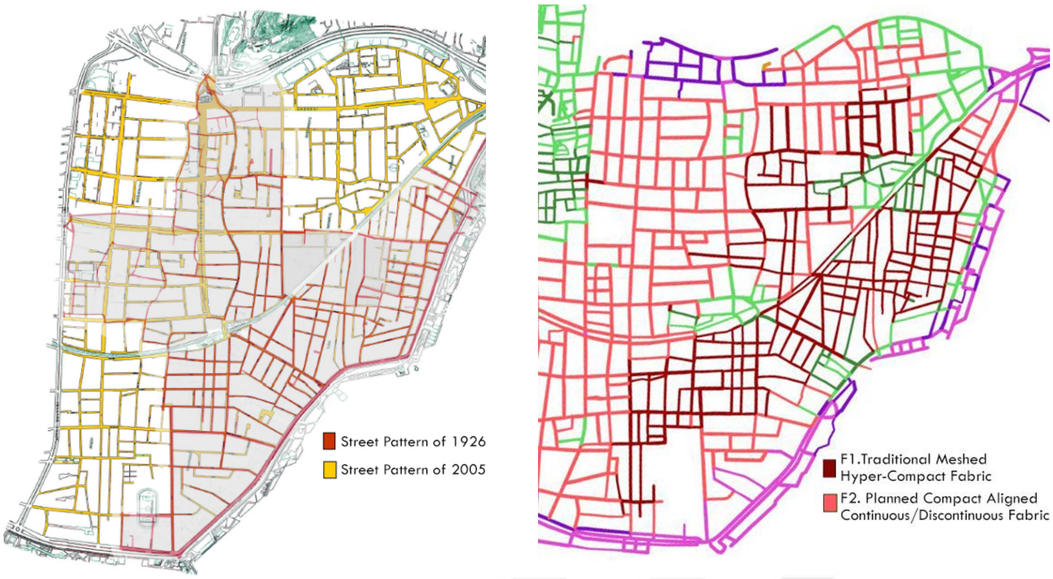


Figure 4.9 Comparison of the old and new street patterns and urban fabrics F1 and F2 (left: Özkan, 2006, p.137)

F3. Heterogeneous Irregular Hyper-Compact Fabric and *F4. Open-worked and Heterogeneous Fabric*

The heterogeneous fabric types F3 and F4 are found at the northwest of F2 (Figure 4.5). These fabrics correspond to housing developments of the populist modernity period (1960s); housing supply for the high demand due to strong demographic growth in 1960s. In this period legalization of unplanned areas via amnesty acts stimulate strong morphological transformation in the following decades. For these reasons, the regions identified by F3-F4 share several similarities with F1: these fabrics are characterized by similar patterns of low open space and high building height, street width ratio, street corridor effect, building frequency and building coverage ratio. Moreover, the remnants of its unplanned nature are still observable in the distorted grid layout with a lower regularity when compared to the neighboring F2 and F1. In contrast, some older small fragments within F1 preserving the original irregular street layout are also classified as F3 (Figure 4.5). Irregularity and heterogeneous structure of F3-F4 is due to the transformation of buildings on old spontaneously developed parcels (Figure 4.10 and Figure 4.11).

Figure 4.10 F3. Heterogeneous irregular hyper-compact fabric (Google Street View & Map, 2020)

Despite these morphological similarities, F3 might be differentiated mainly for its building type variability, composed by patterns of high prevalence of small contiguous buildings (B3), but also of higher apartment buildings (B1) and smaller buildings and townhouses (B4). This building heterogeneity is explained, here again, by the "build-and-sell" practice where former low-rise buildings are replaced at first by compact standardized apartment buildings and, lately, by mid-to-high-rise and detached modern apartment buildings.

F4 is found within larger threadlike areas encompassing F3; it appears where the hyper-compact fabric F3 got spaced-out producing its typical open-worked layout, especially in correspondence of highways, connective streets, parks and empty spaces and empty lots distributed within and around F3. Therefore, F4 is characterized by patterns of higher open space ratio and lower building coverage ratio when compared to F3 (Figure 4.5).

Figure 4.11 F7. Open-worked and heterogeneous fabric (Google Street View & Map, 2020)

F5 Informal Low-Rise Compact Fabric and *F6 Discontinuous Heterogenous Irregular Fabric*

The fifth and sixth fabrics (F5 and F6) have strongly distinctive features, making these fabrics easily recognizable. F5-F6 have been originally developed as squatter settlements during the *populist modernity* period. Slums at the south of Anadolu Street (Figure 4.5) have been legalized and went through a profound urban transformation process. At the north of the same street, on the contrary, the spontaneous fabrics built by immigrants from the east of Turkey kept its original layout probably because of their lack of accessibility.

As F5 and F6 originated by a spontaneous growth those urban fabrics share some characteristics of F3, F4 and F1. High street corridor effect, building frequency and low open space ratio are the main characteristics of those fabrics. The main difference between F5-F6 and F1, F3, and F4 stem from the type of buildings and street layout. Whereas mid-rise or high-rise buildings (B1) are predominant in other urban fabrics, F5-F6 are characterized by low-rise detached buildings and townhouses. Similarly, grid street network is predominant in previous urban fabrics, F5-F6 are characterized by organic street layout.

F5 can be distinguished by its hyper-compact fabric with an organic street layout completed by dead-end-streets. Windigness of the streets is higher compared to other fabrics due to the higher irregularity of the site morphology (Figure 4.12). F6 can be seen as a specific variation of F5: it still consists of mainly low-rise buildings but less regularly disposed and more frequently alternated with open spaces (mainly private gardens and empty lots) (Figure 4.13). These features produce heterogeneous open space patterns (mixed and high values), building frequency and street corridor effect variation (mixed and low values). These fabrics are mainly found in Cumhuriyet neighborhood and in its contiguous areas of İnönü, İmbatlı and Örnekköy (Figure 4.5).

Figure 4.12 F5 Informal low-rise compact fabric (Google Street View & Map, 2020)

After the construction of the highway in 2007, the increased accessibility of this northern sector of Karşıyaka, triggered the urban transformation process previously described for F3-4, especially in some fragments in the western part of Örnekköy. Indeed, this neighborhood is one of the six "Urban Transformation and Development Areas" designated by the current Izmir Master Plan. This trend suggests how F5-6 might rapidly evolve in the next years, assuming the same morphological properties observed for F3-4.

Figure 4.13 F6 Discontinuous heterogenous irregular fabric (Google Street View & Map, 2020)

F7 Discontinuous Spaced-out Modernist Fabric and *F8 Empty and/or Connective Spaces*

The Discontinuous Spaced-out Modernist Fabric (F7) is mainly made of high-rise buildings located in the center of large plots resulting in patterns of high open space and setbacks in correspondence of patterns of low coverage ratio (50m PB), building frequency, street corridor effect and cross-sectional ratios. High patterns of street lengths are explained by the planned vehicle-oriented nature of this large-meshed network made up of gated communities (Figure 4.14). Separate F7 areas are attached to each other and to other fabrics via F8 (Empty and/or Connective Spaces) (Figure 4.15).

While F1-F6 are arranged from the south-east to the northwest axes describing the main direction of the urban development process of Karşıyaka, F7-F8 are mainly found at the western and northern part of our study region. Both areas have been planned and developed since 1980 and are still under development (*erosion of modernity* period). As a production of the erosion of modernity period, in order words neo-liberal policies these areas contain huge shopping malls (Ege Park, Mavibahçe, Hilltown) and gated communities, varying both in terms of socioeconomic and physical characteristics. At the west of the district, they are usually for high-income families. High-rise buildings

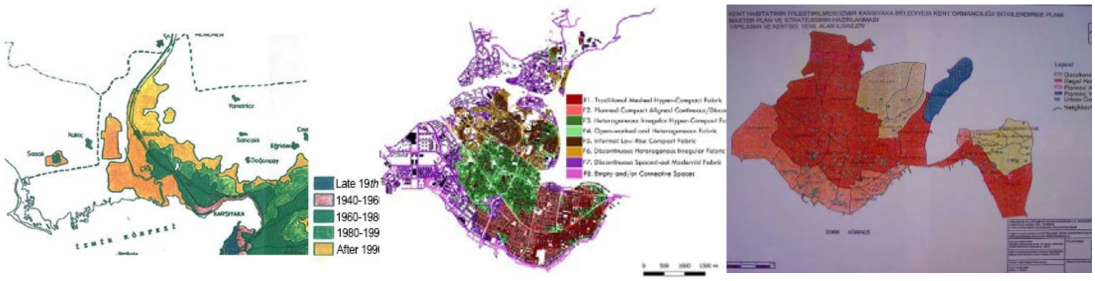
(B1) are dominant in the area, while low-rise buildings (B4) become more frequent closer to the seafront (i.e. Mavişehir Villas and Atakent Venedik Site; Mavişehir Selçuk Blocks contain both high-rise and low-rise buildings). Gated communities like Soyak Mavişehir Housing, Park Yaşam and Mavişehir Albatros Blocks made up of high-rise buildings are also addressed to high-income families. The region at the north of the highway the housing is totally high-rise; depending on the qualitative and aesthetic features they target middle-income families (such as Yaşam Housing, Esin Site) or high-income families (Varyant Housing, Nar Housing).

Figure 4.14 F7 Discontinuous spaced-out modernist fabric (Google Street View & Map, 2020)

Beyond these two large areas, smaller F7 and F8 areas are also scattered in Karşıyaka district indicating punctual interventions of recent modernists developments or urban regeneration. Connective areas F8 are especially found along the Karşıyaka coastline: these urban spaces have been specifically developed to overcome the traffic congestion problems caused by the poor connectivity of the district. Planned in the early 80s and developed along the 90s, a narrow strip of land extended the original Karşıyaka coastline hosting new coastal roads, green areas and light-rail.

Figure 4.15 F8 Empty and/or connective spaces (Google Street View & Map, 2020)

Applied for the first time at the small scale of un urban district, MFA successfully produced a meaningful clustering in Karşıyaka. In addition to the comparison of street pattern of 1926 with F1 and F2 (Figure 4.9), urban development map of the district and the planned and informal development areas shown in the activity report of the Karşıyaka Municipality in 2000 prove the validity of clustering outcome (Figure 4.16). In the first map blue and pink area, which are developed in the late 19th century and the period until 1960, in other words in shy and radical modernity periods, correspond to mainly F1 and F2 the traditional fabrics. Developments between the years 1960 and 1980 (green areas) are mostly associated with F3-F4, and F5-F6. F7-F8 correspond to the developments after 1990 (yellow areas). The third map, the activity report of the Karşıyaka Municipality in 2000, shows planned and unplanned areas in the district with its former borders. The fabrics F1-F2 and F7-F8 at the south match with the planned areas. The transformed fabrics F3-F4 and F6 and informal fabric F5 overlap informal housing areas. Also, the fabric F7 at the north is shown as informal housing, but this area is developed after 2000 (after the realization of the map) as the modern and planned fabric.



Urban development of Karşıyaka (Karadağ, 2000 cited in Özkan, 2006, p.143) | MFA results in Karşıyaka | Planned and Informal Development Areas (Sormaykan, 2008, 63)

Figure 4.16 Comparison of the development map of Karşıyaka, MFA results, and the Activity Report of the Karşıyaka Municipality in 2000

4.2.2 Results of the Survey Before the Outbreak of the Covid-19 Pandemic

In this section characteristics of the data and the participants, and statistical results of the survey before the pandemic will be presented.

Survey results are processed to find statistical relationship between urban morphology and neighborhood satisfaction through the SPSS software. Data is adapted to the analysis by (1) drawing the maps of the participants on ArcGIS and geoprocessing, (2) categorizing personal information of the participants (Table 4.10), (3) scoring the neighborhood satisfaction evaluations which were already structured on 5-point likert scale (Table 4.11).

Table 4.10 Categorization of demographic data

Age	18 – 25 / 26 – 45 / 46 - 65
Gender	Female / Male
Number of people in household:	1 / 2 / 3 or more
Number of children in household (under 18)	0 / 1 / 2 or more
Length of residence in the neighborhood	Less than 2 years / 2-5 years 6-10 years / 11-25 years / More than 26 years
Housing Tenure	Owner / Tenant
Education + Occupancy = Socio-Economic Status	Low / Middle / High

Table 4.11 Scoring the survey statements and questions

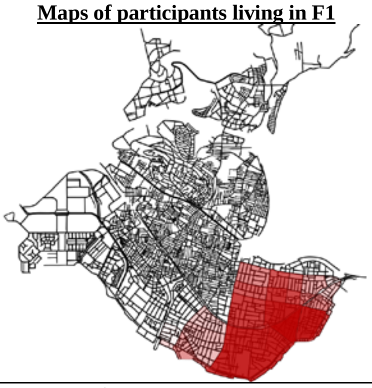
Questions	1	2	3	4	5
Part A 1 - 35	Definitely disagree	Disagree	Neither disagree nor agree	Agree	Definitely agree
Part B 1 - 4	Never	Once in two weeks	Once a week	More than once in a week	Everyday
Part C 1	Never	Once a month	Twice a month	Once a week	Everyday
Part C 2	Almost never	Once a month	Twice a month	Saturday or Sunday in a week	Every Saturday and Sunday
Part C 3 & 8	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very Satisfied
Part C 4	Very difficult	Difficult	Neither difficult nor easy	Easy	Very easy
Part C 5	Very bad	Bad	Moderate	Good	Very good
Part C 6	Definitely not	Probably Not	Probably	Most Probably	Definitely
Part C 7	Very unsafe	Unsafe	Neither unsafe nor safe	Safe	Very safe

First frequencies of urban fabrics, locations, building types and demographic characteristics are interpreted via descriptive statistics. Then the statistical relation between demographic characteristics and urban fabric is investigated to see if there is a relation mediating the influence of urban fabric on neighborhood satisfaction. Finally, neighborhood satisfaction results and urban fabric / location / building type relationship are examined.

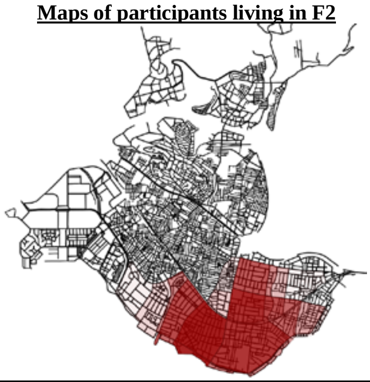
This examination is made by two different approaches. In the first one, urban fabric and location of the participant's dwelling was considered. In the second one, the maps that the participant drew as a neighborhood were taken into account. On the neighborhood map of each participant, the areas of the street segments and percentages of seven fabrics and three locations are calculated. Then new classification is held based on the percentage of the fabrics and the locations. If one fabric or location is accounts for more than 66% of the street segments, that fabric or location is attributed to that survey. If two fabrics or locations are found between 33% and 66%, then these two fabrics or locations are attributed to that survey. In case only one fabric or location is found more than 33% in the neighborhood map of participant, the neighborhood is considered as mixture of fabrics or locations with one prevalent fabric or location. If all fabrics or locations are lower than 33%, that survey map is taken as mixed fabrics or locations (Table 4.13).

Table 4.12 Overlapped neighborhood maps of the participants in the first survey

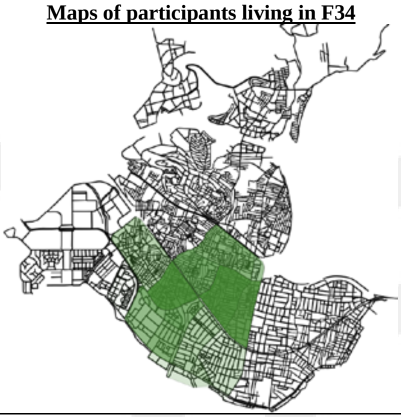
Maps of participants living in F1



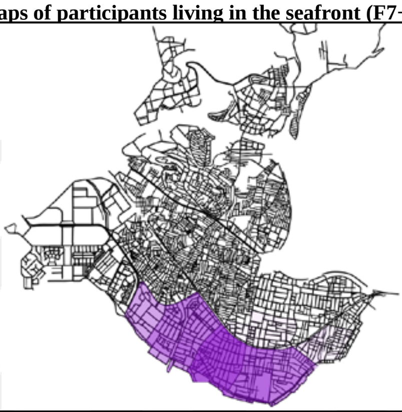
Maps of participants living in F2



Maps of participants living in F34

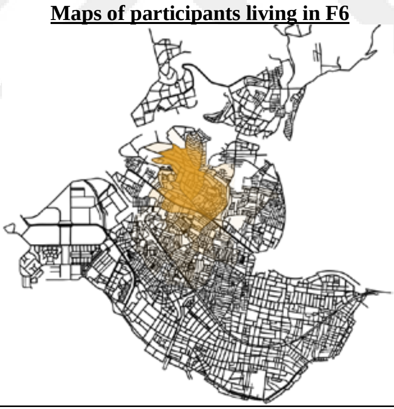


Maps of participants living in the seafront (F7+2)

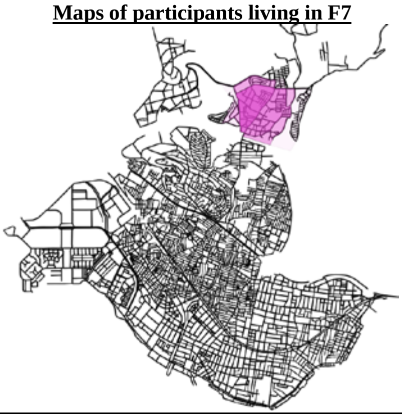


Maps of participants living in F5

Maps of participants living in F6



Maps of participants living in F7



All maps of the participants

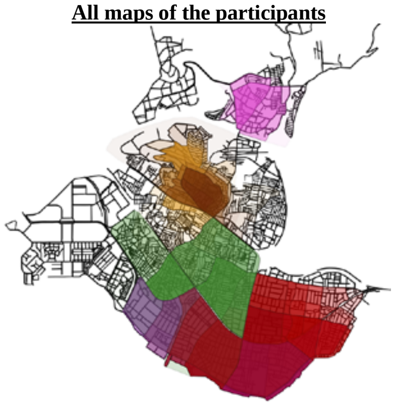
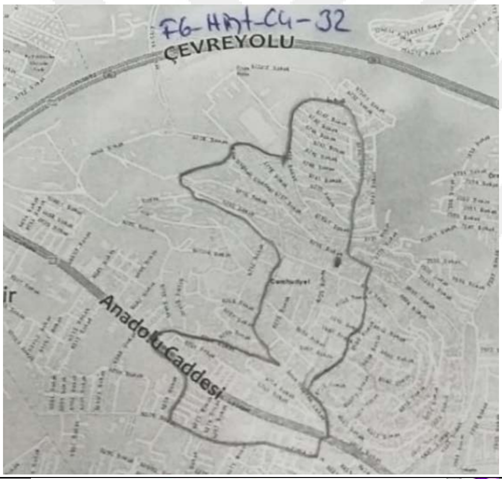
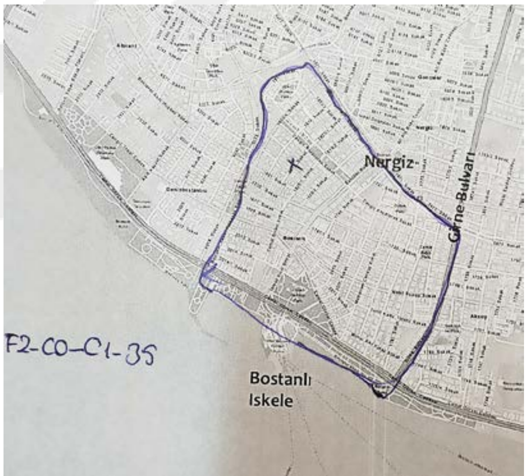
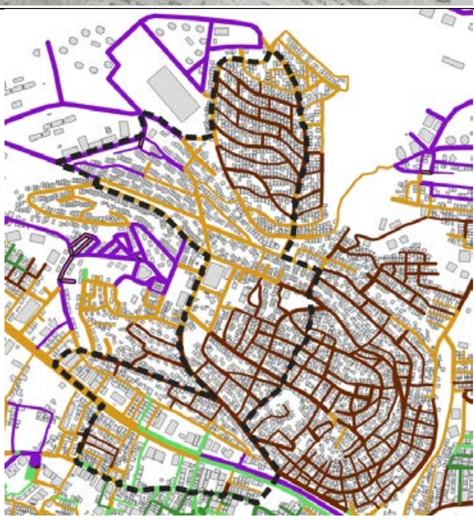


Table 4.12 presents overlapped maps of the participants and shows the limits of their perceived neighborhoods. On the neighborhood map of each participant, the areas of the street segments and percentages of seven fabrics and three locations are calculated. Then new classification is held based on the percentage of the fabrics and the locations. If one fabric or location is accounts for more than 66% of the street segments, that fabric or location is attributed to that survey. If two fabrics or locations are found between 33% and 66%, then these two fabrics or locations are attributed to that survey. In case only one fabric or location is found more than 33% in the neighborhood map of participant, the neighborhood is considered as mixture of fabrics or locations with one prevalent fabric or location. If all fabrics or locations are lower than 33%, that survey map is taken as mixed fabrics or locations (Table 4.13).

Table 4.13 Drawing and interpreting neighborhood maps







ID:	262	
F (street segment of the dwelling):	F6	
Location:	Hinterland	
Building Type:	B4	
Percentages of Fs in the maps:	F1: 0 F2: 0 F34: 9%	F5: 45% F6: 36% F7: 10% F8: 1%
Fabric Class of the Neighborhood	Combination of F5 and F6	
Coding	F5+F6	
Percentages of locations in the maps:	Coastal: 0 Semi-Coastal: 13% Hinterland: 87%	
Location Class of the Neighborhood	Hinterland	

ID:	357	
F (street segment of the dwelling):	F2	
Location:	Coastal	
Building Type:	B1	
Percentages of Fs in the maps:	F1: 3% F2: 55% F34: 8%	F5: 0 F6: 0 F7: 23% F8: 11%
Fabric Class of the Neighborhood	Mixture of fabrics F2 being the prevalent fabric	
Coding	X+F2	
Percentages of locations in the maps:	Coastal: 100% Semi-Coastal: 0 Hinterland: 0	
Location Class of the Neighborhood	Coastal	

4.2.2.1 Characteristics of the Data

322 surveys were conducted in eleven zones considering urban fabric, location and building type combinations, and gender and age balance. Eleven zones cover seven urban fabrics, four different locations and three building types.

Urban Fabric, Location and Building Type. Table 4.14 presents the number and the percentage of surveys in each fabric, location and building type where the participant resides. Most of the surveys (25%) were conducted in the fabric F34, due to the diversity of representation of this fabric. F34 is a combination of two fabrics (F3 and F4), it appears in two different locations (coastal and semi-coastal areas), and it contains all building types (B1, B3, B4). F1 and F2 follow F34, as they are found in two different locations. F72 is a special zone and unfortunately limited to 26 surveys (8.1%) due to the outbreak of the Covid-19 pandemic.

Locational distribution is well-balanced considering that the seafront area which is the zone where F72 appears is a subzone of the coastal area. 119 surveys (37.0%) are conducted in the coastal area including the seafront, 101 (31.4%) in the semi-coastal, and 102 (31.7%) in the hinterland areas. Third stratum in the survey building cluster is also well-balanced between the building types B1 (34.2%), B3 (34.5%), and B4 (31.4%).

Table 4.14 Characteristics of the data (N=322)

Urban Fabric	
F1: Traditional Meshed Hyper-Compact Fabric	56 (17.4%)
F2: Planned Compact Aligned Continuous/Discontinuous Urban Fabric	57 (17.7%)
F34: Irregular Hyper-Compact Fabric and Open-worked and Heterogeneous Fabric	81 (25.2%)
F5: Informal Low-Rise Compact Fabric	36 (11.2%)
F6: Discontinuous Heterogeneous Irregular Fabric	36 (11.2%)
F7: Discontinuous Spaced-out Modernist Fabric	30 (9.3%)
F72: Prestigious Seafront Line (composed of street segments F2 and F7)	26 (8.1%)
Location	
Seafront	26 (8.1 %)
Coastal	93 (28.9%)
Semi-Coastal	101 (31.4%)
Hinterland	102 (31.7%)
Building Cluster	
B1: Mid-to-big size, mid-to-high-rise, often isolated ordinary apartment buildings	110 (34.2%)
B3: Big, low-rise, isolated and often specialized buildings	111 (34.5%)
B4: Small-to-midsize, mid-rise, contiguous, compact ordinary apartment buildings	101 (31.4%)

Finally, Table 4.15 shows the distribution of the survey regarding all strata: urban fabric, location, and building type. The number of the surveys in each case allows to have a statistical analysis with two strata. For example, F1 in coastal area can be compared to F2 in coastal area or building B1 in the urban fabric F2 can be compared to B3 in F2.

Table 4.15 Distribution of surveys in terms of urban fabric, location and building type

Urban Fabric		Location	B1	B3	B4	Tot
F1	Traditional Meshed Hyper-Compact F.	Coastal	-	27	-	27
F1	Traditional Meshed Hyper-Compact F.	Semi-coastal	-	29	-	29
F2	Planned Compact Aligned Continuous/Discontinuous F.	Coastal	13	14	-	27
F2	Planned Compact Aligned Continuous/Discontinuous F.	Semi-coastal	15	15	-	30
F3 + F4	Heterogeneous Irregular Hyper-Compact F. + Open-worked F.	Coastal	11	14	14	39
F3 + F4	Heterogeneous Irregular Hyper-Compact F. + Open-worked F.	Semi-coastal	15	12	15	42
F5	Informal Low-Rise Compact F.	Hinterland	-	-	36	36
F6	Discontinuous Heterogenous Irregular F.	Hinterland	-	-	36	36
F7	Discontinuous Spaced-out Modernist F.	Hinterland	30	-	-	30
F2+F7	Planned Compact Aligned Continuous/Discontinuous F.	Seafront	26	-	-	26
			110	111	101	322

Participants. Gender and age were important information for selecting the participants. Number of female participants (172) are more than male participants (150), but they are close to each other. (Table 4.16). The participants were divided into three age groups as (1) 18 - 25, (2) 26 - 45 and (3) 46 - 65. Although it was planned to balance the age groups, due to technical difficulties mostly older participants are found at home to interview, thus the first age group (16.5%) remained less represented. The number of households is also grouped in three (1) 1 person, (2) two people, and (3) more than two people. This categorization is taken into consideration as (1) single person, (2) couple, and (3) families, but two or more than two people can also be students, friends, or any other group of people. Single household is the smallest group (6.9%), the group with more than two household (69.5%) is the largest group in the survey. There are 107 participants with children under 18 years old. Three groups are made of (1) no child, (1) one child, and (2) more than one child. Most of the participants (66.7%) do not have a child under 18 years old. The households with children have mostly only one child at home (21.5%). There are 5 categories for this question: (1) less than 2 years, (2) 2-5 years, (3) 6-10 years, (4) 11-25 years and (5) more than 26 years. Length of residence is high among the participants. 70.2% of the participants have been living in their current neighborhood for more than eleven years. Around two thirds of the participants are owners of their dwelling, whereas one third are tenants. Most of the participants belong to the middle SES group (62.1%) (Table 4.16).

Table 4.16 Characteristics of the participants in the survey before the outbreak (N=322)

Gender	F1	F2	F34	F5	F6	F7	F72	Tot	Chi-Square Test
(1) Female	33 (58,9%)	32 (56,1%)	46 (56,8%)	16 (44,4%)	18 (50%)	17 (56,7%)	10 (38,5%)	172 (53.4%)	X^2 (6, N = 322) = 5.022, p = 0.541
(2) Male	23 (41,1%)	25 (43,9%)	35 (43,2%)	20 (55,6%)	18 (50%)	13 (43,3%)	16 (61,5%)	150 (46.6%)	
Age									
(1) 18-25	15 (26,8%)	10 (17,5%)	7 (8,6%)	9 (25%)	11 (30,6%)	0	1 (3,8%)	53 (16.5%)	N/A
(2) 26-45	17 (30,4%)	20 (35,1%)	34 (42%)	16 (44,4%)	10 (27,8%)	15 (50%)	9 (34,6%)	121 (37.6%)	
(3) 46-65	24 (42,9%)	27 (47,4%)	40 (49,4%)	11 (30,6%)	15 (41,7%)	15 (50%)	16 (61,5%)	148 (46.0%)	
Number of people in the household									
(1) 1 person	7 (12,5%)	1 (1,8%)	5 (6,2%)	5 (13,9%)	3 (8,3%)	1 (3,3%)	0	22 (6.9%)	N/A
(2) 2 people	21 (37,5%)	16 (28,1%)	20 (24,7%)	1 (2,8%)	3 (8,3%)	5 (16,7%)	10 (38,5%)	76 (23.7%)	
(3) more than 2 people	28 (50%)	40 (70,2%)	56 (69,1%)	30 (83,3%)	29 (80,6%)	24 (80%)	16 (61,5%)	223 (69.5%)	
Number of children in household (under 18)									
(0) no child	41 (73,2%)	47 (82,5%)	47 (58%)	16 (44,4%)	19 (52,8%)	23 (76,7%)	21 (80,8%)	214 (66.7%)	N/A
(1) 1 child	12 (21,4%)	7 (12,3%)	26 (32,1%)	9 (25%)	7 (19,4%)	3 (10%)	5 (19,2%)	69 (21.5%)	
(2) more than 1 child	3 (5,4%)	3 (5,3%)	8 (9,9%)	11 (30,6%)	9 (25%)	4 (13,3%)	0	38 (11.8%)	
Length of Residence of the Participants									
(1) Less than 2 years	6 (10,7%)	0	0	0	3 (8,3%)	3 (10%)	0	12 (3.7%)	N/A
(2) 2-5 years	8 (14,3%)	5 (8,8%)	13 (16%)	0	4 (11,1%)	3 (10%)	2 (7,7%)	35 (10.9%)	
(3) 6-10 years	8 (14,3%)	5 (8,8%)	19 (23,5%)	5 (13,9%)	5 (13,9%)	3 (10%)	4 (15,4%)	49 (15.2%)	
(4) 11-25 years	15 (26,8%)	32 (56,1%)	21 (25,9%)	16 (44,4%)	13 (36,1%)	16 (53,3%)	10 (38,5%)	123 (38.2%)	
(5) More than 26 years	19 (33,9%)	15 (26,3%)	28 (34,6%)	15 (41,7%)	11 (30,6%)	5 (16,7%)	10 (38,5%)	103 (32.0%)	

Table 4.16 continues

Housing Tenure									
(1) Owner	38 (67,9%)	42 (73,7%)	50 (61,7%)	28 (77,8%)	20 (55,6%)	23 (76,7%)	18 (69,2%)	219 (68.0%)	X^2 (6, N = 322) = 7.510, p = 0.276
(2) Tenant	18 (32,1%)	15 (26,3%)	31 (38,3%)	8 (22,2%)	16 (44,4%)	7 (23,3%)	8 (30,8%)	103 (32.0%)	
Socio-Economic Status (SES) (derived from data on education and occupation)									
(1) Low	7 (12,5%)	5 (8,8%)	17 (21%)	21 (58,3%)	13 (36,1%)	7 (23,3%)	1 (3,8%)	71 (22.0%)	N/A
(2) Middle	38 (67,9%)	36 (63,2%)	54 (66,7%)	15 (41,7%)	22 (61,1%)	17 (56,7%)	18 (69,2%)	200 (62.1%)	
(3) High	11 (19,6%)	16 (28,1%)	10 (12,3%)	0	1 (2,8%)	6 (20%)	7 (26,9%)	51 (15.8%)	

When the characteristics of the participants in urban fabrics are compared; results showed that gender and housing tenure distribution was statistically similar in all seven fabrics (Table 4.16). In F5 and F72, there are more male and int other fabrics there are more female participants. In all fabrics homeowners are more than tenants. The remaining parameters (age, household size, number of children, length of residence and SES) involve at least three levels, and inferential statistical analysis are not applicable considering the sample size. Yet, it is obvious that the participants' household size, number of children, and length of residence are similar in all fabrics. Majority are older than 45 years in all fabrics except for F5 in which majority is between 26 and 45 years. Mostly there are more than two people in the household of the participant, having no child under 18 years old, and living at least 10 years in the neighborhood. However, the distribution of SES groups is not similar in all urban fabrics. In F5 the majority belong to the low SES group, whereas in other fabrics they are in the middle SES group. Also, in F5, there are no participants in the high SES group and in F6 there is only one participant in this group. In brief, no statistically meaningful difference is observed in the distribution of personal and social characteristics of the participants based on urban fabrics. Although any statistical test is not applicable, the distribution table of SES values reveals a differentiation between urban fabrics. This knowledge is important in terms of evaluating the neighborhood satisfaction across urban fabrics. The effect of SES values on neighborhood satisfaction should be considered the important, as certain SES values are clustered in certain urban fabrics. Yet, in the scope of the thesis, it is also meaningful to see the effect of other characteristics of participants on neighborhood satisfaction.

4.2.2.2 Effect of Participants' Characteristics on Neighborhood Satisfaction

Recall participants' characteristics that are interrogated in this neighborhood satisfaction survey age, gender, number of households and children, length of residence, housing tenure, education level and occupancy are independent variables of neighborhood satisfaction. In this section their relationship with neighborhood satisfaction parameters (dependent variables) is inspected. T-test is applied to see the differentiation of the mean values of neighborhood satisfaction parameters based on gender and housing tenure information. For the rest of the personal and social characteristics ANOVA is applied to test the statistical relation between the mean values. Further Post-hoc Tukey test is applied which produces homogeneous subsets of variables and then homogeneous groups are formed considering intersecting subsets. Tukey test presents in which group of the independent variable satisfaction of the parameter is similar and in which it is significantly different. Lastly, chi-square test was meant to be applied for the parameter on moving out of the neighborhood. The test was not applicable in here because the sample size for the answer "yes" was small. So, the observation is made through cross-tables for this parameter.

In fact, T-test and ANOVA should be applied, after verifying that the data are normally distributed through Shapiro-Wilk and Kolmogorov-Smirnov tests and if they have the same variance through Levine test. If these tests fail, non-parametric tests which check difference of medians (for example, Wilcox-Mann-Whitney instead of t-test, Kruskal-Wallis instead of ANOVA) should be used. However, published papers from the fields of urban design, environmental psychology and human-behavior studies have showed contradictory approaches against this above argument. Moreover, many published papers in urban design, environmental psychology, human-behavior studies journals have used t-test and ANOVA to evaluate survey data containing groups (such as age or SES groups) and likert-scale degrees. In this study, T-test, ANOVA and Kruskal-Wallis test was applied to data that shows non-normal distribution. Yet, the results from parametric and non-parametric tests were parallel (Appendix 1). Thus, T-test and ANOVA results are reported in this part (even when the survey data are not normally distributed) since the subject discussed in this thesis is from the field of urban design and environmental psychology.

Age: As stated in the methodology chapter, the survey responses are evaluated in three age groups: (1) 18 - 25, (2) 26 - 45 and (3) 46 - 65. There are eleven measures in the survey which significantly differ across age groups. These questions are found in all dimensions: one parameter in satisfaction in general, two in accessibility, two in physical characteristics, two in safety and four in social relations (Table 4.17).

Table 4.17 Neighborhood satisfaction in terms of age groups

Satisfaction in General	**ANOVA Test**	**1**	**2**	**3**	**Tot**
How satisfied are you with your neighborhood in general	F(2,319)=4.999; p=0.007	3.96	3.90	4.18	4.04
Accessibility					
I reach various destinations in my neighborhood on bike	F(2,319)=9.122; p=0.000	1.74	1.36	1.14	1.32
I cycle to exercise or for recreation in my neighborhood	F(2,319)=14.639; p=0.000	1.83	1.45	1.11	1.36
Physical Characteristics					
It is easy to pass from a building to a building, from building to the street	F(2,319)=3.105; p=0.046	4.19	4.38	4.13	4.23
There is a visual diversity and richness in my neighborhood	F(2,319)=3.293; p=0.038	2.92	3.32	3.40	3.29
Safety					
My neighborhood is a safe place in case of a disaster	F(2,319)=5.542; p=0.004	2.28	2.92	3.00	2.85
I feel safe when I walk around in the neighborhood during nighttime	F(2,319)=6.765; p=0.001	3.83	4.15	4.44	4.23
Social Relations					
Do you feel a part of this neighborhood	F(2,319)=6.567; p=0.002	3.72	3.82	4.11	3.93
I know most of my neighbors	F(2,319)=5.856; p=0.003	3.40	3.81	3.94	3.80
I spend time with my neighbors, friends or relatives in my neighborhood	F(2,319)=7.997; p=0.000	2.19	2.72	3.12	2.82
I prefer to spend time in the neighborhood for weekend activities	F(2,319)=5.1; p=0.007	2.06	2.47	2.82	2.56

According to Tukey test results the participants between the age 46-65 (group 3) gave significantly higher scores for neighborhood satisfaction in general, for visual diversity parameter in physical characteristics dimension, for safety in disasters and safety during nighttime parameters in safety dimension, for all parameters in social relations dimension: feeling a part of the neighborhood, knowing most of the neighbors, spending time with neighbors, friends or relatives in the neighborhood and having weekend activities in the neighborhood. The participants between the age 18-25 (group 1) gave significantly higher scores for parameters related to biking activities in accessibility dimension (Appendix 2).

Gender. There are only two parameters in the survey which significantly differ between men and women. They are on traffic jam and meeting daily needs in the neighborhood. For all other questions gender does not make any difference in responses (Table 4.18).

Table 4.18 Neighborhood satisfaction in terms of gender

	T-Test	**F**		**M**		
Accessibility		**M**	**SD**	**M**	**SD**	**Tot**
Traffic jam is not an issue in my neighborhood	t=2.075, df=320, p=0.039	3.31	1.489	2.97	1.447	3.16
I meet my daily needs in the neighborhood	t=3.717, df=320, p=0.000	4.55	0.695	4.23	0.876	4.40

Males (M=2.97; SD=1.45) tend to give lower satisfaction ratings than females (M=3.31; SD=1.49) regarding traffic jam in the neighborhood. Females (M=4.55; SD=0.70) tend to give higher satisfaction ratings than males (M=4.23; SD=0.88) in terms of meeting daily needs in the neighborhood.

Number of people in household. There are eight measures which are significantly different regarding the three groups of number of people in the household. These measures are related to overall neighborhood satisfaction, accessibility, physical characteristics, and social relations (Table 4.19).

Table 4.19 Neighborhood satisfaction in terms of number of people in the household

Satisfaction in General	**ANOVA**	**1**	**2**	**3**	**Tot**
How satisfied are you with your current dwelling	F(2,318)=4.133; p=0.017	3.95	4.33	4.05	4.11
My neighborhood is a calm place to live	F(2,318)=4,.30; p=0.017	3.59	4.21	4.21	4.17
Accessibility					
I can easily find a parking place close to my house	F(2,318)=5.097; p=0.007	2.82	2.34	3.01	2.84
Physical Characteristics					
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F(2,318)=11.664; p=0	3.00	4.18	4.02	3.99
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	F(2,318)=3.794; p=0.024	2.82	3.21	3.44	3.34
Steepness of the streets in my neighborhood is comfortable for walking	F(2,318)=6.777; p=0.001	3.09	4.24	3.71	3.79
Social Relations					
I know most of my neighbors	F(2,318)=3.170; p=0.043	3.50	4.03	3.75	3.80
How safe is your neighborhood	F(2,318)=4.692; p=0.01	3.91	4.12	3.87	3.93

According to Tukey test results the participants having more than two people in the household tend to give significantly higher scores to the parameter of calm place to live in satisfaction in general dimension, the parameters of imageability and feeling in appropriate closure when walking along the street in physical characteristics dimension. The participants having two people in the household tend to give significantly higher scores to the parameters of imageability and steepness in physical characteristics dimension, and the parameter of knowing most of the neighbors in social relations dimension (Appendix 3).

Number of Children: There are twelve measures which are significantly different related to number of children under 18 years in the household. These measures are on accessibility, physical characteristics, and social relations (Table 4.20).

Table 4.20 Neighborhood satisfaction in terms of number of children in the household

Accessibility	ANOVA	0	1	2	Tot
As I go out of my house, I can easily access to green areas where I relax or do sports	F(2,318)=6,305; p=0,002	4,16	3,87	3,47	4,02
Green areas where I relax or do sports are quite close to my house	F(2,317)=7,349; p=0,001	4,09	3,81	3,32	3,94
Public transportation modes around my housing are quite reliable, comfortable, and not crowded	F(2,318)=3,746; p=0,025	3,85	3,70	3,26	3,74
As I go out of my house, I easily access to main roads which are connected to the city center	F(2,318)=3,157; p=0,044	4,57	4,48	4,21	4,51
I enjoy walking in the close vicinity of my house	F(2,318)=5,622; p=0,004	4,01	4,12	3,42	3,96
I walk to exercise or for recreation in my neighborhood	F(2,318)=4,202; p=0,016	4,43	4,28	3,97	4,34
Physical Characteristics					
The building sizes (width and height) in my neighborhood are coherent with each other	F(2,318)=4,302; p=0,014	3,63	3,55	3,05	3,55
There is a visual diversity and richness in my neighborhood	F(2,318)=7,364; p=0,001	3,40	3,35	2,63	3,30
Steepness of the streets in my neighborhood is comfortable for walking	F(2,318)=7,751; p=0,001	3,92	3,88	2,95	3,79
Social Relations					
I spend time with my neighbors, friends, or relatives in my neighborhood	F(2,318)=4,720; p=0,01	2,65	2,97	3,42	2,81
I prefer to spend time in the neighborhood for weekend activities	F(2,318)=3,771; p=0,024	2,51	2,36	3,18	2,56
Do you feel a part of this neighborhood	F(2,318)=3,025; p=0,05	4,01	3,77	3,79	3,93

According to Tukey test results the participants with no children tend to give significantly higher scores to the parameters of easy access and closeness to green areas, quality of public transportation, easy access to main roads, enjoy of walking in the close vicinity and walk to exercise in accessibility dimension, the parameters of building size coherence, visual diversity and richness in the neighborhood, and steepness in physical characteristics dimension. The participants with more than one child tend to give significantly higher scores to the parameters of spending time with neighbors, friends or relatives in the neighborhood, and having weekend activities in the neighborhood in social relations dimension (Appendix 4).

Length of residence in the neighborhood. There are 5 categories for this question: (1) less than 2 years, (2) 2-5 years, (3) 6-10 years, (4) 11-25 years and (5) more than 26 years. Scores of twelve parameters on accessibility, physical characteristics and on social relations significantly differ in terms of length of residence (Table 4.21).

Table 4.21 Neighborhood satisfaction in terms of length of residence in the neighborhood

Accessibility	ANOVA	1	2	3	4	5	Tot
As I go out of my house, I can easily access to green areas where I relax or do sports	F(4,317)=2.64;p=0.034	4.50	4.43	4.14	3.98	3.80	4.02
I can easily access to where my friends and relatives live	F(4,317)=3.449;p=0.009	3.17	4.00	4.20	4.21	4.14	4.12
My friends and relatives live quite close to me	F(4,317)=2.763;p=0.028	3.08	3.83	4.02	4.06	3.95	3.96
I walk to reach various destinations in my neighborhood	F(4,317)=2.804;p=0.026	4.33	4.91	4.80	4.65	4.72	4.71
Physical Characteristics							
Physical conditions in the close vicinity of my house are convenient for walking	F(4,317)=2.789;p=0.027	3.08	3.83	3.80	3.85	3.43	3.68
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F(4,317)=3.427;p=0.009	3.17	4.11	4.08	4.14	3.82	3.99
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	F(4,317)=2.998;p=0.019	3.92	3.34	3.00	3.52	3.23	3.34
Safety							
My neighborhood is a good place to raise children	F(4,317)=2.733;p=0.029	4.08	4.34	4.33	4.18	3.83	4.10
Social Relations							
Do you feel a part of this neighborhood	F(4,317)=8.428;p=0	3.58	3.54	3.57	4.01	4.19	3.93
I know most of my neighbors	F(4,317)=8.215;p=0	2.50	3.60	3.63	3.83	4.07	3.80
I spend time with my neighbors, friends or relatives in my neighborhood	F(4,317)=7.915;p=0	1.92	2.06	2.31	2.92	3.30	2.82
I prefer to spend time in the neighborhood for weekend activities	F(4,317)=4.473;p=0.002	2.92	2.17	1.88	2.63	2.89	2.56

According to Tukey test results the participants living less than two years in the same neighborhood tend to give significantly lower scores to the parameters of easy access and closeness to where friends and relatives live, and walking to reach various destinations in accessibility dimension, the parameters of imageability, and feeling appropriate closure when walking along the street in physical characteristics dimension, the parameters of feeling a part of the neighborhood, knowing most of the neighbors, and spending time with neighbors, friends or relatives in the neighborhood, in the neighborhood in social relations dimension. On the contrary, they gave significantly higher scores to spending time in the neighborhood for weekend activities in social relations dimension (Appendix 5).

Housing Tenure: There are eight measures in the survey which significantly differ for house owners and tenants. They are on accessibility, social relations, and dwelling satisfaction (Table 4.22).

Table 4.22 Neighborhood satisfaction in terms of housing tenure

Satisfaction in General	T-Test	Owner		Tenant		Total
		M	SD	M	SD	M
How satisfied are you with your current dwelling	t=3.120, df=320, p=0.002	4.20	0.733	3.91	0.853	4.11
Accessibility						
I can easily access to where my friends and relatives live	t=2.187, df=320, p=0.029	4.21	0.861	3.95	1.175	4.12
My friends and relatives live quite close to me	t=2.432, df=320, p=0.016	4.05	0.915	3.76	1.184	3.96
Social Relations						
Do you feel a part of this neighborhood	t=4.209, df=320, p=0.000	4.06	0.758	3.66	0.892	3.93
I know most of my neighbors	t=2.334, df=320, p=0.020	3.89	0.932	3.61	1.131	3.80
I spend time with my neighbors, friends, or relatives in my neighborhood	t=2.452, df=320, p=0.015	2.96	1.548	2.51	1.448	2.82
I prefer to spend time in the neighborhood for weekend activities	t=1.993, df=320, p=0.047	2.68	1.559	2.31	1.540	2.56

Homeowners (M=4.20; SD=0.74) tend to be more satisfied with their dwellings than tenants (M=3.90; SD=0.85).

Homeowners (M=4.20; SD=0.86 | M=4.05; SD=0.92) tend to give higher satisfaction ratings than tenants (M=3.97; SD=1.17 | M=3.76; SD=1.19) regarding easy access and closeness to their friends and relatives.

All questions on social relations are found related to housing tenure and in all of them homeowners tend to give higher rates than tenants. However, while feeling a part of the neighborhood and knowing the neighbors tend be rated positively, spending time with neighbors, friends, relatives and having activities at the weekends in the neighborhood are rated negatively.

Socio-Economic Status: There are 3 categories for this question: (1) low, (2) middle, (3) high. SES groups is the characteristic to which more attention should be paid in this survey. As it is found in previous section, this characteristic is not distributed similarly in the urban fabrics. In the fabrics F5 and F6, the number of participants in low and middle SES groups are much higher than the other fabrics. In the survey, there are 20 measures on which responses of SES groups significantly differ. Concerning satisfaction in general, high SES group revealed more satisfaction with their dwellings and aliveness of their neighborhood.

On accessibility extent in general the participants within a high SES group tend to give more positive scores than middle and low groups. There are two measures that the participants in the high SES group revealed more dissatisfaction than others. These issues are concerning traffic jam and finding a parking place which is meaningful concerning the limited automobile ownership of low SES groups. In Karşıyaka like other highly populated districts in other cities of Turkey, parking places are not enough and parallel parking on streets is common. This leads to parking and traffic problems especially in neighborhoods occupied mostly with high or middle SES groups and automobile ownership is high.

Similar to accessibility, physical characteristics parameters are evaluated more positively by middle or high SES groups except for the pollution issue. The participants of the high SES group revealed more satisfaction with their neighborhood in terms of being a safe place and an environment to raise children.

Considering social relations although all groups give negative response for having weekend activities in their neighborhood, low SES group tend to give higher scores. Also, low SES group tend to know more neighbors (Table 4.23).

Table 4.23 Neighborhood satisfaction in terms of SES groups

Satisfaction in General	ANOVA	1	2	3	Tot
How satisfied are you with your current dwelling	F(2,319)=6.59;p=0.002	3.96	4.08	4.45	4.11
My neighborhood has a lively environment	F(2,319)=4.65;p=0.01	3.13	3.28	3.75	3.32
Accessibility					
How would you rate the accessibility to important points in your neighborhood	F(2,319)=4.19;p=0.016	3.83	4.02	4.16	4.00
As I go out of my house, I can easily access to green areas where I relax or do sports	F(2,319)=13.45;p=0	3.52	4.04	4.61	4.02
Green areas where I relax or do sports are quite close to my house	F(2,319)=13.04;p=0	3.42	3.96	4.51	3.93
Public transportation modes around my housing are quite reliable, comfortable, and not crowded	F(2,319)=6.02;p=0.003	3.86	3.58	4.22	3.74
As I go out of my house, I easily access to main roads which is connected to the city center	F(2,319)=4.14;p=0.017	4.28	4.54	4.69	4.51
Traffic jam is not an issue in my neighborhood	F(2,319)=8.85;p=0	3.76	2.92	3.22	3.16
I can easily find a parking place close to my house	F(2,319)=5.41;p=0.005	3.28	2.82	2.33	2.84
I enjoy walking in the close vicinity of my house	F(2,319)=4;p=0.019	3.86	3.89	4.35	3.96
I walk to exercise or for recreation in my neighborhood	F(2,319)=4.44;p=0.012	4.46	4.22	4.61	4.34
Physical Characteristics					
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F(2,319)=3.33;p=0.037	3.70	4.08	4.04	3.99
The building sizes (width and height) in my neighborhood are coherent with each other	F(2,319)=3.7;p=0.026	3.28	3.55	3.84	3.54
There is a visual diversity and richness in my neighborhood	F(2,319)=3.41;p=0.034	3.31	3.19	3.64	3.29
Steepness of the streets in my neighborhood is comfortable for walking	F(2,319)=8.47;p=0.000	3.21	3.88	4.20	3.79
Pollution is not an issue in my neighborhood	F(2,319)=3.58;p=0.029	3.68	3.23	3.47	3.37
Safety					
How safe is your neighborhood	F(2,319)=7.79;p=0.000	3.69	3.98	4.08	3.93
My neighborhood is a good place to raise children	F(2,319)=5.64;p=0.004	3.72	4.21	4.22	4.10
My neighborhood is a good place for disabled and old people to live	F(2,319)=3.02;p=0.050	3.93	4.27	4.04	4.16
Social Relations					
I know most of my neighbors	F(2,319)=3.35;p=0.036	4.07	3.72	3.76	3.80
I prefer to spend time in the neighborhood for weekend activities	F(2,319)=4.69;p=0.010	2.94	2.55	2.08	2.56

According to Tukey test results the participants in the high SES group tend to give significantly higher scores to the parameters of dwelling satisfaction and aliveness of the neighborhood in satisfaction in general dimension, the parameters of accessibility in general, easy access and closeness to green areas, quality of public transportation, easy access to main roads, enjoy of walking in the close vicinity and walking to exercise in the neighborhood in accessibility dimension, the parameters of building size coherence, visual diversity and richness in the neighborhood, and steepness in physical characteristics dimension, the parameters of safety in general, and being a good place to raise children in safety dimension. The participants in the low SES group tend to give significantly higher scores to the parameters of traffic issue, finding a parking place in the accessibility dimension, the parameter of having weekend activities in the neighborhood in social relations dimension (Appendix 6).

4.2.2.3 Influence of Urban Morphology on Neighborhood Satisfaction

This section includes the influence of urban fabric and location on neighborhood satisfaction, also the influence of building type on dwelling satisfaction. Influence of urban fabric and location is evaluated by two different approaches. The first is based on the urban fabric and location of the street where the dwelling of the participant is located. The second is based on the perceived neighborhood territorial borders and associated with the ratio of the urban fabrics in the neighborhood maps that were drawn by the participants. In both evaluations, neighborhood satisfaction will be held by the dimensions which are satisfaction in general, accessibility, physical characteristics, safety, social relations.

4.2.2.3.1 Neighborhood Satisfaction in Urban Fabrics Based on the Location of the Dwelling. The statistical relation between 47 neighborhood satisfaction parameter and the urban fabric of the street segment where the participant live is measured via ANOVA test and Post-hoc Tukey test. Only the categorical question on moving from the neighborhood is observed via cross-tables, as there were not enough observations to run chi-square test.

Overall satisfaction with the neighborhoods in Karşıyaka is rated high (m: 4.04) by the participants of the survey (Table 4.24). However, it does not differ by urban fabrics.

Despite of this fact, 43 of 47 parameters significantly differ in urban fabrics. Two parameters that do not statistically differentiate in urban fabrics are on accessibility and closeness of workplace (Table 4.26). The other two are on social relations: feeling a part of the neighborhood and having weekend activities in the neighborhood (Table 4.28).

Satisfaction in general. There are five measures on satisfaction in general, where four are tested via ANOVA. According to ANOVA results satisfaction with the neighborhood does not significantly differ in terms of urban fabrics. However, other three parameters show significant differences in urban fabrics (Table 4.24).

Table 4.24 ANOVA results of satisfaction in general in urban fabrics

Satisfaction in General		**F1**	**F2**	**F34**	**F5**	**F6**	**F7**	**F72**	**Tot**
How satisfied are you with your neighborhood in general	F(6,315)=1.741;p=0.111	3.96	4.18	4.00	3.97	3.81	4.17	4.31	4.04
How satisfied are you with your current dwelling	F(6,315)=6.331;p=0.000	4.11	4.39	4.12	3.83	3.56	4.30	4.38	4.11
My neighborhood is a calm place to live	F(6,315)=4.532;p=0.000	3.71	4.32	4.32	4.33	3.78	4.50	4.27	4.17
My neighborhood has a lively environment	F(6,315)=5.915;p=0.000	3.52	3.42	3.15	2.64	3.03	3.83	3.96	3.32

Appendix 7 presents Tukey Post-Hoc test results. According to these results:

- *Traditional Meshed Hyper-Compact Fabric (F1)* is evaluated as significantly the calmest urban fabric.
- In the *Planned Compact Aligned Continuous/Discontinuous Fabric (F2)* dwelling satisfaction is evaluated significantly the highest.
- In the *Heterogeneous Irregular Hyper-Compact Fabric and Open-worked and Heterogeneous Fabric (F34)* there is no significantly different values on satisfaction in general.
- *Informal Low-Rise Compact Fabric (F5)* is significantly the least lively urban fabric among all fabrics. Dwelling satisfaction has almost the lowest scores in this fabric.
- In the *Discontinuous Heterogenous Irregular Fabric (F6)* dwelling satisfaction is evaluated significantly the lowest among all urban fabrics. Calmness together with aliveness of the neighborhood are evaluated significantly almost the lowest in this fabric.

- In the *Discontinuous Spaced-out Modernist Fabric (F7)* calmness of the neighborhood has significantly the highest score whereas aliveness of the neighborhood has almost the highest scores.
- *Prestigious Seafront Line (composed of street segments F2 and F7)* is evaluated as the liveliest fabric. Also, in this area dwelling satisfaction is almost the highest.

Last parameter on satisfaction in general dimension "Are you thinking of moving out from this neighborhood?" is analyzed via cross-tabulation. 294 of 322 participants do not think of moving out. In F2 and F7, none of the participants want to move out. Most of the participants who want to move out live in the fabrics F6 (11) and F1 (10). The sample size of the participants who are willing to move out across the urban fabrics are too low that does not allow to run chi-square analysis. Reasons for moving out is a multiple answer question where the participants could give more than one answer from the options economic, social, and physical. Most of the participants gave social reasons to stay at the same place such as getting along with neighbors, feeling belong to that place. Physical reasons (e.g. dissatisfaction with aesthetics of the neighborhood, infrastructure, transportation) are given the most for leaving the neighborhood (15 participant). Six of ten participants in the fabric F1 want to move out because of physical reasons, and six of eleven participants living in F6 want to leave the neighborhood due to economic reasons (e.g. affording a higher rent or priced apartment) (Table 4.25).

Table 4.25 Participants willing or not to move out based on urban fabrics

Urban Fabrics	Yes	No	Tot
F1	10	46	56
F2	0	57	57
F34	4	77	81
F5	2	34	36
F6	11	25	36
F7	0	30	30
F72	1	25	26
Total	28	294	322

		F1	F2	F34	F5	F6	F7	F72	Tot
YES	Economic	3	0	1	1	6	0	0	11
	Social	3	0	3	2	1	0	0	9
	Physical	6	0	4	0	4	0	1	15
NO	Economic	13	11	17	15	10	0	9	75
	Social	32	47	63	25	17	30	17	231
	Physical	9	13	19	0	2	4	8	55

Accessibility. Accessibility scores are found mostly high in Karşıyaka. Most of the parameters are rated above or close to 4 (satisfied). Only traffic jam and parking place issues are rated moderate. Further, cycling activities were a matter of strong dissatisfaction both as a mode of transportation and exercise. Among all 20 accessibility parameters, two parameters, access and closeness to workplace, do not statistically differ in urban fabrics (Table 4.26).

Table 4.26 ANOVA results of satisfaction with accessibility in urban fabric

Accessibility		F1	F2	F34	F5	F6	F7	F72	Tot
How would you rate the accessibility to important points in your neighborhood	F(6,315)=7.296;p=0	4.14	4.23	3.99	3.67	3.64	3.90	4.35	4.00
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	F(6,315)=3.195;p=0.005	4.50	4.53	4.46	4.22	4.00	4.50	4.77	4.43
Services like shops, schools, health center, cinema etc are quite close to my house	F(6,315)=4.615;p=0	4.61	4.39	4.28	4.08	3.94	4.60	4.77	4.37
As I go out of my house, I can easily access to green areas where I relax or do sports	F(6,315)=22.619;p=0	4.39	4.44	3.99	3.03	2.75	4.70	4.69	4.02
Green areas where I relax or do sports are quite close to my house	F(6,315)=27.371;p=0	4.41	4.37	3.84	3.00	2.46	4.63	4.69	3.93
As I go out of my house, I can easily access to public transportation	F(6,315)=2.805;p=0.011	4.84	4.63	4.47	4.39	4.47	4.70	4.73	4.60
Public transportation modes around my housing are quite reliable, comfortable and not crowded	F(6,315)=5.333;p=0	4.25	3.86	3.65	3.56	2.94	3.63	4.15	3.74
As I go out of my house, I can easily access to my workplace	F(6,136)=1.275;p=0.273	3.87	4.00	4.00	4.00	3.60	4.33	4.47	4.02
My workplace is quite close to my house	F(6,136)=1.383;p=0.226	3.83	3.77	3.41	3.70	3.47	4.00	4.29	3.73
I can easily access to where my friends and relatives live	F(6,315)=4.049;p=0.001	4.29	4.26	4.07	4.36	3.44	4.10	4.27	4.12
My friends and relatives live quite close to me	F(6,315)=4.12;p=0.001	4.16	4.09	3.75	4.31	3.39	3.93	4.19	3.96
As I go out of my house, I easily access to main roads which is connected to the city center	F(6,315)=7.058;p=0	4.93	4.70	4.43	4.00	4.28	4.30	4.69	4.51
Traffic jam is not an issue in my neighborhood	F(6,315)=20.15;p=0	1.91	2.89	3.11	4.47	3.64	4.17	2.88	3.16
I can easily find a parking place close to my house	F(6,315)=39.621;p=0	1.21	2.09	2.86	4.36	3.64	4.33	3.04	2.84
I meet my daily needs in the neighborhood	F(6,315)=3.262;p=0.004	4.70	4.35	4.41	4.39	4.03	4.57	4.19	4.40
I enjoy walking in the close vicinity of my house	F(6,315)=10.322;p=0	4.34	4.12	3.90	3.25	3.17	4.37	4.54	3.96
I walk to reach various destinations in my neighborhood	F(6,315)=5.911;p=0	4.82	4.77	4.80	4.81	4.19	4.73	4.62	4.71
I walk to exercise or for recreation in my neighborhood	F(6,315)=17.468;p=0	4.59	4.53	4.46	4.47	3.03	4.53	4.38	4.34
I reach various destinations in my neighborhood on bike	F(6,315)=7.594;p=0	2.00	1.18	1.27	1.11	1.19	1.00	1.19	1.32
I cycle to exercise or for recreation in my neighborhood	F(6,315)=5.421;p=0	1.89	1.40	1.33	1.06	1.22	1.00	1.19	1.36

Appendix 8 presents Tukey Post-Hoc test results. According to these results:

- In the *Traditional Meshed Hyper-Compact Fabric (F1)* traffic and parking issues are evaluated significantly the lowest. Access to and quality of public transportation, access to main roads, meeting the daily needs, walking for both reaching a destination and for exercise, also cycling for both reaching a destination and for exercise are evaluated significantly the highest. Overall satisfaction with the accessibility, closeness to services, access and closeness to friends and relatives, enjoying walking in the close vicinity of the house are scored almost the highest.

- In the *Planned Compact Aligned Continuous/Discontinuous Fabric (F2)* parking issue is scored almost the lowest. Overall satisfaction with the accessibility, quality of public transportation, access to main roads, enjoying walking in the close vicinity of my house, walking to exercise are evaluated almost the highest.
- In the *Heterogeneous Irregular Hyper-Compact Fabric and Open-worked and Heterogeneous Fabric (F34)* walking to reach various destinations is evaluated almost the highest, other parameters did not receive significantly different scores.
- In the *Informal Low-Rise Compact Fabric (F5)* access to main roads and public transportation are scored significantly the lowest. Overall satisfaction with the accessibility, access and closeness to services, access and closeness to green areas, enjoying walking, biking to reach a destination, and cycling for exercise received almost the lowest scores in this fabric. Access and closeness to friends and relatives, traffic and parking issues are the parameters that are significantly the most satisfied. Further, walking to reach a destination has almost the highest score.
- In the *Discontinuous Heterogenous Irregular Fabric (F6)* overall satisfaction with the accessibility, access and closeness to services, access and closeness to green areas, quality of public transport, access and closeness to friends, meeting daily needs, enjoying walking, walking for reaching to a destination and for exercise are scored significantly the lowest. Access to main roads received almost the lowest scores in this fabric. Traffic and parking issues are the parameters that the participants are almost the most satisfied.
- In the *Discontinuous Spaced-out Modernist Fabric (F7)* cycling for reaching to a destination and for exercise are the parameters that are scored significantly the lowest. Access to green areas is the only parameter which received

significantly the highest score in this fabric. Yet, closeness to services and green areas, satisfaction with the traffic and parking places, meeting daily needs and enjoying walking have almost the highest scores.

- In the *Prestigious Seafront Line (composed of street segments F2 and F7)* satisfaction with the traffic and meeting daily needs received almost lowest scores. Overall satisfaction with the accessibility, access and closeness to services, closeness to green areas, enjoying walking are scored significantly the highest. Access to green areas, quality of public transport, access and closeness to friends and relatives, access to main roads, and walking to exercise have almost the highest scores.

Physical characteristics. Physical characteristics scores are found between moderate and high in Karşıyaka. According to ANOVA test, all 13 parameters of physical characteristics significantly differ in urban fabrics (Table 4.27).

Table 4.27 ANOVA results of satisfaction with physical characteristics in urban fabrics

Physical Characteristics		**F1**	**F2**	**F34**	**F5**	**F6**	**F7**	**F72**	**Tot**
How would you rate the general appearance of your neighborhood	F(6,315)=17.388;p=0	3.29	4.18	3.74	3.22	3.00	3.90	4.04	3.64
Physical conditions in the close vicinity of my house are convenient for walking	F(6,315)=14.749;p=0	3.68	4.16	3.83	2.94	2.47	4.13	4.31	3.68
With its all built elements my neighborhood is beautiful and attractive	F(6,315)=14.426;p=0	3.07	3.84	3.58	2.92	2.50	4.17	3.96	3.43
My neighborhood is clean and well-maintained	F(6,314)=13.293;p=0	3.02	4.09	3.89	3.36	2.97	4.30	4.19	3.67
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F(6,315)=17.649;p=0	3.46	4.33	4.28	3.67	2.97	4.53	4.65	3.99
The building sizes (width and height) in my neighborhood are coherent with each other	F(6,315)=27.36;p=0	3.50	3.79	3.83	2.75	2.11	4.50	4.12	3.54
The building facades in my neighborhood are coherent with each other	F(6,315)=21.986;p=0	3.29	3.60	3.80	2.72	2.14	4.33	4.04	3.44
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	F(6,315)=6.113;p=0	2.80	3.51	3.19	3.58	3.39	4.17	3.31	3.34
The amount of buildings and green areas in my neighborhood is quite balanced	F(6,315)=17.372;p=0	2.38	3.58	3.30	2.86	2.44	4.17	3.81	3.16
It is easy to pass from a building to a building, from building to the street	F(6,315)=5.119;p=0	3.89	4.33	4.44	4.56	3.83	4.23	4.19	4.23
There is a visual diversity and richness in my neighborhood	F(6,315)=18.246;p=0	2.91	3.82	3.49	2.83	2.06	4.07	3.77	3.29
Steepness of the streets in my neighborhood is comfortable for walking	F(6,315)=65.224;p=0	4.21	4.40	4.58	1.67	1.94	4.07	4.19	3.79
Pollution is not an issue in my neighborhood	F(6,315)=4.863;p=0	2.75	3.56	3.47	3.86	3.14	3.80	3.08	3.37

Appendix 9 presents Tukey Post-Hoc test results. According to these results:

- In the *Traditional Meshed Hyper-Compact Fabric (F1)* parameters of feeling appropriate closure, balance between built and green areas and pollution are scored significantly the lowest. Maintenance of the neighborhood, imageability and legibility of the neighborhood, ease to pass from building to building and to street, and visual diversity received almost the lowest scores. There are no significantly high scores in this fabric concerning physical characteristics.

- In the *Planned Compact Aligned Continuous/Discontinuous Fabric (F2)* there is no parameters which are scored significantly low concerning physical characteristics. In this fabric, satisfaction with the general appearance of the neighborhood is scored significantly the highest. Furthermore, satisfaction with convenience for walking, beauty and attractiveness of the built elements, maintenance of the neighborhood, imageability and legibility of the neighborhood, balance between built and green areas, visual diversity, steepness of the streets and pollution are evaluated almost the highest in this fabric.

- In the *Heterogeneous Irregular Hyper-Compact Fabric and Open-worked and Heterogeneous Fabric (F34)* feeling in appropriate closure is scored almost the lowest. Steepness of the streets concerning comfortable walking is scored significantly the highest. Ease to pass from a building to a building, from building to the street is evaluated almost the highest.

- In the *Informal Low-Rise Compact Fabric (F5)* steepness of the streets concerning comfortable walking is scored significantly the lowest. Further, general appearance of the neighborhood, convenient physical conditions for walking, beauty and attractiveness of the built elements, coherence in building sizes and facades, and visual diversity are scored almost the lowest. Satisfaction with ease to pass from a building to a building, from building to the street and pollution are scored significantly the highest. Feeling in appropriate closure is scored almost the highest in this fabric.
- In the *Discontinuous Heterogenous Irregular Fabric (F6)* balance between built and green areas and steepness of the streets are scored almost the lowest. All other parameters except for feeling in appropriate closure and pollution are evaluated significantly the lowest. No parameters are evaluated significantly high concerning physical characteristics in this fabric.

- In the *Discontinuous Spaced-out Modernist Fabric (F7)* no parameter is scored significantly the lowest. Beauty and attractiveness of the built elements, maintenance of the neighborhood, coherence in building sizes, feeling in appropriated closure, balance between built and green areas, and visual diversity are evaluated significantly the highest. Moreover, satisfaction with the general appearance of the neighborhood, convenient physical conditions for walking, imageability and legibility of the neighborhood, and pollution are scored almost the highest.
- In the *Prestigious Seafront Line (composed of street segments F2 and F7)* no parameter is scored significantly the lowest either. Convenient physical conditions for walking, imageability and legibility of the neighborhood are scored significantly the highest. Furthermore, general appearance of the neighborhood, beauty and attractiveness of the built elements, maintenance of the neighborhood, coherence in building sizes, balance between built and green areas, and visual diversity are evaluated almost the highest in the seafront area.

Safety. Satisfaction with the safety of the neighborhood is evaluated high in all parameters except for the safety in case of disasters. According to ANOVA test, all parameters of safety are significantly different in urban fabrics (Table 4.28).

Table 4.28 ANOVA results of satisfaction with safety in urban fabrics

Safety		**F1**	**F2**	**F34**	**F5**	**F6**	**F7**	**F72**	**Tot**
How safe is your neighborhood	F(6,315)=10.423;p=0	3.86	4.30	4.04	3.53	3.64	3.73	4.15	3.93
My neighborhood is a safe place in case of a disaster	F(6,315)=20.257;p=0	1.57	2.84	2.80	4.00	2.81	3.90	3.04	2.85
I feel safe when I walk around in the neighborhood during daytime	F(6,315)=3.016;p=0.007	4.52	4.60	4.77	4.78	4.25	4.77	4.73	4.63
I feel safe when I walk around in the neighborhood during nighttime	F(6,315)=5.563;p=0	4.07	4.23	4.62	3.81	3.64	4.60	4.35	4.23
My neighborhood is a good place to raise children	F(6,315)=15.25;p=0	3.84	4.33	4.52	3.39	3.14	4.77	4.42	4.10
My neighborhood is a good place for disabled and old people to live	F(6,315)=10.463;p=0	4.04	4.25	4.49	3.72	3.19	4.60	4.62	4.16

Appendix 10 presents Tukey Post-Hoc test results. According to these results:

- In the *Traditional Meshed Hyper-Compact Fabric (F1)* safety in case of a disaster is scored significantly the lowest.
- In the *Planned Compact Aligned Continuous/Discontinuous Fabric (F2)* overall safety of the neighborhood is scored significantly the highest.

- In the *Heterogeneous Irregular Hyper-Compact Fabric and Open-worked and Heterogeneous Fabric (F34)* overall safety of the neighborhood, feeling safe when walking around during both day and nighttime, being a safe place to raise children and for disabled and old people are evaluated almost the highest.
- In the *Informal Low-Rise Compact Fabric (F5)* overall safety of the neighborhood is scored significantly the lowest. Feeling safe when walking around during nighttime, being a safe place to raise children and for disabled and old people are evaluated almost the lowest. However, safety in case of disasters, and feeling safe when walking around during daytime are scored significantly the highest.
- In the *Discontinuous Heterogenous Irregular Fabric (F6)* overall safety of the neighborhood is scored significantly the lowest. Feeling safe when walking around during both day and nighttime, being a safe place to raise children and for disabled and old people are evaluated almost the lowest.
- In the *Discontinuous Spaced-out Modernist Fabric (F7)* feeling safe when walking around during nighttime, being a safe place to raise children are scored significantly the highest. Moreover, safety in case of disasters, feeling safe when walking around during the daytime, being a safe place for disabled and people are scored almost the highest.
- In the *Prestigious Seafront Line (composed of street segments F2 and F7)* being a safe place for disabled and people are evaluated significantly the highest. Overall safety of the neighborhood is scored almost the highest in this neighborhood.

Social Relations. There are four parameters on social relations two of which (feeling a part of the neighborhood and knowing the neighbors) are evaluated high. Two parameters spending time with neighbors, friends or relatives in the neighborhood and preferring to spend time in the neighborhood for weekend activities are evaluated moderately low. Two of the four parameters of social relations significantly differ in urban fabrics according to ANOVA test (Table 4.29).

Table 4.29 ANOVA results of satisfaction with social relations in urban fabrics

Social Relations		F1	F2	F34	F5	F6	F7	F72	Tot
Do you feel a part of this neighborhood	F(6,315)=2.066;p=0.057	3.84	4.14	3.94	3.97	3.58	4.10	3.92	3.93
I know most of my neighbors	F(6,315)=2.962;p=0.008	3.57	3.60	3.78	4.31	3.75	4.10	3.85	3.80
I spend time with my neighbors, friends or relatives in my neighborhood	F(6,315)=3.021;p=0.007	2.38	2.65	2.86	3.47	3.31	2.80	2.42	2.82
I prefer to spend time in the neighborhood for weekend activities	F(6,315)=1.815;p=0.096	2.34	2.40	2.65	3.17	2.72	2.57	2.04	2.56

Appendix 11 presents Tukey Post-Hoc test results. According to these results:

- In the *Traditional Meshed Hyper-Compact Fabric (F1)* knowing most of the neighbors and spending time with neighbors, friends, or relatives in the neighborhood are evaluated significantly the lowest.
- In the *Planned Compact Aligned Continuous/Discontinuous Fabric (F2)* knowing most of the neighbors is scored almost the lowest.
- In the *Informal Low-Rise Compact Fabric (F5)* knowing most of the neighbors and spending time with neighbors, friends, or relatives in the neighborhood are evaluated significantly the highest.
- In the *Prestigious Seafront Line (composed of street segments F2 and F7)* spending time with neighbors, friends, or relatives in the neighborhood is evaluated almost the lowest.
- For *Heterogeneous Irregular Hyper-Compact Fabric and Open-worked and Heterogeneous Fabric (F34), Discontinuous Heterogenous Irregular Fabric (F6), Discontinuous Spaced-out Modernist Fabric (F7)* there are no significantly different scores in social relations dimension.

As all dimensions are examined, 26 parameters in F6, 9 parameters in F1, 5 parameters in F5 and received significantly the lowest scores. Other fabrics did not have significantly the lowest scores in any parameters. 18 parameters which is the highest quantity received almost the lowest scores in F5. Four fabrics (F5, F7, F72, and F1) received almost the highest scores in numerous parameters (10, 10, 9, 8 respectively). Concerning significantly the highest scores three fabrics (F7, F72 and F2) had the most parameters (14, 14, 13 respectively) receiving significantly the highest scores. Fabrics F5, F6 and F1 had the fewest parameters with significantly the highest scores (2, 2, 5 respectively).

Table 4.30 Number of significantly different parameters based on urban fabrics

	Significantly the Lowest	**Almost the Lowest**	**Almost the Highest**	**Significantly the Highest**
Traditional Meshed Hyper-Compact Fabric (F1)	9	4	8	5
Planned Compact Aligned Continuous/Discontinuous *Fabric* (F2)	-	2	3	13
Heterogeneous Irregular Hyper-Compact / Open-worked and Heterogeneous Fabric (F34)	-	1	1	7
Informal Low-Rise Compact Fabric (F5)	5	18	10	2
Discontinuous Heterogenous Irregular Fabric (F6)	26	7	-	2
Discontinuous Spaced-out Modernist Fabric (F7)	-	2	10	14
Prestigious Seafront Line (composed of F2 and F7)	-	3	9	14

4.2.2.3.2 Neighborhood Satisfaction in Urban Fabric Classes Based on the Neighborhood Maps. This section is an evaluation of the survey questions based on the amount of urban fabric in the neighborhoods that the participants identified. Recall, first, on the neighborhood map of each participant, the areas of the street segments and the percentages of all fabrics are calculated. Then according to the dominance of the urban fabrics, a new classification is held. 18 urban fabric classes are found. However, all these classes cannot be included in statistical analysis because there is not enough sample. The classes with at least 17 surveys are taken into consideration in statistical analysis, which are seven classes: F6, F7, X+F1, X+F2, F34, F5+F6, X+F6 (Table 4.31).

Table 4.31 New urban fabric classes based on survey maps

Number of the Surveys	**New Urban Fabric Classes**		**Number of the New Classes**
56	**F1**	Prevalent fabric of F1	9
57	**F2**	Prevalent fabric of F2	5
81	**F34**	Prevalent fabric of F34	58
36	**F5**	Prevalent fabric of F5	1
36	**F6**	Prevalent fabric of F6	21
30	**F7**	Prevalent fabric of F7	30
	F1+F2	Combination of the fabrics F1 and F2	3
	F2+F34	Combination of the fabrics F2 and F34	4
	F2+F7	Combination of the fabrics F2 and F7	5
	F34+F7	Combination of the fabrics F34 and F7	9
	F5+F6	Combination of the fabrics F5 and F6	17
	X+F1	Mixture of fabrics F1 being the prevalent fabric	23
	X+F2	Mixture of fabrics F2 being the prevalent fabric	91
	X+F34	Mixture of fabrics F34 being the prevalent fabric	12
	X+F5	Mixture of fabrics F5 being the prevalent fabric	8
	X+F6	Mixture of fabrics F6 being the prevalent fabric	19
	X+F7	Mixture of fabrics F7 being the prevalent fabric	5
	X	Mixture of fabrics	2
	Total		322

According to ANOVA analysis, overall satisfaction with the neighborhoods in Karşıyaka does not differ between these seven urban fabric classes, too (Table 4.32). Despite of this fact, 40 of 47 parameters significantly differ in urban fabric classes, whereas test based on urban fabrics in previous section revealed 43 parameters which differed between urban fabrics.

Satisfaction in General. Among four parameters of satisfaction in general, which are tested via ANOVA, three of them differ in urban fabric classes. Like it was in the previous section (test based on urban fabrics), satisfaction with the dwelling, calmness and aliveness of the neighborhood show differences between urban fabric classes (Table 4.32).

Table 4.32 ANOVA results of satisfaction in general in urban fabric classes

Satisfaction in General		XF1	XF2	F34	F5F6	F6	XF6	F7	Tot
How satisfied are you with your neighborhood in general	F(6,252)=1.852; p=0.090	3.83	4.15	4.19	3.76	3.90	4.11	4.17	4.08
How satisfied are you with your current dwelling	F(6,252)=2.729; p=0.014	4.09	4.26	4.17	3.65	4.05	3.84	4.30	4.14
My neighborhood is a calm place to live	F(6,252)=2.526; p=0.022	3.57	4.20	4.21	4.18	4.24	4.00	4.50	4.17
My neighborhood has a lively environment	F(6,252)=4.477; p=0.000	3.70	3.52	3.21	2.94	2.57	2.84	3.83	3.34

Tukey Post-Hoc test showed that urban fabrics F1 and F2 in the previous section are replaced by mixed fabrics XF1 and XF2 in this section; F34 remains as it is; F5 is replaced by the combination of F5F6 and XF6; F6 is replaced by mixed fabric XF6 and pure F6; F7 remains the same pure F7 integrating also F72 in this pure group. F72 is also associated by XF2 (Appendix 12).

Last parameter on satisfaction in general dimension “Are you thinking of moving out from this neighborhood?” is analyzed via cross-tabulation. 241 of 259 participants in selected urban fabrics classes do not think of moving out. None of the participants of F7 wants to move out. There are not many participants who want to move out in other fabric classes either, excluding XF1 and F5F6. The sample size of the participants who are willing to move out are too low that does not allow to run chi-square analysis. Most of the participants gave social reasons to stay at the same neighborhood such as getting along with neighbors, feeling belong to that place (Table 4.33).

Table 4.33 Number of participants willing or not to move out

Urban Fabrics	Yes	No	Tot
XF1	6	17	23
XF2	2	89	91
F34	2	56	58
F5F6	4	13	17
F6	1	20	21
XF6	3	16	19
F7	0	30	30
Total	18	241	259

		XF1	XF2	F34	F5F6	F6	XF6	F7	Tot
YES	Economic	1	-	-	-	1	2	-	4
	Social	3	-	2	1	1	1	-	8
	Physical	4	2	2	3	-	-	-	11
NO	Economic	6	23	8	3	12	5	-	57
	Social	11	66	49	11	12	13	30	192
	Physical	5	19	16	1	-	-	4	45

Accessibility. Scores of 17 of the 20 parameters on accessibility significantly differ in urban fabric classes. Accessibility and closeness to workplace and meeting daily needs in the neighborhood do not show any significant difference across urban fabric classes (Table 4.34). In the previous section, there were 18 parameters which were significantly different in the accessibility dimension. Accessibility and closeness to workplace did not show any significant difference, but satisfaction with meeting daily needs in the neighborhood was different across urban fabric in the previous section.

Table 4.34 ANOVA results of satisfaction with accessibility in urban fabric classes

Accessibility		**XF1**	**XF2**	**F34**	**F5F6**	**F6**	**XF6**	**F7**	**Tot**
How would you rate the accessibility to important points in your neighborhood	F(6,252)=6,522; p=0	4.04	4.21	4.05	3.47	3.67	3.63	3.90	3.99
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	F(6,252)=3,64; p=0,002	4.35	4.56	4.31	3.82	4.52	3.84	4.50	4.37
Services like shops, schools, health center, cinema etc are quite close to my house	F(6,252)=5,463; p=0	4.57	4.48	4.19	3.76	4.48	3.58	4.60	4.32
As I go out of my house, I can easily access to green areas where I relax or do sports	F(6,252)=19,948; p=0	4.09	4.52	3.91	2.29	3.38	2.79	4.70	4.00
Green areas where I relax or do sports are quite close to my house	F(6,252)=19,773; p=0	4.17	4.48	3.74	2.41	3.43	2.58	4.63	3.95
As I go out of my house, I can easily access to public transportation	F(6,252)=3,218; p=0,005	4.74	4.70	4.43	4.29	4.67	4.11	4.70	4.57
Public transportation modes around my housing are quite reliable, comfortable and not crowded	F(6,252)=4,644; p=0	3.96	4.09	3.45	2.65	3.62	3.42	3.63	3.70
As I go out of my house, I can easily access to my workplace	F(6,107)=0,543; p=0,775	3.90	4.10	3.87	4.33	3.83	4.10	4.33	4.04
My workplace is quite close to my house	F(6,107)=1,697; p=0,129	3.90	3.90	3.13	4.00	3.67	4.10	4.00	3.75
I can easily access to where my friends and relatives live	F(6,252)=4,026; p=0,001	3.96	4.32	3.95	4.12	4.52	3.32	4.10	4.11
My friends and relatives live quite close to me	F(6,252)=4,478; p=0	3.78	4.19	3.64	4.18	4.43	3.26	3.93	3.95
As I go out of my house, I easily access to main roads which is connected to the city center	F(6,252)=5,654; p=0	4.87	4.74	4.40	3.82	4.29	4.00	4.30	4.47
Traffic jam is not an issue in my neighborhood	F(6,252)=16,624; p=0	1.74	2.62	2.98	3.76	4.52	3.95	4.17	3.13
I can easily find a parking place close to my house	F(6,252)=29,071; p=0	1.26	2.04	2.69	3.65	4.10	4.47	4.33	2.83
I meet my daily needs in the neighborhood	F(6,252)=1,099; p=0,363	4.48	4.41	4.29	4.24	4.57	4.11	4.57	4.39
I enjoy walking in the close vicinity of my house	F(6,252)=7,915; p=0	4.00	4.32	3.83	3.24	3.00	3.58	4.37	3.95
I walk to reach various destinations in my neighborhood	F(6,252)=2,767; p=0,013	4.65	4.79	4.78	4.29	4.86	4.53	4.73	4.72
I walk to exercise or for recreation in my neighborhood	F(6,252)=8,571; p=0	4.52	4.48	4.38	3.00	4.48	4.16	4.53	4.35
I reach various destinations in my neighborhood on bike	F(6,252)=3,737; p=0,001	2.09	1.41	1.29	1.18	1.14	1.26	1.00	1.35
I cycle to exercise or for recreation in my neighborhood	F(6,252)=3,417; p=0,003	1.96	1.48	1.31	1.24	1.05	1.26	1.00	1.36

In the accessibility dimension same urban fabric replacements in self-defined maps are observed through Tukey Post-Hoc. Except for the condition below:

- In the previous section, walking for reaching various destinations was evaluated significantly the highest in the *Traditional Meshed Hyper-Compact Fabric (F1)*, whereas here according to the results based on fabrics in self-defined maps the mixed fabric of XF1 did not receive significantly high or low scores.

- *Heterogeneous Irregular Hyper-Compact Fabric and Open-worked and Heterogeneous Fabric (F34)* received almost the highest score in satisfaction with overall accessibility based on fabrics in self-defined maps, whereas in the previous section this fabric did not receive significantly high or low scores therefore it was close the mean value.
- In the previous section, the *Discontinuous Heterogenous Irregular Fabric (F6)* was evaluated significantly the lowest for the parameters access and closeness to where friends and relatives live. In the self-defined neighborhood maps two different urban fabric classes are associated with F6, which are mixed fabric of XF6 and pure F6. According to results based on these fabrics, access and closeness to where friends and relatives live is evaluated significantly the highest in the pure fabric of F6, but significantly the lowest in mixed fabric of XF6. Considering that these parameters were scored significantly the highest in F5 (Informal Low-Rise Compact Fabric) in the previous section, it is evident that participants living in the street segment F5 defined their neighborhood as in pure F6 (Appendix 13).

Physical characteristics. According to ANOVA test, all 13 parameters of physical characteristics are significantly different in urban fabrics classes of self-defined maps like it was in the previous section between urban fabrics (Table 4.35).

Table 4.35 ANOVA results of satisfaction with physical characteristics in urban fabric classes

Physical Characteristics		**XF1**	**XF2**	**F34**	**F5F6**	**F6**	**XF6**	**F7**	**Tot**
How would you rate the general appearance of your neighborhood	F(6,252)=14,883; p=0	3.00	4.00	3.78	2.94	3.38	2.95	3.90	3.65
Physical conditions in the close vicinity of my house are convenient for walking	F(6,252)=13,654; p=0	3.00	4.27	3.79	2.65	2.90	3.11	4.13	3.73
With its all built elements my neighborhood is beautiful and attractive	F(6,252)=11,322; p=0	2.96	3.82	3.48	2.35	3.14	2.79	4.17	3.48
My neighborhood is clean and well-maintained	F(6,251)=7,446; p=0	3.09	3.84	3.91	2.65	3.62	3.21	4.30	3.67
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F(6,252)=13,05; p=0	3.70	4.22	4.28	2.59	4.05	3.26	4.53	4.03
The building sizes (width and height) in my neighborhood are coherent with each other	F(6,252)=22,314; p=0	3.26	3.87	3.81	2.00	2.90	2.53	4.50	3.58
The building facades in my neighborhood are coherent with each other	F(6,252)=17,675; p=0	2.91	3.67	3.74	2.06	2.81	2.53	4.33	3.44
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	F(6,252)=4,24; p=0	2.78	3.35	3.33	3.53	3.29	3.68	4.17	3.42
The amount of buildings and green areas in my neighborhood is quite balanced	F(6,252)=13,404; p=0	2.04	3.48	3.16	2.47	2.76	2.84	4.17	3.19

Table 4.35 continues

It is easy to pass from a building to a building, from building to the street	F(6,252)=3,261; p=0,004	3.65	4.30	4.36	4.06	4.52	4.32	4.23	4.25
There is a visual diversity and richness in my neighborhood	F(6,252)=14,285; p=0	2.61	3.74	3.40	1.94	2.81	2.74	4.07	3.33
Steepness of the streets in my neighborhood is comfortable for walking	F(6,252)=66,29; p=0	3.96	4.41	4.48	1.53	1.38	1.89	4.07	3.73
Pollution is not an issue in my neighborhood	F(6,252)=3,674; p=0,002	2.39	3.30	3.28	3.29	3.81	3.47	3.80	3.32

In the physical characteristics dimension same urban fabric replacements in self-defined maps are observed through Tukey Post-Hoc. Except for the condition below:

- In the previous section, the *Discontinuous Heterogenous Irregular Fabric (F6)* was evaluated significantly the lowest for the parameter easy pass from a building to building and from building to a street. Also, pollution issue was closer to the mean. In the self-defined neighborhood maps two different urban fabric classes are associated with F6, which are mixed fabric of XF6 and pure F6. According to results based on these fabrics, satisfaction with easy pass from a building to building and from building to a street and pollution are evaluated significantly the highest in the pure fabric of F6, and mixed fabric of XF6. Considering that these parameters were scored significantly the highest in F5 in the previous section, it is evident that some participants living in the street segment F5 defined their neighborhood as in F6 (Appendix 14).

Safety. Five of six parameters of safety are significantly different in urban fabric classes according to ANOVA test, whereas in the previous section all parameters were significantly different. The only parameter which does not significantly differ is safety during daytime (Table 4.36).

Table 4.36 ANOVA results of satisfaction with safety in urban fabric classes

Safety		XF1	XF2	F34	F5F6	F6	XF6	F7	Tot
How safe is your neighborhood	F(6,252)=6,879; p=0	3.87	4.10	4.02	3.53	3.62	3.47	3.73	3.90
My neighborhood is a safe place in case of a disaster	F(6,252)=13,015; p=0	1.57	2.46	2.79	3.35	4.00	3.21	3.90	2.86
I feel safe when I walk around in the neighborhood during daytime	F(6,252)=0,961; p=0,452	4.52	4.53	4.72	4.53	4.76	4.63	4.77	4.63
I feel safe when I walk around in the neighborhood during nighttime	F(6,252)=4,386; p=0	4.04	4.11	4.67	3.76	3.71	3.89	4.60	4.22
My neighborhood is a good place to raise children	F(6,252)=12,798; p=0	3.74	4.25	4.43	2.76	3.48	3.32	4.77	4.08
My neighborhood is a good place for disabled and old people to live	F(6,252)=8,429; p=0	4.17	4.34	4.45	3.00	3.81	3.58	4.60	4.19

In the safety dimension same urban fabric replacements in self-defined maps are observed through Tukey Post-Hoc. Except for the condition below:

- In the previous section, the *Discontinuous Heterogenous Irregular Fabric (F6)* was evaluated close to the mean value for the parameter safety in case of disasters. In the self-defined neighborhood maps two different urban fabric classes are associated with F6, which are mixed fabric of XF6 and pure F6. According to results based on these fabrics, satisfaction with safety in case of disasters are evaluated significantly the highest in the pure fabric of F6. Considering that this parameter was scored significantly the highest in F5 in the previous section, it is evident that some participants living in the street segment F5 defined their neighborhood as in F6 (Appendix 15).

Social Relations. There are four parameters on social relations, two of which significantly differ in urban fabric classes according to ANOVA test results. Feeling part of the neighborhood and having weekend activities in the neighborhood do not differ in urban fabric classes like it was in the previous section (Table 4.37).

Table 4.37 ANOVA results of satisfaction with social relations in urban fabric classes

Social Relations		**X+F1**	**X+F2**	**F34**	**F5+F6**	**F6**	**X+F6**	**F7**	**Tot**
Do you feel a part of this neighborhood	F(6,252)=1,06; p=0,387	3.74	4.04	4.09	3.88	3.86	3.84	4.10	3.99
I know most of my neighbors	F(6,252)=3,176; p=0,005	3.57	3.69	3.78	4.53	4.19	3.79	4.10	3.85
I spend time with my neighbors, friends, or relatives in my neighborhood	F(6,252)=4,428; p=0	2.26	2.47	3.19	4.06	3.05	3.32	2.80	2.86
I prefer to spend time in the neighborhood for weekend activities	F(6,252)=1,84; p=0,092	2.48	2.22	2.76	2.94	2.76	3.26	2.57	2.57

Same urban fabric replacements in self-defined maps are observed through Tukey Post-Hoc in the social relations dimension, too (Appendix 16).

4.2.2.3.3 Neighborhood Satisfaction in Different Locations Based on the Location of the Dwelling. In this section neighborhood satisfaction parameters in three location is analyzed: (1) coastal area, (2) semi-coastal area, (3) hinterland. Location is held based on the location where the participant resides. Like the first urban fabric statistical analysis section, neighborhood satisfaction parameters are evaluated via ANOVA test and Post-hoc Tukey test except for the last parameter which is on moving from the neighborhood and it is evaluated via cross-tables.

Overall satisfaction with the neighborhood in Karşıyaka does not differ in terms of location either. However, 36 of 47 parameters significantly differ in terms of location. 11 parameters which do not have significant difference in different locations are found in all dimensions of neighborhood satisfaction survey.

Satisfaction in General. Four of five measures of satisfaction in general are tested via ANOVA. According to the results, satisfaction with the neighborhood and calmness of the neighborhood do not significantly differ in terms of location. Two parameters show significant differences in different locations (Table 4.38).

Table 4.38 ANOVA results of satisfaction in general in different locations

Satisfaction in General		C	S	H	Tot
How satisfied are you with your neighborhood in general	F(2,319)=1,326; p=0,267	4.02	4.14	3.97	4.04
How satisfied are you with your current dwelling	F(2,319)=9,788; p=0.000	4.11	4.35	3.87	4.11
My neighborhood is a calm place to live	F(2,319)=1,613; p=0,201	4.05	4.29	4.19	4.17
My neighborhood has a lively environment	F(2,319)=11,261; p=0.000	3.71	3.06	3.13	3.32

Appendix 17 presents Tukey Post-Hoc test results. According to these results:

- The *coastal area* is evaluated as significantly the most alive locational zone.
- In the *semi-coastal area* aliveness of the neighborhood is evaluated significantly the lowest and dwelling satisfaction is evaluated significantly the highest.
- In *the hinterland area* satisfaction with both the current dwelling and aliveness of the neighborhood are evaluated significantly the lowest.

The cross-tabulation on the last parameter on satisfaction in general dimension “Are you thinking of moving out from this neighborhood?” show that in the semi-coastal area, there are only two participants who want to leave their neighborhood. 13 participants in both the coastal area and the hinterland want to move out. The sample size does not allow a chi-square analysis. In the coastal area 9 of 13 participants want to leave the neighborhood because of physical reasons, in the hinterland 7 of 13 due to economic reasons (Table 4.39).

Table 4.39 Number of participants willing or not to move out in different locations

Urban Fabrics	Yes	No	Tot
Coastal	13	106	119
Semi-Coastal	2	99	101
Hinterland	13	89	102
Total	28	294	322

		Coastal	Semi-Coastal	Hinterland	Tot
YES	**Economic**	4	0	7	11
	Social	5	1	3	9
	Physical	9	2	4	15
NO	**Economic**	28	22	25	75
	Social	80	79	72	231
	Physical	38	11	6	55

Accessibility. Among all 20 accessibility parameters, four parameters, access to public transportation and workplace, access and closeness to where friends and relatives live, and meeting daily needs do not statistically differ in terms of location (Table 4.40).

Table 4.40 ANOVA results of satisfaction with accessibility in different locations

Accessibility		C	S	H	Tot
How would you rate the accessibility to important points in your neighborhood	F(2,319)=15,108; p=0.000	4.13	4.13	3.73	4.00
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	F(2,319)=6,159; p=0.002	4.61	4.43	4.23	4.43
Services like shops, schools, health center, cinema etc. are quite close to my house	F(2,319)=5,742; p=0.004	4.56	4.32	4.19	4.37
As I go out of my house, I can easily access to green areas where I relax or do sports	F(2,319)=22,598; p=0.000	4.41	4.15	3.42	4.02
Green areas where I relax or do sports are quite close to my house	F(2,318)=25,451; p=0.000	4.37	4.05	3.30	3.93
As I go out of my house, I can easily access to public transportation	F(2,319)=1,232; p=0.293	4.65	4.62	4.51	4.60
Public transportation modes around my housing are quite reliable, comfortable, and not crowded	F(2,319)=7,509; p=0.001	3.88	3.96	3.36	3.74
As I go out of my house, I can easily access to my workplace	F(2,140)=2,742; p=0.068	4.23	3.75	3.96	4.02
My workplace is quite close to my house	F(2,140)=3,358; p=0.038	3.98	3.36	3.70	3.73
I can easily access to where my friends and relatives live	F(2,319)=2,552; p=0.080	4.14	4.27	3.96	4.12
My friends and relatives live quite close to me	F(2,319)=0,773; p=0.463	3.95	4.05	3.87	3.96
As I go out of my house, I easily access to main roads which is connected to the city center	F(2,319)=13,140; p=0.000	4.72	4.58	4.19	4.51
Traffic jam is not an issue in my neighborhood	F(2,319)=36,368; p=0.000	2.74	2.70	4.09	3.16
I can easily find a parking place close to my house	F(2,319)=69,244; p=0.000	2.50	1.98	4.10	2.84
I meet my daily needs in the neighborhood	F(2,319)=2,180; p=0.115	4.36	4.53	4.31	4.40
I enjoy walking in the close vicinity of my house	F(2,319)=10,944; p=0.000	4.11	4.19	3.55	3.96
I walk to reach various destinations in my neighborhood	F(2,319)=4,337; p=0,014	4.76	4.79	4.57	4.71
I walk to exercise or for recreation in my neighborhood	F(2,319)=11,773; p=0.000	4.45	4.55	3.98	4.34
I reach various destinations in my neighborhood on bike	F(2,319)=4,819; p=0,009	1.37	1.49	1.11	1.32
I cycle to exercise or for recreation in my neighborhood	F(2,319)=6,304; p=0.002	1.47	1.49	1.10	1.36

Appendix 18 presents Tukey Post-Hoc test results. According to these results:

- In the *coastal area* satisfaction with the traffic is evaluated significantly the lowest. Satisfaction with the overall accessibility, access and closeness to services and green areas, quality of public transportation, closeness to workplace, access to main roads, enjoying walking and walking for both reaching to a destination and exercise, also cycling for exercise are scored significantly the highest.

- In the *semi-coastal area* satisfaction with closeness to workplace, traffic and parking place are evaluated significantly the lowest. Parameters of overall accessibility, access and closeness to green areas, quality of public transportation, access to main roads, enjoying walking, walking and cycling for both reaching to a destination and exercise are evaluated significantly the highest.
- In *the hinterland area* satisfaction with the overall accessibility, access and closeness to services and green areas, quality of public transportation, access to main roads, enjoying walking, walking and cycling for both reaching to a destination and exercise are evaluated significantly the lowest. Satisfaction with traffic and parking place are evaluated significantly the highest.

Physical Characteristics. According to ANOVA test, 11 of 13 parameters related to physical characteristics are significantly different in terms of location. Cleanness and maintenance of the neighborhood, and passages from building to building and building to street in the neighborhood do not significantly differ in terms of location (Table 4.41).

Table 4.41 ANOVA results of satisfaction with physical characteristics in different locations

Physical Characteristics		**C**	**S**	**H**	**Tot**
How would you rate the general appearance of your neighborhood	F(2,319)=10,735; p=0.000	3.75	3.80	3.34	3.64
Physical conditions in the close vicinity of my house are convenient for walking	F(2,319)=16,915; p=0.000	3.92	3.94	3.13	3.68
With its all built elements my neighborhood is beautiful and attractive	F(2,319)=5,464; p=0,005	3.55	3.58	3.14	3.43
My neighborhood is clean and well-maintained	F(2,318)=2,302; p=0,102	3.82	3.68	3.50	3.67
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F(2,319)=7,022; p=0,001	4.18	4.07	3.68	3.99
The building sizes (width and height) in my neighborhood are coherent with each other	F(2,319)=16,072; p=0.000	3.83	3.69	3.04	3.54
The building facades in my neighborhood are coherent with each other	F(2,319)=12,681; p=0.000	3.72	3.55	2.99	3.44
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	F(2,319)=9,211; p=0.000	3.05	3.35	3.69	3.34
The amount of buildings and green areas in my neighborhood is quite balanced	F(2,319)=4,098; p=0,017	3.39	2.96	3.10	3.16
It is easy to pass from a building to a building, from building to the street	F(2,319)=,508; p=0,602	4.29	4.19	4.21	4.23
There is a visual diversity and richness in my neighborhood	F(2,319)=7,932; p=0.000	3.42	3.51	2.92	3.29
Steepness of the streets in my neighborhood is comfortable for walking	F(2,319)=101,604; p=0.000	4.27	4.54	2.47	3.79
Pollution is not an issue in my neighborhood	F(2,319)=4,390; p=0,013	3.11	3.45	3.59	3.37

Appendix 19 presents Tukey Post-Hoc test results. According to these results:

- In the *coastal area* the parameters of feeling in appropriate closure and pollution are evaluated significantly the lowest. Satisfaction with the general appearance of the neighborhood, convenient physical conditions for walking, beauty and attractiveness of the built elements, imageability and legibility of the neighborhood, coherence in building sizes and facades, balance between built and green areas, visual diversity, steepness of the streets concerning comfortable walking are evaluated significantly the highest.
- In the *semi-coastal area* satisfaction with the balance between built and green areas is evaluated significantly the lowest. The parameters of general appearance of the neighborhood, convenient physical conditions for walking, beauty and attractiveness of the built elements, imageability and legibility of the neighborhood, coherence in building sizes and facades, visual diversity, steepness of the streets concerning comfortable walking are evaluated significantly the highest.
- In *the hinterland area* satisfaction with the general appearance of the neighborhood, convenient physical conditions for walking, beauty and attractiveness of the built elements, imageability and legibility of the neighborhood, coherence in building sizes and facades, visual diversity, steepness of the streets concerning comfortable walking are evaluated significantly the lowest. The parameters of feeling in appropriate closure and pollution are evaluated significantly the highest.

Safety. According to ANOVA test, 5 of 6 parameters related to safety are significantly different in terms of location. Only walking around during daytime parameter do not differ in terms of location (Table 4.42).

Table 4.42 ANOVA results of satisfaction with safety in different locations

Safety		**C**	**S**	**H**	**Tot**
How safe is your neighborhood	F(2,319)=20,618; p=0.000	4.10	4.04	3.63	3.93
My neighborhood is a safe place in case of a disaster	F(2,319)=26,023; p=0.000	2.76	2.25	3.55	2.85
I feel safe when I walk around in the neighborhood during daytime	F(2,319)=,952; p=0.387	4.71	4.59	4.59	4.63
I feel safe when I walk around in the neighborhood during nighttime	F(2,319)=4,867; p=0.008	4.44	4.24	3.98	4.23
My neighborhood is a good place to raise children	F(2,319)=10,199; p=0.000	4.26	4.32	3.71	4.10
My neighborhood is a good place for disabled and old people to live	F(2,319)=9,501; p=0.000	4.26	4.41	3.79	4.16

Appendix 20 presents Tukey Post-Hoc test results. According to these results:

- In the *coastal area* overall safety of the neighborhood, feeling safety when walking during the nighttime, being a good place for children, disabled and old people are scored significantly the highest.
- In the *semi-coastal area* safety in case of disasters is evaluated significantly the lowest. Overall safety of the neighborhood, being a good place for children, disabled and old people are evaluated significantly the highest.
- In the *hinterland area* overall safety of the neighborhood, being a good place for children, disabled and old people are scored significantly the lowest. Safety in case of disasters is evaluated significantly the highest.

Social Relations. Three of four parameters on social relations significantly differ in terms of location according to ANOVA test results. Spending time in the neighborhood for weekend activities do not significantly differ in terms of location (Table 4.42).

Table 4.43 ANOVA results of satisfaction with social relations in different locations

Social Relations		C	S	H	Tot
Do you feel a part of this neighborhood	F(2,319)=3,382; p=0.035	3.84	4.11	3.87	3.93
I know most of my neighbors	F(2,319)=4,693; p=0.010	3.66	3.71	4.05	3.80
I spend time with my neighbors, friends or relatives in my neighborhood	F(2,319)=5,328; p=0.005	2.59	2.68	3.22	2.82
I prefer to spend time in the neighborhood for weekend activities	F(2,319)=2,467; p=0.086	2.50	2.37	2.83	2.56

Appendix 21 presents Tukey Post-Hoc test results. According to these results:

- In the *coastal area* feeling a part of the neighborhood, knowing most of the neighbors and spending time with neighbors, friends, or relatives in the neighborhood are evaluated significantly the lowest.
- In the *semi-coastal area* knowing most of the neighbors and spending time with neighbors, friends, or relatives in the neighborhood are scored significantly the lowest. Feeling a part of the neighborhood is scored significantly the highest.
- In the *hinterland area* knowing most of the neighbors and spending time with neighbors, friends, or relatives in the neighborhood are scored significantly the highest.

As all dimensions are examined, 6 parameters in the coastal, 8 parameters in the semi-coastal, and 26 parameters in in the hinterland area received significantly the lowest scores. 26 parameters in the coastal, 23 parameters in the semi-coastal, and 7 parameters in the hinterland area received significantly the highest scores.

4.2.2.3.4 Neighborhood Satisfaction in Different Location Classes Based on the Neighborhood Maps. This section is an evaluation of the survey questions based on the amount of three-partitioned locational areas in the neighborhoods that the participants identified by drawing the borders of their neighborhoods. According to the areal dominance of the locations, a new classification is held. Five classes are found, in four of which there are enough samples to analyze neighborhood satisfaction responses and run ANOVA test: (1) the coastal, (2) the semi-coastal, (3) the hinterland, (4) the combination of the coastal and semi-coastal areas. New classification showed that although 119 participants live in the coastal area and 101 participants in the semi-coastal area, 132 participants perceive their neighborhood mostly in the coastal area, also 42 participants perceive in both the coastal and semi-coastal areas. Only 46 participants perceive their neighborhood in the semi-coastal area. In the hinterland area, the separation is more concrete that 97 of 102 participants live and perceive their neighborhood in the hinterland, and only 5 of them includes semi-coastal area to their neighborhood borders (Table 4.44).

Table 4.44 New urban fabrics classes based on survey maps

Number of the Surveys	New UF Classes	Number of the New Classes	Percentage
119	Coastal	132	41.0
101	Semi-Coastal	46	14.3
102	Hinterland	97	30.1
	Coastal + Semi-Coastal	42	13.0
	Semi-Coastal +Hinterland	5	1.6
	Total	322	100

Overall satisfaction with the neighborhoods in Karşıyaka does not differ in terms of location classes either. However, 35 of 47 parameters significantly differ in terms of location classes. 12 parameters which do not have significant difference in different location classes are found in all dimensions of neighborhood satisfaction survey.

Satisfaction in General. Four of five measures of satisfaction in general are tested via ANOVA. According to the results, satisfaction with the neighborhood and calmness of the neighborhood do not significantly differ in terms of location classes like it is in the previous section (Table 4.45).

Table 4.45 ANOVA results of satisfaction in general in location classes

Satisfaction in General		C	S	H	CS	Tot
How satisfied are you with your neighborhood in general	F(3,313)=1.36; p=0.255	4.01	4.24	3.99	4.10	4.05
How satisfied are you with your current dwelling	F(3,313)=4.513; p=0.004	4.20	4.35	3.91	4.12	4.12
My neighborhood is a calm place to live	F(3,313)=0.326; p=0.806	4.11	4.20	4.21	4.26	4.17
My neighborhood has a lively environment	F(3,313)=4.907; p=0.002	3.60	3.26	3.12	2.98	3.32

The combination of the coastal and the semi-coastal zones is added to the pure coastal and the semi-coastal zones, pure hinterland zone remained the same as it is in the previous section. According to Tukey Post-Hoc test no change is observed in significant difference of the parameters for satisfaction in general dimension compared to the previous section (Appendix 22).

294 of 322 participants do not think of moving out. In the semi-coastal and combination of semi-coastal areas, one participant of each class wants to move out. In the coastal and in the hinterland, it is 13 and 12 participants respectively. The sample size is too low for chi-square analysis. 9 of 13 participants gave physical reasons in the coastal area for moving out the neighborhood. (Table 4.46).

Table 4.46 Number of participants willing or not to move out in location classes

Urban Fabrics	Yes	No	Tot
Coastal	13	119	132
Semi-Coastal	1	45	46
Hinterland	12	85	97
Coastal + Semi-Coastal	1	41	42
Semi-Coastal + Hinterland	1	4	5
Total	28	294	322

		C	S	H	C+S	S + H	Tot
YES	Economic	4	-	6	-	1	11
	Social	5	1	3	-	-	9
	Physical	9	1	4	1	-	15
NO	Economic	34	5	24	11	1	75
	Social	87	42	69	30	3	231
	Physical	35	10	5	4	1	55

Accessibility. 15 of 20 accessibility parameters significantly differ in location classes, which is the same in the previous section. Five parameters, access to public transportation and workplace, access, and closeness to where friends and relatives live, meeting the daily needs in the neighborhood do not statistically differ in terms of location classes based on participants' maps (Table 4.47).

Table 4.47 ANOVA results of satisfaction with accessibility in location classes

Accessibility		C	S	H	CS	Tot
How would you rate the accessibility to important points in your neighborhood	F(3,313)=9,301; p=0	4.17	4.07	3.74	4.10	4.01
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	F(3,313)=4,396; p=0,005	4.61	4.33	4.24	4.45	4.44
Services like shops, schools, health center, cinema etc. are quite close to my house	F(3,313)=5,23; p=0,002	4.59	4.20	4.20	4.29	4.37
As I go out of my house, I can easily access to green areas where I relax or do sports	F(3,313)=15,489; p=0	4.38	3.93	3.42	4.40	4.03
Green areas where I relax or do sports are quite close to my house	F(3,313)=17,404; p=0	4.35	3.80	3.31	4.29	3.94
As I go out of my house, I can easily access to public transportation	F(3,313)=2,229; p=0,085	4.71	4.50	4.51	4.55	4.60
Public transportation modes around my housing are quite reliable, comfortable, and not crowded	F(3,313)=5,654; p=0,001	4.02	3.52	3.45	4.05	3.78
As I go out of my house, I can easily access to my workplace	F(3,136)=0,918; p=0,434	4.18	3.82	4.00	3.83	4.04
My workplace is quite close to my house	F(3,136)=3,332; p=0,021	4.00	3.06	3.75	3.56	3.75
I can easily access to where my friends and relatives live	F(3,313)=1,146; p=0,331	4.23	4.15	3.99	4.17	4.14
My friends and relatives live quite close to me	F(3,313)=1,265; p=0,286	4.05	3.76	3.90	4.07	3.97
As I go out of my house, I easily access to main roads which is connected to the city center	F(3,313)=10,199; p=0	4.73	4.41	4.18	4.69	4.51
Traffic jam is not an issue in my neighborhood	F(3,313)=25,532; p=0	2.67	2.96	4.12	2.62	3.15
I can easily find a parking place close to my house	F(3,313)=46,158; p=0	2.29	2.50	4.16	1.93	2.85
I meet my daily needs in the neighborhood	F(3,313)=0,691; p=0,558	4.44	4.35	4.36	4.55	4.42
I enjoy walking in the close vicinity of my house	F(3,313)=7,279; p=0	4.23	3.89	3.60	4.17	3.98
I walk to reach various destinations in my neighborhood	F(3,313)=3,257; p=0,022	4.80	4.67	4.59	4.83	4.72
I walk to exercise or for recreation in my neighborhood	F(3,313)=5,572; p=0,001	4.55	4.46	4.08	4.40	4.37
I reach various destinations in my neighborhood on bike	F(3,313)=3,932; p=0,009	1.40	1.28	1.11	1.64	1.33
I cycle to exercise or for recreation in my neighborhood	F(3,313)=4,673; p=0,003	1.54	1.30	1.10	1.48	1.36

According to Tukey Post-Hoc test no change is observed in significant difference of the parameters for accessibility dimension compared to the previous section (Appendix 23).

Physical Characteristics. According to ANOVA test, 9 of 13 parameters related to physical characteristics are significantly different in terms of location classes based on participants' maps. Cleanness and maintenance of the neighborhood, the balance of the buildings and green areas, passages from building to building and building to street, and pollution in the neighborhood do not statistically differ in location classes (Table 4.48). In the previous section there were 11 parameters which were significantly different. The parameters of balance between the amount of buildings and green areas, and pollution issue were found significantly different based on location zones in the previous section.

Table 4.48 ANOVA results of satisfaction with physical characteristics in location classes

Physical Characteristics		C	S	H	CS	Tot
How would you rate the general appearance of your neighborhood	F(3,313)=6,595; p=0	3.80	3.74	3.35	3.74	3.64
Physical conditions in the close vicinity of my house are convenient for walking	F(3,313)=10,275; p=0	3.97	3.65	3.22	4.12	3.71
With its all built elements my neighborhood is beautiful and attractive	F(3,313)=2,919; p=0,034	3.61	3.37	3.23	3.64	3.46
My neighborhood is clean and well-maintained	F(3,312)=0,746; p=0,526	3.76	3.76	3.56	3.74	3.69
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F(3,313)=3,998; p=0,008	4.14	4.22	3.71	4.02	4.00
The building sizes (width and height) in my neighborhood are coherent with each other	F(3,313)=7,916; p=0	3.80	3.72	3.13	3.74	3.57
The building facades in my neighborhood are coherent with each other	F(3,313)=6,095; p=0	3.68	3.65	3.08	3.52	3.47
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	F(3,313)=4,683; p=0,003	3.12	3.37	3.66	3.19	3.33
The amount of buildings and green areas in my neighborhood is quite balanced	F(3,313)=1,935; p=0,124	3.34	2.89	3.16	3.07	3.19
It is easy to pass from a building to a building, from building to the street	F(3,313)=1,861; p=0,136	4.31	4.30	4.21	3.98	4.23
There is a visual diversity and richness in my neighborhood	F(3,313)=3,947; p=0,009	3.45	3.37	3.01	3.62	3.32
Steepness of the streets in my neighborhood is comfortable for walking	F(3,313)=62,572; p=0	4.33	4.43	2.49	4.57	3.81
Pollution is not an issue in my neighborhood	F(3,313)=1,558; p=0,199	3.23	3.37	3.58	3.26	3.36

According to Tukey Post-Hoc test no change is observed in significant difference of the parameters for physical characteristics dimension compared to the previous section (Appendix 24).

Safety. According to ANOVA test, 5 of 6 parameters related to safety are significantly different in terms of location classes. Only walking around during daytime parameter scores do not differ in terms of location groups based on participants' maps (Table 4.49).

Table 4.49 ANOVA results of satisfaction with safety in relation to location classes

Safety		C	S	H	CS	Tot
How safe is your neighborhood	F(3,313)=13,228; p=0	4.11	4.09	3.65	3.93	3.94
My neighborhood is a safe place in case of a disaster	F(3,313)=18,38; p=0	2.61	2.74	3.61	2.02	2.86
I feel safe when I walk around in the neighborhood during daytime	F(3,313)=1,654; p=0,177	4.68	4.76	4.63	4.45	4.65
I feel safe when I walk around in the neighborhood during nighttime	F(3,313)=4,018; p=0,008	4.36	4.61	4.05	4.02	4.26
My neighborhood is a good place to raise children	F(3,313)=6,42; p=0	4.25	4.46	3.73	4.21	4.12
My neighborhood is a good place for disabled and old people to live	F(3,313)=5,91; p=0,001	4.26	4.41	3.81	4.45	4.17

According to Tukey Post-Hoc test only one change is observed in significant difference of the parameters for safety dimension compared to the previous section (Appendix 25).

In this section the scores of safety in case of disasters in the hinterland and the semi-coastal areas are significantly higher than the coastal and the coastal/semi-coastal areas. Whereas in the previous section this parameter was evaluated significantly the highest in the hinterland and the lowest in the semi-coastal areas.

Social Relations. All parameters of social relations significantly differ in terms of location classes based on participants' maps according to ANOVA test results (Table 4.50). In the previous section there were 3 parameters which significantly differ. The parameter of preferring to spend time in the neighborhood for weekend activities was not found significantly different based on location zones in the previous section.

Table 4.50 ANOVA results of satisfaction with social relations in relation to location classes

Social Relations		**C**	**S**	**H**	**CS**	**Tot**
Do you feel a part of this neighborhood	F(3,313)=3,051; p=0,029	3.84	4.24	3.93	4.05	3.95
I know most of my neighbors	F(3,313)=4,518; p=0,004	3.69	3.70	4.12	3.67	3.82
I spend time with my neighbors, friends or relatives in my neighborhood	F(3,313)=7,451; p=0	2.45	3.24	3.27	2.55	2.83
I prefer to spend time in the neighborhood for weekend activities	F(3,313)=3,151; p=0,025	2.39	2.85	2.82	2.12	2.56

According to Tukey Post-Hoc test no change is observed in significant difference of the parameters for safety dimension compared to the previous section (Appendix 26).

4.2.2.3.5 Influence of Building Type on Dwelling Satisfaction. In this section statistical relation between neighborhood satisfaction parameters and building type of the participant is analyzed. As a single building (participant's dwelling) cannot be related to whole neighborhood and neighborhood satisfaction, in this section only dwelling satisfaction is analyzed. It is evaluated via ANOVA test and Post-hoc Tukey test.

According to ANOVA test, satisfaction of the participants with their current dwelling differs in terms of building type. Tukey test produces two subsets and two groups on this parameter. B1 is the building type, in which participants are satisfied the most. B1 and B3 have significantly higher scores than B4 (Table 4.51).

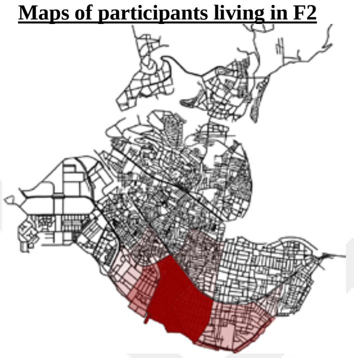
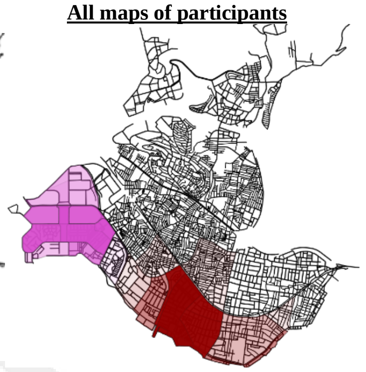
Table 4.51 ANOVA and TUKEY results of satisfaction with dwelling in relation to building type

How satisfied are you with your current dwelling			**B1**	**B3**	**B4**	**Tot**
ANOVA Results	F(2,319)=16.183; p=0.000		4.35	4.18	3.77	4.11
TUKEY Results	**Subset 1**	**Subset 2**	**Reclassification based on Intersected Subsets**			
	B4	B3, B1	B4 < B3, B1			

4.2.3 Results of the Survey After the Outbreak of the Covid-19 Pandemic

In this section characteristics of the data and the participants, and statistical results of the survey after the pandemic will be presented. The same evaluation procedure with the previous section is used in this section. Table 4.52 presents overlapped maps which were done after the covid-19 first wave.

Table 4.52 Overlapped neighborhood maps of the participants in the second survey

Maps of participants living in F2	**Maps of participants living in F7**	**All maps of participants**
		

4.2.3.1 Characteristics of the Data

76 surveys were conducted in two urban fabrics. Location and building type are kept the same, location being the coastal area and building type as B1. In this survey neighborhoods with similar socio-economic groups are chosen. Also, gender is equalized. The participants were targeted to be balanced in age groups too, but the first category (youngest group) is found rarely, and it remained minor. However, the second and the third groups are close to each other. The number of households is mostly more than two people in both fabrics, but in the fabric F2 it is 47.4% and, in the fabric F7 it is almost twice 81.6%. There is mostly no child under 18 years in the households of both fabrics. In F2 the length of residence of the participants are distributed evenly in five categories. In F7, there are mostly participants living between 6-25 years in the same neighborhood. The number of the house owners are more than tenants, but they are close to each other in both fabrics. Low SES group is almost negligible, the majority is belonged to the middle SES group, but the high SES group is large too in both fabrics.

Table 4.53 Characteristics of the participants in the survey after the outbreak (N=76)

Characteristics of Participants	**F2 (n=38)**	**F7 (n=38)**	**Chi-Square Test**
Gender			
(1) Female	20 (52.6%)	18 (47.4%)	X^2 (1, N = 76) = 0.211, p = 0.646
(2) Male	18 (47.4%)	20 (52.6%)	
Age			
(1) 18-25	1 (2.6%)	9 (21.1%)	N/A
(2) 26-45	17 (44.7%)	32 (39.5%)	
(3) 46-65	20 (52.6%)	35 (39.5%)	
Number of people in household			
(1) 1 person	8 (21.1%)	1 (2.6%)	N/A
(2) 2 people	12 (31.6%)	6 (15.8%)	
(3) more than 2 people	18 (47.4%)	31 (81.6%)	
(3) High	13 (34.2%)	15 (39.5%)	
Number of children in household (under 18)			
0 (no child)	29 (76.3%)	27 (71.1%)	N/A
1 (1 child)	5 (13.2%)	8 (21.1%)	
2 (more than 1 child)	4 (10.5%)	3 (7.9%)	
Length of Residence of the Participants			
(1) Less than 2 years	7 (18.4%)	0	N/A
(2) 2-5 years	6 (15.8%)	8 (21.1%)	
(3) 6-10 years	9 (23.7%)	10 (26.3%)	
(4) 11-25 years	8 (21.1%)	18 (47.4%)	
(5) More than 26 years	8 (21.1%)	2 (5.3%)	
Housing Tenure			
1 (Owner)	21 (55.3%)	21 (55.3%)	X^2 (1, N = 76) = 0.000, p = 1.000
2 (Tenant)	17 (44.7%)	17 (44.7%)	
Socio-Economic Status (SES) (derived from data on education and occupation)			
(1) Low	2 (5.3%)	0	N/A
(2) Middle	23 (60.5%)	23 (60.5%)	

4.2.3.2 Effect of Participants' Characteristics on Neighborhood Satisfaction

Given that the distribution of three variables of participants' characteristics differentiate in the fabrics F2 and F7, neighborhood satisfaction evaluation is observed in terms of these two variables, age, number of people in the household and length of residence in the neighborhood.

Age. ANOVA test results revealed that there are five parameters in the survey, the scores of which significantly differ across age groups. These parameters are related to accessibility, physical characteristics, and safety (Table 4.54).

Table 4.54 Satisfaction parameters which differ across age groups

Accessibility		**1**	**2**	**3**	**Tot**
I reach various destinations in my neighborhood on bike	F(2,73)=12.851;p=0.000	3.89	2.19	1.51	2.08
I cycle to exercise or for recreation in my neighborhood	F(2,73)=11.637;p=0.000	3.78	2.16	1.57	2.08
Physical Characteristics					
The amount of buildings and green areas in my neighborhood is quite balanced	F(2,73)=3.679;p=0.030	4.44	3.72	4.29	4.07
It is easy to pass from a building to a building, from building to the street	F(2,73)=3.173;p=0.048	4.67	3.88	4.23	4.13
Safety					
My neighborhood is a good place for disabled and old people to live	F(2,73)=3.389;p=0.039	4.67	3.88	4.49	4.25

According to Tukey test results the youngest group of participants (18-25 group 1) gave significantly higher scores on cycling activities and ease to pass from a building to a building, from building to the street. The parameters on balance of buildings and green areas in the neighborhood and being a good place for disabled and old people to live are found significantly different across age groups through ANOVA test, but Tukey test did not produce homogeneous subsets (Appendix 27).

Number of People in the Household. According to ANOVA test, the scores of three parameters in the survey significantly differ across household groups. These parameters are related to accessibility and physical characteristics (Table 4.55).

Table 4.55 Satisfaction parameters which differ across household groups

Accessibility		**1**	**2**	**3**	**Tot**
I reach various destinations in my neighborhood on bike	F(2,73)=3.316;p=0.042	2.33	1.33	2.31	2.08
I cycle to exercise or for recreation in my neighborhood	F(2,73)=3.673;p=0.030	2.44	1.33	2.29	2.08
Physical Characteristics					
Pollution is not an issue in my neighborhood	F(2,73)=4.670;p=0.012	4.44	3.61	3.04	3.34

Although ANOVA test revealed that cycling activities are found significantly different based on household groups, Tukey Post-Hoc test produced one single subset for these parameters. The test produced two subsets and three groups on pollution issue. The participants who live alone are more satisfied with the issue. The first group evaluated this issue significantly higher than the third group (Appendix 28).

Length of Residence in the Neighborhood. According to ANOVA test results, none of the parameters of neighborhood satisfaction different between five categories of length of residence in the neighborhood.

4.2.3.3 Influence of Urban Morphology on Neighborhood Satisfaction

Like it is in the first survey, there are two different evaluations of urban fabrics in this survey. The first is based on the urban fabric of the street where the dwelling of the participant is located. The second is associated with the ratio of the urban fabric in the neighborhood maps that were drawn by the participants.

4.2.3.3.1 Neighborhood Satisfaction Based on the Location of the Dwelling. In this section statistical relation between neighborhood satisfaction questions and the urban fabric of the street segment where the participant live is mostly evaluated via T-test. Only the question on moving from the neighborhood is test via chi-square test.

Overall satisfaction with the neighborhood in the survey is rated high in both fabrics. In contrast to the first survey, overall satisfaction with the neighborhood does differ in the fabrics F2 and F7. In F7, the participants are significantly more satisfied with their neighborhood compared to F2. Despite of this fact, evaluation of only 13 parameters out of 47 have significantly different scores in F2 and F7 (Table 4.56).

Table 4.56 T-Test results of neighborhood satisfaction in urban fabrics

		F2		F7	
Satisfaction in General		**M**	**SD**	**M**	**SD**
How satisfied are you with your neighborhood in general?	t(74)=-2,534; p=0,000	4.47	0.557	4.76	0.431
Accessibility					
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	t(74)=-2,01; p=0,048	4.68	0.739	4.95	0.324
Services like shops, schools, health center, cinema etc are quite close to my house	t(74)=-1,872; p=0,001	4.68	0.574	4.89	0.388
As I go out of my house, I can easily access to green areas where I relax or do sports	t(74)=-2,255; p=0,000	4.50	1.033	4.89	0.311
I reach various destinations in my neighborhood on bike	t(74)=-1,435; p=0,010	1.84	1.242	2.32	1.613
I cycle to exercise or for recreation in my neighborhood	t(74)=-1,494; p=0,021	1.84	1.220	2.32	1.526
Physical Characteristics					
Physical conditions in the close vicinity of my house (sidewalk width, material quality and continuity) are convenient for walking	t(74)=-3,113; p=0,002	4.21	1.044	4.79	0.474
My neighborhood is clean and well-maintained	t(74)=-2,749; p=0,025	3.97	1.078	4.55	0.724
Safety					
My neighborhood is a safe place in case of a disaster	t(74)=-1,202; p=0,010	3.37	1.618	3.76	1.218
I feel safe when I walk around in the neighborhood during nighttime	t(74)=-1,906; p=0,000	4.55	0.860	4.84	0.370
My neighborhood is a good place to raise children	t(74)=-2,213; p=0,012	4.42	0.683	4.74	0.554
My neighborhood is a good place for disabled and old people to live	t(74)=-2,896; p=0,000	3.89	1.371	4.61	0.638
Social Relations					
I know most of my neighbors	t(74)=3,225; p=0,022	4.13	1.095	3.21	1.379

Accessibility in general do not differ in F2 and F7. Five of 20 parameters of accessibility are found significantly different in two urban fabrics. The participants living both in F2 and F7 are quite satisfied with three parameters of accessibility, access and closeness to services and access to green areas. However, in F7 they are significantly more satisfied than they are in F2. The frequencies of biking to reach some destination and biking for exercise are low in both urban fabrics. Nevertheless, in F2 it is significantly lower than it is in F7 (Table 4.56).

According to T-test results, among 13 parameters of physical characteristics two of them statistically differ in F2 and F7. Both convenient physical conditions for walking, and cleanness and maintenance of the neighborhood are evaluated high. Yet, the scores are significantly higher in F7 (Table 4.56).

Four of six the parameters on safety have significantly different scores in F2 and F7. Safety in disasters received moderate score in F2, but the score of F7 is significantly higher than F7. The parameters, nighttime safety, safety for raising children, and safety for disabled and old people are evaluated high, but they are statistically higher in F7 (Table 4.56).

According to T-test results, in the dimension of social relations, there is only one parameter, which statistically differ in F2 and F7. F7 got moderate scores on knowing most of the neighbors. Contrary to other parameters, F2 received significantly higher score than F7 for this parameter (Table 4.56).

Cross-tabulation on the question “Are you thinking of moving out from this neighborhood?” reveals that 70 of 76 participants do not think of moving out. In the fabric F7 there is only one participant and in F2 there are five participants who plan to leave the neighborhood. Four participants in F2 gave physical reasons like general appearance, infrastructure etc. for leaving the neighborhood (Table 4.57).

Table 4.57 Number of participants willing or not to move out in urban fabrics

Urban Fabrics	Yes	No	Tot
F2	5	33	38
F7	1	37	38
Total	6	70	76

		F2	F7	Tot
YES	Economic	-	1	1
	Social	1	-	1
	Physical	4	-	4
NO	Economic	1	-	1
	Social	29	36	65
	Physical	26	27	53

4.2.3.3.2 Neighborhood Satisfaction Based on the Neighborhood Maps. This section is an evaluation of the survey based on the amount of urban fabrics in the neighborhood maps. Three urban fabric classes are found when the survey maps are analyzed. Neighborhoods of all participants living in the fabric F7 are found to be made of predominantly F7. Neighborhoods of 32 participants living in the fabric F2 are comprise of mixed fabrics, but F2 found more than one third of the neighborhood.

Six of the participants living in F2 perceive their neighborhood as combination of the fabrics F2 and F7. Urban fabrics classes F7 and XF2 have enough sample size to conduct statistical analysis (Table 4.58).

Table 4.58 New urban fabrics classes based on survey maps

Number of the Surveys	New Urban Fabric Classes		Number of the New Classes
38	F2	Prevalent fabric of F2	0
38	F7	Prevalent fabric of F7	38
	F2+F7	Combination of the fabrics F2 and F7	6
	X+F2	Mixture of fabrics F2 being the prevalent fabric	32

According to T-test analysis, overall satisfaction with the neighborhoods in Karşıyaka does not differ between these two urban fabric classes. Seven parameters significantly differ in XF2 and F7. Parameters that do not differ in these fabric classes are found in all dimensions of neighborhood satisfaction.

Table 4.59 T-Test results of neighborhood satisfaction in urban fabric classes

		XF2		F7	
Satisfaction in General		**M**	**SD**	**M**	**SD**
How satisfied are you with your current dwelling?	t(68)=-2,978;p=0.004	4.34	0.545	4.74	0.554
Accessibility					
As I go out of my house, I can easily access to green areas where I relax or do sports	t(68)=-2.441;p=0.017	4.44	1.105	4.89	0.311
Physical Characteristics					
Physical conditions in the close vicinity of my house (sidewalk width, material quality and continuity) are convenient for walking	t(68)=-2.763;p=0.007	4.31	0.931	4.79	0.474
My neighborhood is clean and well-maintained	t(68)=-2.722;p=0.008	3.97	1.062	4.55	0.724
Safety					
My neighborhood is a good place for disabled and old people to live	t(68)=-2.476;p=0.016	3.97	1.425	4.61	0.638
Social Relations					
I know most of my neighbors	t(68)=3.498;p=0.001	4.25	1.047	3.21	1.379
I spend time with my neighbors, friends, or relatives in my neighborhood.	t(68)=-2.598;p=0.011	2.69	1.061	3.42	1.266

In the satisfaction in general dimension, dwelling satisfaction; in the accessibility dimension, access to green areas; in the physical characteristics dimension, convenience for walking, and cleanness and maintenance of the neighborhood; in the safety dimension, being a good place for disabled and old people; and in the social relations spending time with neighbors, friends, relatives in the neighborhood are evaluated higher in the fabric F7 compared to XF2. The only parameter where the participants in XF2 are significantly more satisfied than the ones in F7 is knowing most of the neighbors.

Cross-tabulation on the question “Are you thinking of moving out from this neighborhood?” show that in the fabric F7 there is one person who is planning to leave the neighborhood as mentioned in the previous section. In XF2 and F2F7, it is three and two respectively. Considering the ratio, it is the highest in F2F7, that two of six participants want to leave their neighborhood, but the sample is not enough to make an inference. Four participants in XF2 and F2F7 gave physical reasons for moving out the neighborhood (Table 4.60).

Table 4.60 Number of participants willing or not to move out in urban fabric classes

Urban Fabrics	Yes	No	Tot
XF2	3	29	32
F2F7	2	4	6
F7	1	37	38
Total	6	70	76

		XF2	F2F7	F7	Tot
YES	**Economic**	-	-	1	1
	Social	1	-	-	1
	Physical	2	2	-	4
NO	**Economic**	1	-	-	1
	Social	25	4	36	65
	Physical	22	4	27	53

4.2.4 Change in Neighborhood Satisfaction Before and After the Pandemic

In this section neighborhood satisfaction before and after the pandemic Covid-19 is observed. The survey was interrupted because of the outbreak in March 2020. In August 2020 after the first wave of the Covid-19 virus, the same survey is held only in two fabrics F2 and F7. The fabric F2 in the coastal area is a common zone in both periods.

4.2.4.1 Characteristics of the Data

In March, 27 surveys were held in F2, the coastal zone including two building types B1 and B3; in August, 38 surveys are held in F2, the coastal zone including buildings B1. In brief, both surveys are conducted in the same area, but building types were slightly different (Table 4.62).

Table 4.61 Building types of the surveys in F2 coastal zone before and after Covid-19

	Before the Pandemic (F2)	After the Pandemic (F2)
B1: Mid-to-big size, mid-to-high-rise, often isolated ordinary apartment buildings	13	38
B3: Big, low-rise, isolated and often specialized buildings	14	0
Total	27	38

When the characteristics of the participants who took the survey before or after the pandemic are compared; results show that gender and housing tenure distribution is statistically similar in both conditions (Table 4.62). Gender distribution is balanced, and the number of house owners are more than the tenants in both conditions. Inferential statistical analyses are not applicable considering the small sample size in age, household size, number of children, length of residence and SES. Yet, it is obvious that the participants' age, number of children and SES are similar before and after the pandemic. Majority have no child and are from middle or high SES groups who are older than 25 years. However, household size and length of residence differ slightly between the participants of the two surveys. Before the pandemic, single person households are not represented in the sample. However, after the pandemic percentage of single person households are 21%. Similarly, before the pandemic, majority of the participants reveal that they live more than 10 years in the neighborhood (about 85%), whereas after the pandemic only about half of that (42%) reveal that they live more than 10 years in the neighborhood.

Table 4.62 Participants' characteristics before and after the pandemic in F2 coastal area

Characteristics of Participants	**Before the Pandemic(n=27)**	**After the Pandemic(n=38)***	**Chi-Square Test**
Gender			
(1) Female	15 (55.6%)	20 (52.6%)	X^2 (1, N = 65) = 0.54, p= 0.816
(2) Male	12 (44.4%)	18 (47.4%)	
Age			
(1) 18-25	5 (18.5%)	1 (2.6%)	N/A
(2) 26-45	9 (33.3%)	17 (44.7%)	
(3) 46-65	13 (48.1%)	20 (52.6%)	
Number of people in household			
(1) 1 person	0	8 (21.1%)	N/A
(2) 2 people	5 (18.5%)	12 (31.6%)	
(3) more than 2 people	22 (81.5%)	18 (47.4%)	
Number of children in household (under 18)			
0 (no child)	21 (77.8%)	29 (76.3%)	N/A
1 (1 child)	4 (14.8%)	5 (13.2%)	
2 (more than 1 child)	2 (7.4%)	4 (10.5%)	
Length of Residence of the Participants			
(1) Less than 2 years	0	7 (18.4%)	N/A
(2) 2-5 years	1 (3.7%)	6 (15.8%)	
(3) 6-10 years	3 (11.1%)	9 (23.7%)	
(4) 11-25 years	14 (51.9%)	8 (21.1%)	
(5) More than 26 years	9 (33.3%)	8 (21.1%)	

Table 4.62 continues

Housing Tenure			
1 (Owner)	19 (70.4%)	21 (55.3%)	X^2 (1, N = 65) = 1.522, p= 0.217
2 (Tenant)	8 (29.6%)	17 (44.7%)	
Socio-Economic Status (SES) (derived from data on education and occupation)			
(1) Low	0	2 (5.3%)	N/A
(2) Middle	22 (81.5%)	23 (60.5%)	
(3) High	5 (18.5%)	13 (34.2%)	

4.2.4.2 Effect of Participants' Characteristics on Neighborhood Satisfaction

Due to the difference in household size and length of residence in two groups (before and after the pandemic), it is necessary to investigate whether neighborhood satisfaction differs by the two parameters.

Number of People in the Household. According to ANOVA test, among 47 parameters the scores of five parameters in the survey significantly differ across household groups. These parameters are related to satisfaction in general, accessibility, physical characteristics and social relations (Table 4.63).

Table 4.63 Satisfaction parameters which differ across household groups

Satisfaction in General		**1**	**2**	**3**	**Tot**
How satisfied are you with your neighborhood in general?	F(2,62)=3.786;p=0.028	4.62	4.59	4.25	4.38
Accessibility					
I meet my daily needs in the neighborhood	F(2,62)=3.426;p=0.039	4.75	4.65	4.28	4.43
Physical Characteristics					
With its all built elements (facades, benches, lightings, paving, trash bins etc.) my neighborhood is beautiful and attractive	F(2,62)=3.915;p=0.025	4.50	4.65	4.05	4.26
Pollution is not an issue in my neighborhood	F(2,62)=6.565;p=0.003	4.38	3.71	2.98	3.34
Social Relations					
I know most of my neighbors	F(2,62)=5.216;p=0.008	4.62	4.24	3.62	3.91

Although ANOVA test revealed that cycling activities are found significantly different based on household groups, Tukey Post-Hoc test produced one single subset for the parameters on neighborhood satisfaction in general, meeting the daily needs and beauty and attractiveness of the neighborhood. The participants who are living alone evaluated the parameters on pollution and knowing most of the neighbors significantly more positive compared to the ones living more than two people in the household (Appendix 29)).

Length of Residence in the Neighborhood. According to ANOVA test, only two parameters in the survey significantly differ in terms of length of residence. These parameters are related to accessibility, and physical characteristics (Table 4.64).

Table 4.64 Satisfaction parameters which differ in terms of length of residence

Accessibility		**1**	**2**	**3**	**4**	**5**	**Tot**
I reach various destinations in my neighborhood on bike	F(4,62)=3.941;p=0.007	2.57	1.00	2.08	1.18	1.53	1.57
Physical Characteristics							
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F(4,62)=4.472;p=0.003	4.14	3.29	4.75	4.36	4.53	4.34

According to Tukey test results the participants living less than two years in the same neighborhood tend to give significantly higher scores to the parameter on biking to reach various destinations, although all scores on this parameter are low. Th participants living in the neighborhood more than 10 years gave higher scores to imageability of the neighborhood (Appendix 30).

4.2.4.3 Effect of Covid-19 Pandemic on Neighborhood Perception and Satisfaction

The pandemic Covid-19 has profoundly affected the urban life. New lifestyles with self-isolation, social distancing, stay-at-home measures arose strong debates on lockdown urbanism, post-pandemic architecture and planning (Bereitschaft & Scheller, 2020; Rice, 2020; Salama, 2020; Yang & Xiang, 2021; Zecca, Gaglione, Laing, Gargiulo, 2020). It did not have an effect only on neighborhood satisfaction, but also in neighborhood perception, as the residents began to spend more time at their homes and neighborhoods under different circumstances. Therefore, it is better to first understand these circumstances and how neighborhood perception has changed.

During the first-wave of the Covid-19, like all other countries Turkey has took some measures to prevent the spread of the virus. These measures can be summarized as below:

- The activities of pavilions, bars and nightclubs have been suspended. Mass ceremonies and events were stopped. Picnic bans were imposed in gardens, parks and recreation areas. Shopping centers were closed.

- All alcoholic and/or non-alcoholic restaurants, patisseries and similar establishments were restricted only to serve takeaway without allowing customers to sit.
- Distance learning started in schools and universities.
- Remote/alternate work was initiated in the public sector.
- People over the age of 65, those under the age of 20 and those with chronic diseases were banned to go out.
- A curfew was imposed on weekends, national and religious holidays (Moral&Partners, 2020).

To observe the change in neighborhood perception self-defined neighborhood maps are analyzed. The analysis of participants' maps showed that the perceived neighborhood boundaries extended during the Covid-19 pandemic (higher mean values for "after" condition compared to "before" condition in Table 4.65). Although, this difference did not achieve a statistical significance ($p>0.05$), higher variation between minimum and maximum values after the pandemic (in comparison to "before" condition) may provide empirical evidence on participants' confusion on determining the neighborhood boundaries. Higher variation in perceived neighborhood area after the first-wave may indicate that for some residents the neighborhood boundaries shrank, whereas for the majority of citizens this area extended after the lockdown as they began to spend most of their time around their house and travel less to work or to other areas (Table 4.65). Perhaps, they discovered places they had never been to before in the immediate vicinity of their residences during the pandemic. As supporting evidence to this argument, after the first-wave, the overlayed maps extended more towards north and east (Figure 4.17).

Table 4.65 Area of the participants' neighborhood boundary maps

	N	Min	Max	Mean	Std. Deviation
Before	27	618.42m^2	1887.73m^2	1023.66m^2	344.45
After	38	505.46m^2	2358.95m^2	1196.42m^2	449.65
Total	65	505.46m^2	2358.95m^2	1124.66m^2	415.25
T-Test			$t(63)= -1.674; p=0.099$		

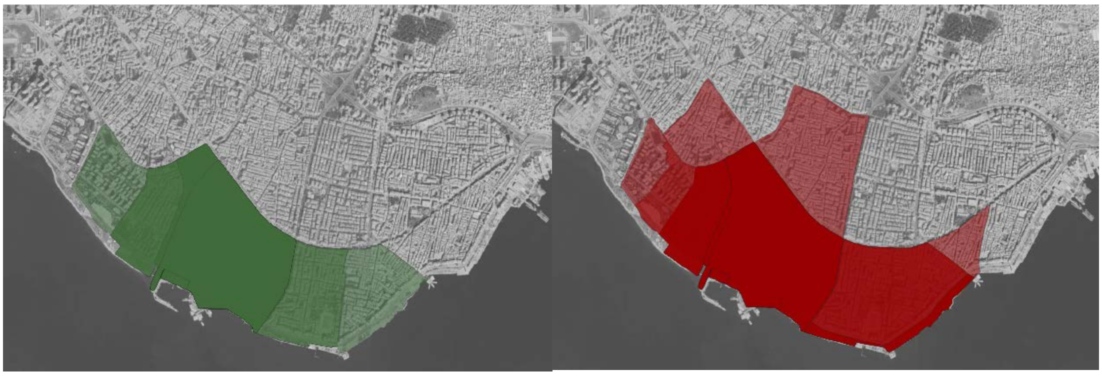


Figure 4.17 Overlayed neighborhood maps of the participants

Next, the content of neighborhood areas before and after the Covid-19 pandemic were compared. Results showed that the “mixture of urban fabrics where F2 is the prevalent urban fabric” was the dominant urban morphological class in participants’ drawings. However, in comparison to the condition before the pandemic, after the first-wave, the percentage of participants who added “Discontinuous Spaced-out Modernist Fabric” (F7) into their neighborhood boundary increased from 4% to 16% (Table 4.66). The fabric F7 is a modernist fabric and contains high-rise buildings in large plots. Large open spaces, low coverage ratio and less commercial area are the main characteristics of this urban fabric. The extension of neighborhood boundaries of the participants towards F7 is reasonable considering the fact that F7 is an urban fabric that meets the isolation and separation requirements of the pandemic.

Table 4.66 Morphological classes of the participants’ maps before and during the pandemic

Coding Based on Urban Fabrics	Before the Pandemic(n=27)	During the Pandemic(n=38)
Mixture of F2 and F7	1 (3.7%)	6 (15.79%)
Mixture of fabrics F2 being the prevalent fabric	26 (96.3%)	32 (84.21%)

When neighborhood satisfaction evaluations before and after the Covid-19 pandemic is compared; it is seen that for nine of the 47 measures the mean evaluations differ between two conditions (Table 4.67).

Four of the 20 parameters of accessibility, participants’ evaluations differ before and after the pandemic. Quality of the public transportation, walkability in the close vicinity of the house, meeting the daily needs in the neighborhood, and reaching various destinations on bike are evaluated significantly higher after the pandemic (Table 4.67).

Table 4.67 Neighborhood satisfaction before and after the pandemic

Accessibility	t-Test	Before		After	
		Mean	S.D.	Mean	S.D.
Public transportation modes around my housing are quite reliable, comfortable, and not crowded	t(63)=-3.031; p=0.004	3.56	1.155	4.37	0.998
I enjoy walking in the close vicinity of my house	t(63)=-2.764; p=0.007	4.04	0.759	4.58	0.793
I meet my daily needs in the neighborhood	t(63)=-2.3; p=0.025	4.22	0.698	4.58	0.552
I reach various destinations in my neighborhood on bike	t(63)=-2.492; p=0.015	1.19	0.681	1.84	1.242
Physical Characteristics					
With its all built elements my neighborhood is beautiful and attractive	t(63)=-3.746; p=0.000	3.85	0.770	4.55	0.724
The building sizes (width and height) in my neighborhood are coherent with each other	t(63)=-2.187; p=0.032	3.93	0.730	4.37	0.852
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	t(63)=-4.12; p=0.000	3.26	0.944	4.32	1.068
Safety					
My neighborhood is a good place for disabled and old people to live	t(63)=2.223; p=0.03	4.52	0.58	3.89	1.371
Social Relations					
I know most of my neighbors	t(63)=-2.215; p=0.03	3.59	0.747	4.13	1.095

Participants' evaluations statistically differ for three of the 13 parameters of physical characteristics. After the pandemic, participants evaluated the beauty and the attractiveness of the neighborhood, coherence of the building size, and the sense of closure more positively (Table 4.67).

Among six parameters of safety, participants' evaluations statistically differ only for "being a good place for disabled and old people". Participants reveal less satisfaction with the qualifications of the neighborhood for disabled and old people after the pandemic (Table 4.67).

Among four parameters of social relations, only one of them differ significantly before and after the pandemic. The participants of the survey after the pandemic tend to know their neighbors statistically more compared to the those who participated the survey before the pandemic (Table 4.67).

On willingness to move out of the neighborhood; five of the 65 participants showed tendency to leave their neighborhood. All these participants who were willing to move out were the ones who were interviewed after the pandemic. Among these five participants only one of them reveal social issues as reason to move out, the remaining four pointed to physical reasons as reasons to move out (Table 4.68).

Table 4.68 Number of participants willing or not to move out before and after the pandemic

Urban Fabrics	Yes	No	Tot
Before	0	27	27
After	5	33	38
Total	5	60	65

		Before	After	Tot
YES	Economic	-	-	-
	Social	-	1	1
	Physical	-	4	4
NO	Economic	4	1	5
	Social	23	29	52
	Physical	10	26	36

The results showed that the pandemic changed residents' evaluations of neighborhood. On one hand, when they have a chance, some residents are willing to move to a different neighborhood with the hope of a better life. On the other hand, residents tended to evaluate their neighborhood as better after the pandemic (in comparison to before pandemic). Perhaps these findings are not conflicting, they are simply reflecting the confusion and obscurity created by the Covid-19 pandemic.

CHAPTER 5

DISCUSSION AND CONCLUSION

This thesis aimed to examine the influence of urban morphology on neighborhood satisfaction in general and the change of neighborhood satisfaction in different urban fabrics in particular. Previous studies have examined the influence of one or more parameters of the urban form on neighborhood satisfaction, but they failed to develop a comprehensive approach to examine the influence of urban fabric on neighborhood satisfaction. In other words, previous studies on neighborhood satisfaction discussed urban form in a fragmented way and focused on certain characteristics. However, urban fabric which is an indivisible form have never been associated with the satisfaction of the neighborhood. This thesis aims to fill this gap.

The research was held in two study areas. In the first case, the French Riviera in France, nine urban fabrics were already found with 21 morphometric parameters within the study of Araldi and Fusco (2019) through a quantitative morphological protocol they developed: Multiple Fabric Assessment (MFA) (Figure 5.1).

UF1. Old constrained urban fabrics of townhouses

UF2. Traditional urban fabrics of the plain with adjoining buildings

UF3. Discontinuous and irregular urban fabrics with houses and buildings

UF4. Modern discontinuous urban fabrics with big and medium-sized buildings

UF5. Suburban residential fabrics in hills or plain

UF6. Small house constrained suburban fabrics

UF7. Connective artificial fabrics with sparse specialized big buildings

UF8. Non urbanized space in hills or plain with sparse homes and buildings

UF9. Mountain natural space with sparse houses

In the second case, the Karşıyaka District in Izmir, Turkey, eight urban fabrics were found with 19 morphometric parameters (including building types and nodes) in three dimensions (Network Morphology, Built-up Morphology, Network-Building Relationship) through MFA (Figure 5.1).

F1. Traditional Meshed Hyper-Compact Fabric

F2. Planned Compact Aligned Continuous/Discontinuous Fabric

F3. Heterogeneous Irregular Hyper-Compact Fabric

F4. Open-worked and Heterogeneous Fabric

F5. Informal Low-Rise Compact Fabric

F6. Discontinuous Heterogenous Irregular Fabric

F7. Discontinuous Spaced-out Modernist Fabric

F8. Empty and/or Connective Spaces

Due to similar geographic characteristics and different cultural, social and political backgrounds the MFA protocol produced both similar and different urban fabrics in two study areas. Traditional (UF2 in the French Riviera and F1 in Karşıyaka) and modern fabrics (UF4 in the French Riviera and F7 in Karşıyaka) in both cases show some similarities. The formation of the tradition fabrics dates back to slightly the same periods. In the French Riviera, between the 18th century and the Second World War, in Izmir, between the 19th century and the early 20th century. They have both regular and well-connected grid-like patterns with attached buildings. However, the building blocks are larger in the first case. Modern fabric (UF4) in the French Riviera was developed after the WW2, the one in Karşıyaka (F7) was developed after 1980s. Both have irregular and discontinuous street networks with modern large or tall buildings (Figure 5.1). Connective fabrics seem another common point in the 21st century Mediterranean metropolises (UF7, F8). Looser resemblances could also be highlighted between the old constrained urban fabrics of townhouses in the French Riviera (UF1) and the informal low-rise compact fabric in Karşıyaka (F5) despite the different historical context of their production. Finally, discontinuous and irregular fabrics with houses and buildings in the French Riviera (UF3) can partially correspond to F6 and F4 in Karşıyaka. Main differences should also be highlighted, like the importance of the suburban fabrics on the French Riviera (UF6) or the presence of scarcely urbanized space in the Riviera landscape (UF8, UF9) which are not to be found within the narrower spatial extent of the Karşıyaka district. The planned, compact aligned continuous/discontinuous fabric (F2), as well as the heterogeneous irregular hyper-compact fabric (F3), seem to be more peculiar forms of the Turkish coastal city.

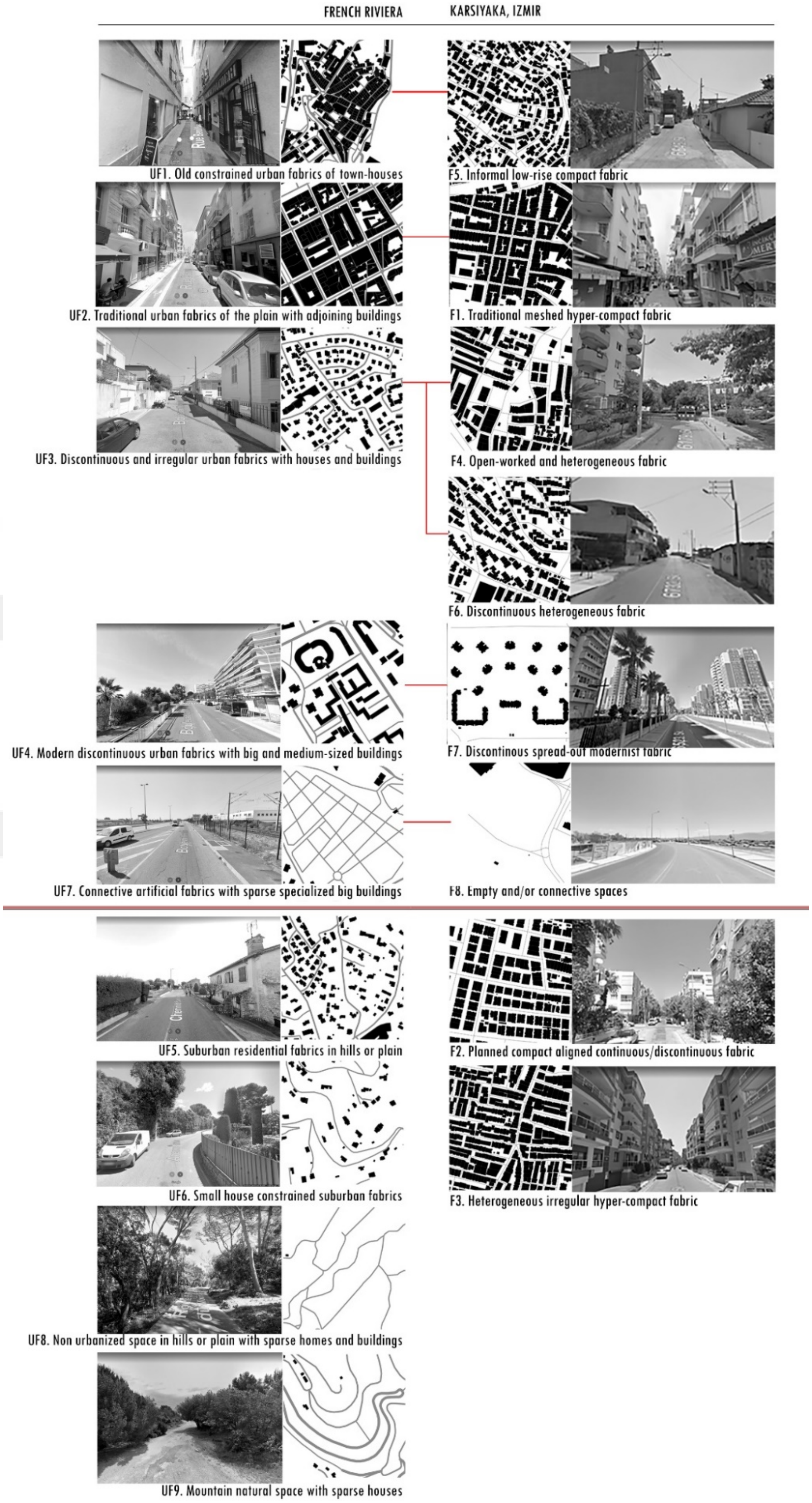


Figure 5.1 Urban fabrics in the study areas

In brief, this study proved that MFA yields meaningful and usable results in different geographies, cultures and on different scales (French Riveria and a district in Turkey). Moreover, this study is important in developing adapting two different methodologies to derive data about neighborhood satisfaction in two areas. On one hand, in the French Riviera, national data base which involves limited number of questions on neighborhood satisfaction was used. On the other hand, in Karşıyaka, Turkey, a survey developed specifically for this study based on literature review.

In the French Riviera, the national data; Household Mobility Survey; which involves data on neighborhood satisfaction, does not involve detailed information on where households live. Thus, this data needed to be adapted to the urban fabric information. Bayesian Network was used to combine two datasets; urban fabric data derived from MFA and neighborhood satisfaction data derived from national database. After combining these two datasets, the results showed that the level of neighborhood satisfaction in the French Riviera is considerably high at 86.10% with a score of 0.768 (scoring between -1 and 1), housing satisfaction is still high at 70.10% with a score of 0.440, but relatively low compared to neighborhood satisfaction. When the differentiation of neighborhood satisfaction scores in different urban fabrics is examined, it is seen that in the fabric UF1, neighborhood satisfaction is the highest, but housing satisfaction is the lowest. In UF2, although the neighborhood satisfaction is still high as in the whole area, it is the lowest compared to other urban fabrics. Concerning other variables, it is seen that neighborhood satisfaction decreases mostly in central areas. However, when urban fabric information is combined with location (centrality or distance to the sea) or with the presence of green areas, neighborhood satisfaction scores alter further. In UF3 in the First Belt, UF3 on the Coast, UF3 in the Center, UF1 in Peri-coastal Area, UF1 in Second Belt and UF1 in the Hinterland, neighborhood satisfaction levels are found to be considerably high compared to other zones. On the contrary, in UF2 in Mixed Zones, UF3 in Pure Zones, UF3 with Medium Nature, UF6 on the Coast, neighborhood satisfaction is found to be the least compared to other zones (Figure 5.2).

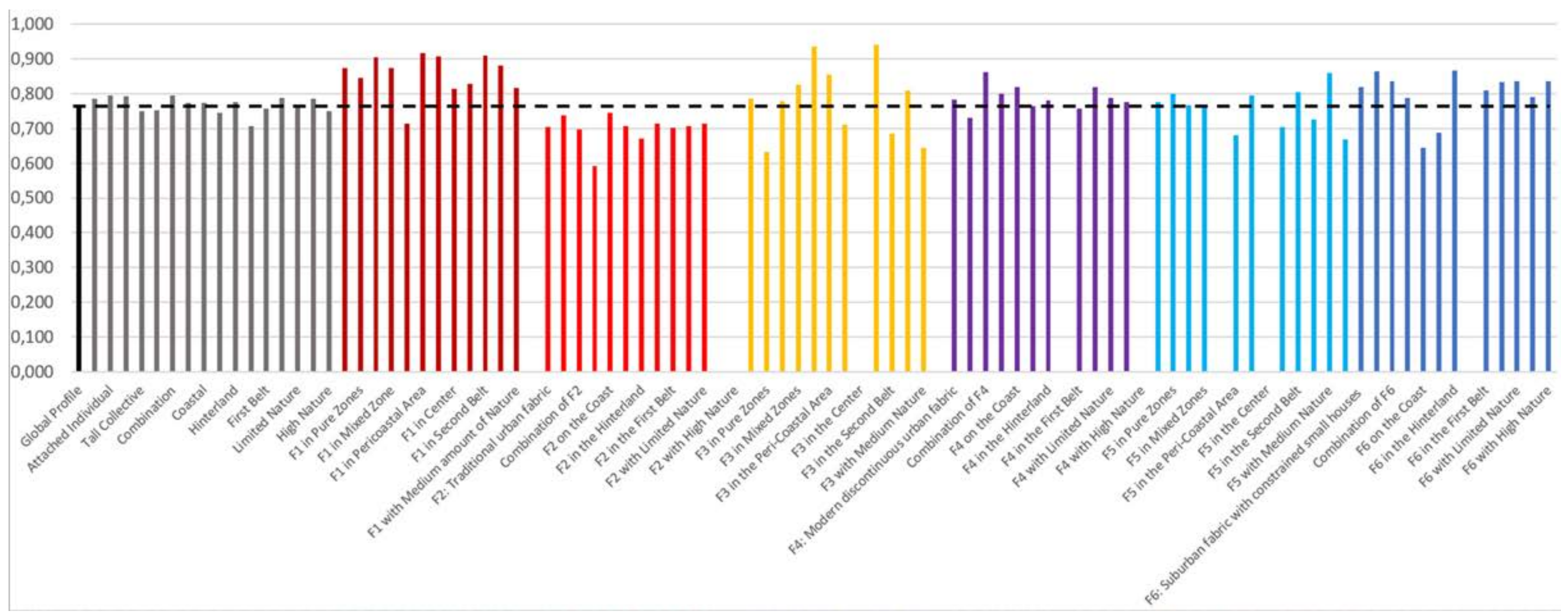


Figure 5.2 Influence of urban morphology on neighborhood satisfaction in the French Riviera

In the Karşıyaka District, the survey was conducted in two different periods the first in March 2020 and the second in August 2020 (before and after the Covid-19 pandemic). Neighborhood satisfaction was evaluated in three stages, based on the survey that is conducted (1) before the Covid-19 pandemic, (2) after the pandemic, and (3) the comparison of two surveys. According to the statistical results that were carried via SPSS (chi-square, t-test, and ANOVA analysis) in Karşıyaka, it was seen that neighborhood satisfaction is high throughout the district in both periods of surveys.

Before the Covid-19 pandemic, 322 residents were interrogated in seven different urban fabrics. In F1 and F2, the participants are mostly older than 45, with household more than two people, having no child under 18, living in the same neighborhood more than 10 years, homeowners and from the middle SES group. In F2, the percentage of the high SES group is the highest compared to other fabrics. In F34, the participants are mostly older than 25, with household more than two people, mostly having no child under 18, but the percentage of the families with one child is high too. They are mostly living in the same neighborhood more than 6 years, homeowners and from the middle SES group. In F5, the participants are mostly between 26-45 years old, with household more than two people, having one or more child under 18, living in the same neighborhood more than 10 years, homeowners and from the low SES group. In F6, the participants are from all age groups, with household more than two people, having one or more child under 18, but the percentages of the families with children is high too. They are mostly living in the same neighborhood more than 10 years. The percentages of homeowners and tenants are similar. They are mostly from the middle SES group, but the percentage of low SES group is quite high too. In F7, all participants are older than 25. They are mostly having household more than two people, having no child under 18, living in the same neighborhood from 11 to 25 years, homeowners and from the middle and also considerably from high SES groups. In F72, the participants are mostly older than 45, with household two or more people, having no child under 18, living in the same neighborhood more than 10 years, homeowners and from the middle SES group, but the percentage of the high SES group is the high, too. In brief, demographic and social characteristics vary in different urban fabrics. Since urban fabric can also be an issue related to the rent value, it is expected and a natural result that social and economic characteristics vary in different urban fabrics. Although it is impossible to control such differences in field studies (unlike laboratory studies) such as this one, it is important to interpret the results in the light of such differences.

The participants revealed a quite high satisfaction with their neighborhood in general (4.08 out of 5.00). Also, 41 of 47 parameters were evaluated high. Two parameters on accessibility dimension, reaching to various destinations on bike and cycling to exercise were rated quite low. Finding a parking place on accessibility dimension, safety in disasters on safety dimension, spending time with neighbors, friends, or relatives in the neighborhood and spending time in the neighborhood for weekend activities on social relations dimension were rated moderately low. Moreover, there were only 28 participants among 322 who were willing to move out of the neighborhood. The evaluation of this survey was done in four ways to measure the influence of (1) the urban fabric type where the participant lives (actual urban fabric), (2) the urban fabric class where the participant perceive as his/her neighborhood (perceived urban fabric), (3) the location (coastal etc.) where the participant lives (actual location), (4) the location (coastal etc.) where the participant perceive as his/her neighborhood (perceived location). <u>The first group of analyses</u> concerns actual urban fabrics and showed that the fabrics F7, F2 and F72 (combination of these fabrics on the seafront) were evaluated better and the fabrics F5 and F6 were evaluated worse than other urban fabrics. The fabrics F7, F72 and F2, where neighborhood satisfaction scores are higher, covers the planned areas in the Karşıyaka. These areas are the neighborhoods with good reputation and high-middle SES groups. The maintenance of these neighborhoods is high especially in F7 which is formed of gated communities and F72 which is the prestigious waterfront area. There were some exceptions mostly concerning the fabric F1. Although several items were scored significantly lower in the fabric F1 (such as calmness of the neighborhood on neighborhood satisfaction in general dimension; traffic congestion and finding a parking place on accessibility dimension; cleanness and maintenance of the neighborhood, ease to pass from building to building and building to street, appropriate closure, balance of built and green areas and pollution parameters on physical characteristics dimension; safety in disasters on safety dimension; knowing neighbors, spending time with neighbors, friends and relatives in the neighborhood on social relations dimension); some items were scored significantly high (such as access to quality of public transportation, connectedness to the city center, meeting daily needs, all walking and biking activities on accessibility dimension). Similarly although, the participants in F5 revealed mostly significantly lower satisfaction compared to other participants, they revealed significantly higher satisfaction on appropriate closure, ease to pass from building to building and building to street, and pollution parameters on physical characteristics dimension; safety in disasters and safety during the night time on safety dimension; and knowing neighbors and spending time with neighbors, friends and relatives in the neighborhood on social relations dimension. The scores of other fabrics were usually in the in-between. Second group of analyses concerned perceived urban fabrics (based on participants maps) and produced similar results as the first group of analyses. Third group of analyses focused on the influence of location (rather than urban fabric) on neighborhood satisfaction. Distance to the sea and central area determines locational differences. 36 of 47 parameters significantly differ in terms of location. The participants of mostly the coastal areas often together with semi-coastal areas were found significantly more satisfied than the ones in the hinterland. Exceptionally, the parameters on traffic and parking place on accessibility dimension; appropriate closure and pollution on physical characteristics dimension; safety in disasters on safety dimension; and knowing most of the neighbors and spending time with the neighbors, friends and relatives in the neighborhood on social relations dimension were scored higher by the participants living in the hinterland. Also feeling a part of the neighborhood was scored significantly higher by the participants living in the semi-coastal areas than both the coastal area and hinterland. Accordingly, 13 participants from the coastal area, 13 from the hinterland were willing to move out, whereas it was only two participants from the semi-coastal area. Fourth group of analyses concerns perceived location (based on participants maps) produced similar results as the third group of analyses. In brief, the results did not differ on the basis of real or perceived neighborhood boundaries; in both cases results showed that satisfaction with the neighborhood differs according to where one lives.

In the second stage of the research (second survey), 76 residents in two fabrics were interrogated. In this survey which was held after the outbreak of the Covid-19 pandemic, the satisfaction with the neighborhood in general is significantly different between the urban fabrics. Although it is high in both fabrics, in F7 the residents were found more satisfied with their neighborhoods compared to the ones in F2. Also, it is seen that the scores of 13 more parameters significantly differ between the urban fabrics F2 and F7. T-Test results showed that satisfaction scores were significantly higher in F7 for all these parameters except for knowing most of the neighbors which was significantly higher in F2. In this survey there were six participants who were willing to move out of the neighborhood, five of which settle in the fabric F2. This finding may indicate that the effect detected before the pandemic in the previous stage (the effect of urban morphologies on the user's neighborhood satisfaction) still exists after the pandemic. In brief, the difference in the morphological features of the neighborhood led to differences in the evaluations of the neighborhood both before and after the pandemic. Yet after the pandemic the findings are not as clear as the ones that derived before the pandemic. This difference may be due to the difference in the representation of urban fabric before and after the pandemic, or the difference in social structure in urban fabrics.

The third stage of the research covers an evaluation of neighborhood satisfaction before and after the first wave of the pandemic in the same urban fabric (F2). The results also showed that evaluations for 9 of 47 neighborhood satisfaction parameters significantly changed after the first wave of the pandemic. All of these parameters were found significantly higher after the pandemic except for being a good place for disabled and old people. In total there were five people who were willing to move out of the neighborhood and they were all the participants of the second survey (the one after the first wave of the pandemic). Before the pandemic people were spending less time in their neighborhood or at their homes. After the pandemic because of the lockdowns and remote working option, people began to spend much more time in their immediate environment. Also, the pandemic disabled the close interaction with other people. Taking into consideration of these circumstances, it is possible that residents got more aware of their environments while spending more time in the same place and slowing down their daily lives. That may also lead to evaluate advantages or disadvantages of the neighborhoods and dwellings better especially the parameter being a good place for disabled and old people looking at the survey results. Moreover, as people needed larger open spaces to walk, isolate themselves and avoid crowds, also greater appartements to spend the whole time in it during the lockdowns, it is evident that some people are willing to move out. This result indicates that the same place can be evaluated in different ways before and after the pandemic. In other words, the differences emerged in lifestyles during and after the pandemic may have caused one to appreciate more to unnoticed features of the neighborhood after the pandemic. In parallel, the features that did not bother one before the pandemic could disturb that person more after the pandemic or these features may not be coherent to "new normal" conditions and lifestyle.

All in all, it is found that the neighborhood satisfaction scores and percentages were not too different in the French Riviera. However, in the Karşıyaka District, Turkey; among 47 parameters of neighborhood satisfaction; 42 parameters (actual urban fabrics), 39 parameters (perceived urban fabrics), 36 parameters (actual locations), and 35 parameters (perceived locations) showed significant difference. Yet, in the second survey (after the pandemic), when the location and SES groups were controlled, 13 parameters (actual urban fabrics of F2 and F7), 7 parameters (perceived urban fabrics of XF2 and F7) showed significant difference (Table 5.1). Given that, this study showed an important influence of urban fabric on neighborhood satisfaction based on first survey (before the pandemic) and failed to prove such an important effect according to the second survey (after the pandemic). In other words, the findings partially support the hypothesis and fail to provide concrete evidence on such an effect. Moreover recall, location and SES groups differ by urban fabrics. Some urban fabrics are more likely to be seen in the coastal area and some others on the periphery. Similarly, in some urban fabrics high SES groups are more likely to be seen (vice versa for low SES). In the light of these findings, it is clear that perhaps the influence of the location and the SES groups are more effective unsuppressed the influence of urban fabric on neighborhood satisfaction in the second survey compared to the first one. However, this argument needs to be investigated with further studies.

Table 5.1 Parameters which significantly differ according to survey stages and levels

	Before Pandemic				**After Pandemic**		**Comparison**
Satisfaction in General	Actual UF*	Perceived UF*	Actual Loc	Perceived Loc*	Actual UF	Perceived UF*	Bef/Aft Pandemic*
How satisfied are you with your neighborhood in general							
How satisfied are you with your current dwelling							
My neighborhood is a calm place to live							
My neighborhood has a lively environment							
Accessibility							
How would you rate the accessibility to important points in your neighborhood							
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.							
Services like shops, schools, health center, cinema etc are quite close to my house							
As I go out of my house, I can easily access to green areas where I relax or do sports							
Green areas where I relax or do sports are quite close to my house							
As I go out of my house, I can easily access to public transportation							
Public transportation modes around my housing are quite reliable, comfortable and not crowded							
As I go out of my house, I can easily access to my workplace							
My workplace is quite close to my house							
I can easily access to where my friends and relatives live							
My friends and relatives live quite close to me							
As I go out of my house, I easily access to main roads							
Traffic jam is not an issue in my neighborhood							
I can easily find a parking place close to my house							
I meet my daily needs in the neighborhood							
I enjoy walking in the close vicinity of my house							
I walk to reach various destinations in my neighborhood							
I walk to exercise or for recreation in my neighborhood							
I reach various destinations in my neighborhood on bike							
I cycle to exercise or for recreation in my neighborhood							
Physical Characteristics							
How would you rate the general appearance of your neighborhood							
Physical conditions in the close vicinity of my house are convenient for walking							
With its all built elements my neighborhood is beautiful and attractive							
My neighborhood is clean and well-maintained							
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember							
The building sizes (width and height) in my neighborhood are coherent with each other							
The building facades in my neighborhood are coherent with each other							
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).							
The amount of buildings and green areas in my neighborhood is quite balanced							
It is easy to pass from a building to a building, from building to the street							
There is a visual diversity and richness in my neighborhood							
Steepness of the streets in my neighborhood is comfortable for walking							
Pollution is not an issue in my neighborhood							
Safety							
How safe is your neighborhood							
My neighborhood is a safe place in case of a disaster							
I feel safe when I walk around in the neighborhood during daytime							
I feel safe when I walk around in the neighborhood during nighttime							
My neighborhood is a good place to raise children							
My neighborhood is a good place for disabled and old people to live							
Social Relations							
Do you feel a part of this neighborhood							
I know most of my neighbors							
I spend time with my neighbors, friends or relatives in my neighborhood							
I prefer to spend time in the neighborhood for weekend activities							

* Colored cells indicate significant difference and non-colored cells indicate insignificant difference

5.1 Significance of the Study

The literature review showed that the relationship between neighborhood satisfaction and urban fabric has never been discussed with a holistic approach with an equal weight given to both subjects. The studies either focus on neighborhood satisfaction or urban morphologies. This thesis is unique for combining these two research areas. Beside of the conceptual uniqueness, it is methodologically unique and contributed to the literature in three ways. First, it used a new quantitative morphological analysis, Multiple Fabric Assessment and applied this method for the first time in a district scale and in a Turkish city. Second, it developed a comprehensive neighborhood satisfaction survey which can be applied in Turkish cities. Lastly, it analyzed the influence of urban morphology on neighborhood satisfaction in two different cultures and study areas with two diverse databases and methods. Further, it has tried to eliminate the methodological deficiency of the previous case by developing it in the next case within the thesis itself.

MFA (Araldi & Fusco, 2017; 2019) is a data-driven and bottom-up quantitative protocol to identify and analyze urban fabric types from the pedestrian point of view. The first implication was realized in the French Riviera in a regional scale as its outcomes were used in this thesis. It was also applied in the metropolitan area of Osaka (Perez et al. 2019), the Brussels Capital Region (Guyot et al. 2021), and the metropolitan area of Marseille (Fusco et al., 2022) with some variations concerning data availabilities. So far, although limited to two layers of data (street-network and building in GIS layers), the method has been proven successful in the analysis of these large study areas. Urban morphology studies are wide in Turkish cities. However, most of the studies especially the older ones are qualitative (Çelik, 1993; Ünlü, 2011) and recent quantitative studies analyze the urban form focusing on street-network properties- rather than urban fabric- through configurational methods such as space syntax (Asami et al., 2002; Can & Heath, 2016), fractal (Kubat, 1997; Terzi & Kaya, 2011) and graph-based analysis (Çubukçu & Çubukçu, 2017). Like it is in Turkish cities, the studies in Izmir are limited to either qualitative methods (Bilsel, 1999; Sakar & Ünlü, 2019) or network-based quantitative methods (Can et al. 2015; Can & Heath, 2016; Çubukçu & Çubukçu, 2017; Kahraman & Kubat, 2015). Furthermore, most of these studies analyzed the historical center in the Konak District (Alper, 2009; Çubukçu, 2015; Kahraman & Kubat, 2015). Fewer attention has been given to other central districts, such as Karşıyaka District which may also represent the urban landscape of today's Turkish cities. In addition to choosing such a case and implying a quantitative urban fabric identification protocol, for the first time in this thesis, MFA was applied on a relatively much smaller scale, the Karşıyaka District, with limited dataset compared to previous applications. This assessment gave successful results also in the Karşıyaka District in the identification of urban fabrics. The fabrics that were found via MFA are meaningful concerning the urban development history of both the district and Turkish cities. Also, the morphological regions on a street-by-street basis match with the maps from the literature.

Neighborhood satisfaction survey was designed considering the neighborhood satisfaction, quality of life, environmental perception, walkability, place attachment, place-making, urban morphology literature together with culture and local characteristics of the case. The survey included characteristics of participants, and neighborhood satisfaction parameters on dimensions of general satisfaction, accessibility, physical characteristics, safety and social relations. The participants agreement and the frequency of their activities for 39 statements via 5-point likert-scale were asked. Also, nine questions were asked to cross check their evaluations on the neighborhood. One of the robust uniqueness of this survey is that the neighborhood borders in the second case were not relied on administrative borders, but the borders that the participant defined as their neighborhood. The literature shows that neighborhood territory is a subjective concept, and environmental psychology researchers suggest the use of resident-defined neighborhoods instead of administrative borders in neighborhood studies (Coulton, Korbin, Chan, & Su, 2001). Definitional precision (such as a small residential area or a greater area with social interaction etc.) is also essential in terms of how residents specify their neighborhood boundaries. To avoid the confusion on the definition, a specific definition derived from the literature was given to the participants and marking the landmarks, major streets and transportation nodes on the map and they were asked to draw the borders of their neighborhood and answer the questions of the survey accordingly.

5.2 Limits and Suggestions for Future Research

This thesis has tried to eliminate methodological weaknesses on measurement of neighborhood satisfaction in different urban fabrics in three stages. In the first stage questions on neighborhood satisfaction was derived from a previously applied survey in the first study area French Riviera, in the second stage a new designed survey was applied in the second study area various urban fabrics of the Karşıyaka District, in the third stage after the Covid-19 outbreak the same survey was applied in two fabrics with more controlled variables. Moreover, turning the crisis into an advantage lastly neighborhood satisfaction before and after the outbreak of the pandemic was compared in the same fabric and location. While there are debates on new urban settings after the pandemic, this comparison reinforced the thesis concerning the observation of neighborhood satisfaction and query of new urban design standards. In brief, one of the most unique strength of this thesis is developing the study across the cases to achieve more accurate results. Although in each stage the method of the previous stage was improved, there are still deficiencies regarding the data and the methods.

The first weakness was that in the first case, the survey that was utilized was not mainly on neighborhood satisfaction and the exact address so the urban fabric where the participant live was unknown. In addition to the probabilistic inference via Bayesian Networks in the same case, in the second case, with a designed survey this weakness was eliminated. However, in the second case in the Karşıyaka District there were other weaknesses. MFA analysis was applied with 19 parameters in the Karşıyaka District due to the lack of data, whereas in the French Riviera 21 parameters were measured. Moreover, the exiting dataset was incomplete or not updated, so it was edited manually. In future studies with a more reliable, updated and larger database (covering the knowledge of e.g. plots, slope, green areas, etc.), a more precise MFA analysis can be applied, and a wider variety of urban fabrics can be successfully identified. Yet, the MFA results in Karşıyaka in terms of the urban fabric clustering was quite satisfying. Although the building clustering was not very successful, the MFA method was robust enough to use very general building types, fewer parameters than on the French Riviera, and still identify 8 distinctively different urban fabric types. One of the reasons of this success was precisely the fact that the analysis was conducted on a smaller spatial extent. The spatial analyses of MFA adapt to the smaller extent and look for differences from the local average values. In a much larger study area which includes undeveloped landscapes, some of the slight differences among the 8 urban fabrics could be missed.

Moreover, the first survey in Karşıyaka showed that besides the locational differences of the urban fabrics, the participants characteristics especially the SES values were not evenly distributed in all urban fabrics. As the impact of location and participants' characteristics on neighborhood satisfaction was approved, the survey can be re-applied in other fabrics by focusing on certain locations or demographic groups as it was done in the last stage of the thesis. This thesis was funded with a budget which allowed 400 surveys in total where only 76 of them were applied in the last stage. Future research may conduct more surveys in different fabrics with more controlled variables of socio-economic status of the respondents.

Beyond the weaknesses, there are some limits of the study. First of all, the measurements of urban form and neighborhood satisfaction are not the same between two cases. While measuring and classifying urban fabric MFA is used in both cases but the indicators are not identical. MFA is a still developing method and French Riviera was the first application area of MFA. It has been developed and improved through the applications in Osaka, Brussels, and Marseille (Araldi&Fusco, 2017; Guyot, 2018; Perez, 2018; Perez, 2019). In Karşıyaka case, it was not aimed to be applied with exactly the same indicators, rather improved version of MFA convenient with the available dataset was preferred. Thus, MFA indicators were adapted to give the best results in Karşıyaka. Even so most of the indicators are identical. Neighborhood satisfaction measurement is totally different in two cases. In the French Riviera neighborhood satisfaction questions were extracted from a national survey which targeted mobility. In Karşıyaka a survey which measures neighborhood satisfaction with various parameters was designed. Here, it was not aimed to apply the same measure in both cases either. The attempt in the first case was to make the measurement with the available data and in the second it was to develop a uniform model.

As the methods of measurements, scales, cultures, and urban development of the cases are not the same, it is not very likely to make a comparison between cases. As a matter of fact, comparing two cases is beyond the scope of this thesis. Yet, in the light of the findings the differences between them can be discussed. In the French Riviera, neighborhood satisfaction is found the highest the Old Constrained Urban Fabrics of Town-houses (UF1) especially when it is in the peri-coastal and hinterland areas or in the second belt. In Karşıyaka, it is found the highest in the Discontinuous Spaced-out Modernist Fabric (F7). These two fabrics are totally contrast, one being in human scale, the other being spaced-out vertical development; one being the oldest, other being the newest fabric production of the district; one being pedestrian friendly, other being car-oriented development. There is no empirical output that can provide an explanation for this difference; so, it can be a subject of future research. At this point it can be discussed by observations. The reason for this difference may occur due to the difference in the expectations, priorities and basic needs of the residents, homogeneity of demographic groups in urban fabrics, reputation of the neighborhood, and level of belonging in each study area. For example, on one hand it can be possible that the residents living in the French Riviera have expectation of a high quality of life with the priority of an environment friendly, walkable neighborhoods in human scale. On the other hand, the priority of the residents in Karşıyaka would be the dwelling with high standards and modern style. In terms of basic needs infrastructure can be discussed which can be supplied in all neighborhoods in the French Riviera, whereas in certain neighborhoods of Karşıyaka infrastructure is not sufficient. So that the residents in the French Riviera may choose to settle wherever they want, but in Karşıyaka the ones belong to high socio-economic status tend to live only in fabrics where the quality of infrastructure is high and the other residents who cannot afford a more qualified neighborhood reveal less satisfaction with their neighborhood. This is also related the homogeneity of the urban fabrics in terms of socio-economic status. As the basic needs are not supplied in every neighborhood/fabric of Karşıyaka, middle and high SES groups tend to be clustered in the more planned and high-quality fabrics. This leads to clustering of certain SES groups in certain neighborhoods/urban fabrics. Considering that the characteristics of the households are effective variables in neighborhood satisfaction, heterogeneous distribution of SES groups in urban fabrics gives biased results of neighborhood satisfaction. At this point, reputation of the neighborhood gets important as well. High SES groups tend to choose the high upkeep neighborhoods with good image and with residents similar to their socio-economic characteristics. Another issue as level of belonging can be also a reason for the difference of tendencies in two study areas. Belonging and attachment to the place may be stronger for the residents who has lived for long time in the old fabrics of the French Riviera and want to continue to live there. Relationship between place attachment, neighborhood satisfaction and urban fabric can be another subject for future research.

Lastly, it is important to highlight that; "overall life satisfaction" can relate to personal expectations and psychological well-being which may influence neighborhood satisfaction. If the resident is satisfied with his life, he can be more likely to be satisfied with his environment and vice versa. In future studies, adding "overall life satisfaction" to the parameters of neighborhood satisfaction survey may give more unbiased results and it may allow to compare the relationship between overall life satisfaction and neighborhood satisfaction.

5.3 Contribution

The results of this thesis make a contribution to the neighborhood satisfaction literature by developing a comprehensive survey to measure neighborhood satisfaction and linking neighborhood satisfaction with urban fabric. Defining the desired spatial forms in terms of neighborhood satisfaction can be conducive in reorganizing existing environments and determining standards in designing new living environments. Yet considering the general structure of the study giving specific guidelines for neighborhood design is beyond the scope of this thesis. Moreover, it is not possible to offer urban designers the most desired urban forms due to biased results. Yet, this research paves the way to seek the preferred urban forms from holistic approach by examining a fabric as an indivisible whole. Indeed, this thesis demonstrates that search for desired forms should not be the goal because urban form discriminates satisfaction factors. That is to say, according to urban form people are more or less satisfied with different aspects of the urban form. For example, in the modern urban fabric in Karşıyaka feeling in appropriate closure evaluated as highly satisfied but spending time with neighbors is evaluated the lowest. Therefore, the aim in these types of studies should be to examine preferred urban forms based on lifestyles, demographic characteristics, and priorities.

This study is also important for its contribution to urban morphology literature as such studies are rare in Turkey. This study enabled the development of MFA in a feasible way for data for Turkish cities. For the first time, an urban fabric classification was made with a quantitative method in the whole district of İzmir Karşıyaka. In the light of this outcome some inferences were made about the general morphological characteristics of Turkish cities, particularly rapidly and highly populated districts and subcenters of metropolitans in Turkey. Also, applied in a Turkish city after France, Japan, and Belgium, and for the first time in a small scale with a narrower dataset, it contributes to the development and improvement of MFA protocol which has proven its success by giving precise urban fabrics in Karşıyaka. Further, as this urban fabric classification is from the pedestrian point of view, it is very likely to adapt to environmental psychology studies (such as walkability, sense of place, urban identity) as it is just realized in this thesis through neighborhood satisfaction. Considering the quantitative side of this classification, it can be utilized in land use plans (implementation development plans) with inclusion of more quantitative parameters which are limited to floor-area ration (FAR), building coverage ratio (BCR), and setback distance today in Turkey. This thesis paves the way for the parametric design to be integrated in urban design and planning projects as it deals with the quantitative urban fabric clustering.

Considering the outcomes of residents' perceptions and preferences in both cases in various urban fabrics, and in pre-pandemic and post-first-wave periods, this thesis also contributes to real-estate market and real estate studies. Future studies may examine the relation between neighborhood satisfaction, urban morphology, and real estate price. Such studies will enable the estimation of the housing price according to the urban morphology.

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APPENDICES

Appendix 1: Comparison of Tukey HSD test after ANOVA and Wilcoxon-Mann-Whitney test after Kruskal-Wallis for Survey Question A3

Tukey HSD test after ANOVA

	diff	lwr	upr	p
2-1	0,045739348	-0,5152013	0,60668	0,9999832
34-1	-0,40520282	-0,92332585	0,1129202	0,2373358
5-1	-1,36507937	-2,00195962	-0,7281991	0
6-1	-1,64285714	-2,2797374	-1,0059769	0
7-1	0,307142857	-0,36739095	0,9816767	0,8269581
72-1	0,299450549	-0,408064	1,0069651	0,8712347
34-2	-0,45094217	-0,96637104	0,0644867	0,1306094
5-2	-1,41081871	-2,04550912	-0,7761283	0
6-2	-1,68859649	-2,32328689	-1,0539061	0
7-2	0,261403509	-0,41106307	0,9338701	0,910658
72-2	0,253711201	-0,45183276	0,9592552	0,9372097
5-34	-0,95987654	-1,55706074	-0,3626923	0,0000576
6-34	-1,23765432	-1,83483852	-0,6404701	0
7-34	0,712345679	0,07515783	1,3495335	0,0173947
72-34	0,704653371	0,0326494	1,3766573	0,0329201
6-5	-0,27777778	-0,98048252	0,424927	0,9038185
7-5	1,672222222	0,93521927	2,4092252	0
72-5	1,664529915	0,89722663	2,4318332	0
7-6	1,95	1,21299705	2,6870029	0
72-6	1,942307692	1,17500441	2,709611	0
72-7	-0,00769231	-0,80652503	0,7911404	1

Wilcoxon-Mann-Whitney test after Kruskal-Wallis

	1	2	34	5
2	1	-	-	-
34	0,0383	0,0482	-	-
5	1,40E-05	7,90E-06	0,0044	-
6	2,00E-07	4,50E-08	5,80E-05	1
7	1	0,6512	0,0033	4,70E-06
72	1	0,9653	0,0082	1,60E-05

relationships which are significant with 0.05 error threshold for both tests

relationships which are significant with 0.05 error threshold for WMW but not for Tukey

Appendix 2: Homogeneous Subsets of Tukey Test for Neighborhood Satisfaction in terms of Age Groups

Parameters of Satisfaction in General	TUKEY Subsets Subset 1	Subset 2	Subset 3	Reclassification based on Intersected Subsets
How satisfied are you with your neighborhood in general	2, 1	1, 3		2 < 1 < 3
Accessibility				
I reach various destinations in my neighborhood on bike	3, 2	1		3, 2 < 1
I cycle to exercise or for recreation in my neighborhood	3	2	1	3 < 2 < 1
Physical Characteristics				
It is easy to pass from a building to a building, from building to the street	3, 1, 2			3, 1, 2
There is a visual diversity and richness in my neighborhood	1, 2	2, 3		1 < 2 < 3
Safety				

My neighborhood is a safe place in case of a disaster	1	2, 3	1 < 2, 3
I feel safe when I walk around in the neighborhood during nighttime	1, 2	2, 3	1 < 2 < 3
Social Relations			
Do you feel a part of this neighborhood	1, 2	3	1, 2 < 3
I know most of my neighbors	1	2, 3	1 < 2, 3
I spend time with my neighbors, friends or relatives in my neighborhood	1	2, 3	1 < 2, 3
I prefer to spend time in the neighborhood for weekend activities	1, 2	2, 3	1 < 2 < 3

Appendix 3: Homogeneous Subsets of Tukey Test for Neighborhood Satisfaction in terms of Number of People in the Household

Parameters of Satisfaction in General	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
How satisfied are you with your current dwelling	1, 3, 2		1, 3, 2
My neighborhood is a calm place to live	1	2, 3	1 < 2, 3
Accessibility			
I can easily find a parking place close to my house	2, 1, 3		2, 1, 3
Physical Characteristics			
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	1	3, 2	1 < 3, 2
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	1, 2	3	1, 2 < 3
Steepness of the streets in my neighborhood is comfortable for walking	1, 3	3, 2	1 < 3 < 2
Safety			
How safe is your neighborhood	3, 1, 2		3, 1, 2
Social Relations			
I know most of my neighbors	1, 3	3, 2	1 < 3 < 2

Appendix 4: Homogeneous Subsets of Tukey Test for Neighborhood Satisfaction in terms of Number of Children in the Household

Accessibility	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
As I go out of my house, I can easily access to green areas where I relax or do sports	2, 1	1, 0	2 < 1 < 0
Green areas where I relax or do sports are quite close to my house	2	1, 0	2 < 1, 0
Public transportation modes around my housing are quite reliable, comfortable, and not crowded	2, 1	1, 0	2 < 1 < 0
As I go out of my house, I easily access to main roads which is connected to the city center	2, 1	1, 0	2 < 1 < 0
I enjoy walking in the close vicinity of my house	2	0, 1	2 < 0, 1
I walk to exercise or for recreation in my neighborhood	2, 1	1, 0	2 < 1 < 0
Physical Characteristics			
The building sizes (width and height) in my neighborhood are coherent with each other	2	1, 0	2 < 1, 0
There is a visual diversity and richness in my neighborhood	2	1, 0	2 < 1, 0
Steepness of the streets in my neighborhood is comfortable for walking	2	1, 0	2 < 1, 0
Social Relations			
I spend time with my neighbors, friends, or relatives in my neighborhood	0, 1	1, 2	0 < 1 < 2
I prefer to spend time in the neighborhood for weekend activities	1, 0	2	1, 0 < 2
Do you feel a part of this neighborhood	1, 2, 0		1, 2, 0

Appendix 5: Homogeneous Subsets of Tukey Test for Neighborhood Satisfaction in terms of Length of Residence in the Neighborhood

Accessibility	TUKEY Subsets			Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	
As I go out of my house, I can easily access to green areas where I relax or do sports	5, 4, 3, 2, 1			5, 4, 3, 2, 1
I can easily access to where my friends and relatives live	1	2, 5, 3, 4		1 < 2, 5, 3, 4
My friends and relatives live quite close to me	1	2, 5, 3, 4		1 < 2, 5, 3, 4

I walk to reach various destinations in my neighborhood	1, 4, 5	4, 5, 3, 2		1 < 4, 5 < 3, 2
Physical Characteristics				
Physical conditions in the close vicinity of my house are convenient for walking	1, 5, 3, 2, 4			1, 5, 3, 2, 4
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	1,5	5, 3, 2, 4		1 < 5 < 3, 2, 4
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	1, 2, 5	2, 5, 4, 3		1 < 2, 5 < 4, 3
Safety				
My neighborhood is a good place to raise children	5, 1, 4, 3, 2			5, 1, 4, 3, 2
Social Relations				
Do you feel a part of this neighborhood	2, 3, 1, 4	4, 5		2, 3, 1 < 4 < 5
I know most of my neighbors	1	2, 3, 4, 5		1 < 2, 3, 4, 5
I spend time with my neighbors, friends or relatives in my neighborhood	1, 2, 3	2, 3, 4	4, 5	1 < 2, 3 < 4 < 5
I prefer to spend time in the neighborhood for weekend activities	3, 2, 4, 5	2, 4, 5, 1		3 < 2, 4, 5 < 1

Appendix 6: Homogeneous Subsets of Tukey Test for Neighborhood Satisfaction in Terms of SES Groups

Parameters of Satisfaction in General	TUKEY Subsets			Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	
How satisfied are you with your current dwelling	1, 2	3		1, 2 < 3
My neighborhood has a lively environment	1, 2	3		1, 2 < 3
Accessibility				
How would you rate the accessibility to important points in your neighborhood	1, 2	2, 3		1 < 2 < 3
As I go out of my house, I can easily access to green areas where I relax or do sports	1	2	3	1 < 2 < 3
Green areas where I relax or do sports are quite close to my house	1	2	3	1 < 2 < 3
Public transportation modes around my housing are quite reliable, comfortable, and not crowded	2, 1	3		2, 1 < 3
As I go out of my house, I easily access to main roads which is connected to the city center	1, 2	2, 3		1 < 2 < 3
Traffic jam is not an issue in my neighborhood	2, 3	3, 1		2 < 3 < 1
I can easily find a parking place close to my house	3, 2	2, 1		3 < 2 < 1
I enjoy walking in the close vicinity of my house	1, 2	3		1, 2 < 3
I walk to exercise or for recreation in my neighborhood	2, 1	1, 3		2 < 1 < 3
Physical Characteristics				
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	1, 3, 2			1, 3, 2
The building sizes (width and height) in my neighborhood are coherent with each other	1, 2	2, 3		1 < 2 < 3
There is a visual diversity and richness in my neighborhood	2, 1	1, 3		2 < 1 < 3
Steepness of the streets in my neighborhood is comfortable for walking	1	2, 3		1 < 2, 3
Pollution is not an issue in my neighborhood	3, 2, 1			3, 2, 1
Safety				
How safe is your neighborhood	1	2, 3		1 < 2, 3
My neighborhood is a good place to raise children	1	2, 3		1 < 2, 3
My neighborhood is a good place for disabled and old people to live	1, 3, 2			1, 3, 2
Social Relations				
I know most of my neighbors	2, 3, 1			2, 3, 1
I prefer to spend time in the neighborhood for weekend activities	3, 2	2, 1		3 < 2 < 1

Appendix 7 : Homogeneous Subsets of Tukey for Satisfaction in General in Urban Fabrics

Parameters of Satisfaction in General	TUKEY Subsets				Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	Subset 4	
How satisfied are you with your current dwelling	F6, F5	F5, F1, F34, F7	F1, F34, F7, F72, F2		F6 < F5 < F1, F34, F7 < F72, F2
My neighborhood is a calm place to live	F1, F6, F72, F2, F34, F5	F72, F2, F34, F5, F7			F1, F6 < F72, F2, F34, F5 < F7
My neighborhood has a lively environment	F5, F6, F34	F6, F34, F2, F1	F34, F2, F1, F7	F2, F1, F7, F72	F5 < F6 < F34 < F2, F1 < F7 < F72

Tukey Post-Hoc test produces:

- Three subsets on dwelling satisfaction and four groups. Participants living in F2-F72 are the ones who are satisfied the most with their dwellings. They are first followed by F7-F34-F1, then F5 and lastly by F6 being moderate. Satisfaction levels in F2-F72 are significantly different than F6 and F5.
- Two subsets and three groups on evaluation of calmness of the neighborhood F7 being the calmest, followed by F5-F34-F2-F72, then by F6-F1. There is a significant difference between F7 and F6-F1.
- Four subsets and six groups on having a lively environment, where F72 evaluated moderately high, F7, F1-F2, F34, F6 and lastly F5 follow it, respectively. With moderate dissatisfaction F5, and with moderate satisfaction levels F6 and F34 significantly lower scores than F72.

Appendix 8 : Homogeneous Subsets of Tukey for Satisfaction with Accessibility in Urban Fabrics

Parameters of Accessibility	TUKEY Subsets				Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	Subset 4	
How would you rate the accessibility to important points in your neighborhood	F6, F5, F7, F34	F7, F34, F1, F2	F34, F1, F2, F72		F6, F5 < F7 < F34 < F1, F2 < F72
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	F6, F5, F34, F1, F7, F2	F34, F1, F7, F2, F72			F6, F5 < F34, F1, F7, F2 < F72
Services like shops, schools, health center, cinema etc. are quite close to my house	F6, F5, F34, F2	F5, F34, F2, F7, F1	F34, F2, F7, F1, F72		F6 < F5 < F34, F2 < F7, F1 < F72
As I go out of my house, I can easily access to green areas where I relax or do sports	F6, F5	F34, F1, F2	F1, F2, F72, F7		F6, F5 < F34 < F1, F2 < F72, F7
Green areas where I relax or do sports are quite close to my house	F6, F5	F34, F2, F1	F2, F1, F7, F72		F6, F5 < F34 < F2, F1 < F7, F72
As I go out of my house, I can easily access to public transportation	F5, F34, F6, F2, F7, F72	F34, F6, F2, F7, F72, F1			F5 < F34, F6, F2, F7, F72 < F1
Public transportation modes around my housing are quite reliable, comfortable, and not crowded	F6, F5, F7, F34	F5, F7, F34, F2, F72, F1			F6 < F5, F7, F34 < F2, F72, F1
I can easily access to where my friends and relatives live	F6, F34	F34, F7, F2, F72, F1, F5			F6 < F34 < F7, F2, F72, F1, F5
My friends and relatives live quite close to me	F6, F34, F7	F34, F7, F2, F1, F72, F5			F6 < F34, F7 < F2, F1, F72, F5
As I go out of my house, I easily access to main roads which is connected to the city center	F5, F6, F7, F34	F6, F7, F34, F72, F2	F34, F72, F2, F1		F5 < F6, F7, F34 < F72, F2 < F1
Traffic jam is not an issue in my neighborhood	F1	F72, F2, F34, F6	F6, F7, F5		F1 < F72, F2, F34 < F6 < F7, F5
I can easily find a parking place close to my house	F1	F2, F34	F34, F72, F6	F6, F7, F5	F1 < F2 < F34 < F72 < F6 < F7, F5
I meet my daily needs in the neighborhood	F6, F72, F2, F5, F34	F72, F2, F5, F34, F7, F1			F6 < F72, F2, F5, F34 < F7, F1
I enjoy walking in the close vicinity of my house	F6, F5	F5, F34	F34, F2, F1, F7, F72		F6 < F5 < F34 < F2, F1, F7, F72
I walk to reach various destinations in my neighborhood	F6	F72, F7, F2, F34, F5, F1			F6 < F72, F7, F2, F34, F5, F1
I walk to exercise or for recreation in my neighborhood	F6	F72, F34, F5, F2, F7, F1			F6 < F72, F34, F5, F2, F7, F1
I reach various destinations in my neighborhood on bike	F7, F5, F2, F72, F6, F34	F1			F7, F5, F2, F72, F6, F34 < F1
I cycle to exercise or for recreation in my neighborhood	F7, F5, F72, F6, F34, F2	F34, F2, F1			F7, F5, F72, F6 < F34, F2 < F1

Tukey Post-Hoc test produces:

- Three subsets and five groups on overall satisfaction with accessibility in the neighborhood, F72 being the highest and followed by F2-F1, F34, F7, and F5-F6. F72 is statistically higher than F6-F5, and F7.
- Two subsets and three groups on access to services, where F72 is the highest and it is followed by F2-F7-F1-F34 and then F5-F6. F72 has significantly higher scores than F6-F5.
- Three subsets and five groups on closeness to services. F72 again is evaluated the highest, followed by F1-F7, F2-F34, F5, and F6. The participants living in the fabric F72 are significantly more satisfied than the ones in F6 and F5.
- Three subsets and four groups on access to green areas. F7-F72 have the highest satisfaction, followed by F2-F1, then F34, and lastly F5-F6. F7-F72 are significantly different than F6-F5 and F34.

- Three subsets and four groups on closeness to green areas, where F72-F7 are evaluated the highest, F1-F2, F34, and F5-F6 follow them respectively. F7-F72 have significantly higher scores than F5-F6, F34 in satisfaction with both access and closeness to green areas, where F5-F6, F34 show moderate satisfaction levels.
- Two subsets and three groups on access to public transportation. F1 has the highest score. F72-F7-F2-F6-F34 follow F1. F5 has the lowest score, although it shows high satisfaction too. F1 is significantly higher than F5.
- Two subsets and three groups on quality of public transportation. F1-F72-F2 have higher scores than others, and they are followed by F34-F7-F5, and F6. F1-F72-F2 are significantly higher than F6.
- Two subsets and three groups on access to friends and relatives, where F5-F1-F72-F2-F7 received higher scores than F34 and F6 respectively. F5-F1-F72-F2-F7 are significantly different than F6.
- Two subsets and three groups on closeness to friends and relatives, where F5-F72-F1-F2 received higher scores than F7-F34 and F6 respectively. F5-F72-F1-F2 are significantly higher than F6.
- Three subsets and four groups on access to city center where F1 has the highest score. It is followed by F2-F72, then F34-F7-F6. F5 has the lowest score. F1 is significantly higher than F5, F6-F7.
- Three subsets and four groups on traffic jam. The participants living in F5-F7 do not complain about traffic jam in their neighborhood. In F6, then in F34-F2-F72 the issue is moderately evaluated. In F1 it is significantly lower than all other fabrics.
- Four subsets and six groups on finding a parking place. The participants are satisfied in F5-F7. They are followed by F6, then F72, then F34 which are evaluated moderately. The participants are dissatisfied in F2 and F1. F1 and F2 are significantly different then F5-F7, F6, F72.
- Two subsets and three groups on meeting the daily needs in the neighborhood. F1-F7 received quite high scores. They are followed by F34-F5-F2-F72, and F6. F1-F7 are significantly higher than F6.
- Three subset and four subsets on enjoy of walking in the close vicinity. F72-F7-F1-F2 have higher scores than F34, F5 and F6, respectively. F72-F7-F1-F2 are significantly different than F5 and F6.
- Two subsets and two groups on frequency of walking to reach some destination and walking for exercise. For both walking activities frequencies in F6 are evaluated significantly lower than all other fabrics.
- Two subsets and two groups on frequency of biking to reach some destination. The frequency in F7-F5-F2-F72-F6-F34 is significantly lower than it is in F1.
- Two subsets and three groups on frequency of biking for exercise. F1 is followed by F2-F34. F7-F5-F72-F6 are scored significantly lower than F1. In all fabrics the frequency of biking for both purposes are quite low and almost never.

Appendix 9: Homogeneous Subsets of Tukey for Satisfaction with Physical Characteristics in Urban Fabrics

Parameters of Physical Characteristics	TUKEY Subsets					Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	Subset 4	Subset 5	
How would you rate the general appearance of your neighborhood	F6, F5, F1	F1, F34	F34, F7, F72, F2			F6, F5 < F1 < F34 < F7, F72, F2
Physical conditions in the close vicinity of my house are convenient for walking	F6, F5	F1, F34, F7, F2, F72				F6, F5 < F1, F34, F7, F2, F72
With its all built elements my neighborhood is beautiful and attractive	F6, F5, F1	F1, F34	F34, F2, F72, F7			F6, F5 < F1 < F34 < F2, F72, F7
My neighborhood is clean and well-maintained	F6, F1, F5	F5, F34	F34, F2, F72, F7			F6, F1 < F5 < F34 < F2, F72, F7
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F6, F1	F1, F5	F34, F2, F7, F72			F6 < F1 < F5 < F34, F2, F7, F72
The building sizes (width and height) in my neighborhood are coherent with each other	F6	F5	F1, F2, F34, F72	F72, F7		F6 < F5 < F1, F2, F34 < F72 < F7
The building facades in my neighborhood are coherent with each other	F6, F5	F5, F1	F1, F2, F34	F2, F34, F72	F7	F6 < F5 < F1 < F2, F34 < F72 < F7
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	F1, F34, F72, F6, F2	F34, F72, F6, F2, F5	F2, F5, F7			F1 < F34, F72, F6 < F2 < F5 < F7
The amount of buildings and green areas in my neighborhood is quite balanced	F1, F6, F5	F5, F34	F34, F2, F72	F2, F72, F7		F1, F6 < F5 < F34 < F2, F72 < F7
It is easy to pass from a building to a building, from building to the street	F6, F1, F72, F7, F2	F72, F7, F2, F34, F5				F6, F1 < F72, F7, F2 < F34, F5

There is a visual diversity and richness in my neighborhood	F6	F5, F1, F34	F34, F72, F2, F7			F6 < F5, F1 < F34 < F72, F2, F7
Steepness of the streets in my neighborhood is comfortable for walking	F5, F6	F7, F72, F1, F2, F34				F5, F6 < F7, F72, F1, F2, F34
Pollution is not an issue in my neighborhood	F1, F72, F6, F34	F72, F6, F34, F2, F7, F5				F1 < F72, F6, F34 < F2, F7, F5

Tukey Post-Hoc test produces:

- Three subsets and four groups on satisfaction with general appearance of the neighborhood, F2-F72-F7 being the highest and followed by F34, then by F1 and lastly by F5-F6. Overall satisfaction with the physical characteristics is rated moderately high, where F2-F72-F7 are significantly different than F5-F6.
- Two subsets and two groups on convenient physical conditions for walking. F72-F2-F7-F34-F1 are significantly higher than F5-F6.
- Three subsets and four groups on beauty and attractiveness of the neighborhood, where F7-F72-F2 have the highest scores. They are followed by F34, then by F1, and finally F5-F6. F7-F72-F2 are significantly different than F6-F5 and F1.
- Three subsets and four groups on cleanness and maintenance of the neighborhood. F7-F72-F2 have the highest scores, they are followed by first F34, F5, F1-F6. F7-F72-F2 are evaluated significantly different than F6-F1 and F5.
- Three subsets and four groups on imageability and legibility of the neighborhood. F7-F72-F2-F34 received higher scores than other fabrics. First F5, then F1 and F6 follow them. The scores of F7-F72-F2-F34 are significantly different than F6, F1 and F5.
- Four subsets and five groups on building size coherence, F7 has the highest score. It is followed by F72, then by F34-F2-F1, later by F5, and F6. F7, F72, F34-F2-F1 are evaluated significantly higher than F6 and F5.
- Five subsets and six groups on coherence of building facades, where F7 received the highest score. It is followed by F72, then by F34-F2, then F1, F5 and F6 respectively. F7, F72, F34-F2 have significantly higher scores than F6 and F5.
- Three subsets and five groups on feeling of in an avoid or narrow area. Having the highest score, the participants in F7 do not feel in an avoid or narrow area when walking along the streets of their neighborhood. F5, F2, F6-F72-F34, F1 follow F7 respectively. F7 and F5 are scored significantly higher than F1.
- Four subsets and five groups on balance of built and green area. F7 received the highest score. It is followed by F72-F2, F34, F5 and F6-F1 respectively. F7, F72-F2 are significantly higher than F1-F6, and F5.
- Two subsets and three groups on ease to pass from building to building and to street. F5-F34 have the highest scores. They are followed by F2-F7-F72, and F1-F6. F5-F34 are significantly higher than F1-F6.
- Three subsets and four groups on visual diversity and richness in the neighborhood. F7-F2-F72 are evaluated the highest. F34, then F1-F5, and finally F6 follow them. F7-F2-F72 are significantly higher than F6, F5-F1.
- Two subsets and two groups on steepness of the neighborhood. F34-F2-F72-F7 are evaluated significantly higher than F6-F5.
- Two subsets and three groups on pollution issue. F5-F7-F2 having the highest scores, followed by F34-F6-F72 and then F1. F5-F7-F2 are significantly different than F1.

Appendix 10: Homogeneous Subsets of Tukey for Satisfaction with Safety in Urban Fabrics

Parameters of Safety	TUKEY Subsets				Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	Subset 4	
How safe is your neighborhood	F5, F6, F7, F1	F7, F1, F34	F1, F34, F72	F34, F72, F2	F5, F6 < F7 < F1 < F34 < F72 < F2
My neighborhood is a safe place in case of a disaster	F1	F34, F6, F2, F72	F72, F7, F5		F1 < F34, F6, F2 < F72 < F7, F5
I feel safe when I walk around in the neighborhood during daytime	F6, F1, F2	F1, F2, F72, F34, F7, F5			F6 < F1, F2 < F72, F34, F7, F5
I feel safe when I walk around in the neighborhood during nighttime	F6, F5, F1, F2	F5, F1, F2, F72	F1, F2, F72, F7, F34		F6 < F5 < F1 < F2 < F72 < F34, F7
My neighborhood is a good place to raise children	F6, F5	F5, F1	F1, F2, F72	F2, F72, F34, F7	F6 < F5 < F1 < F2, F72 < F34, F7
My neighborhood is a good place for disabled and old people to live	F6, F5	F5, F1, F2	F1, F2, F34, F7, F72		F6 < F5 < F1, F2 < F34, F7, F72

Tukey Post-Hoc test produces (**Erreur ! Source du renvoi introuvable.**):

- Four subsets and six groups on overall safety of the neighborhood. F2 received the highest score. It is followed by F72, F34, F1, F7 and F6-F5, respectively. F2, F72, F34 are evaluated significantly higher than F6-F5.
- Three subsets and four groups on safety in disasters, F5-F7 are evaluated the best. They are followed by first F72, then F2-F6-F34, lastly F1. Safety in disasters has the least score among all safety parameters. The participants are quite dissatisfied with the safety in case of disasters in F1 and it is significantly different than all other fabrics.
- Two subsets and three groups on daytime safety. F5-F7-F34-F72 are higher than F2-F1 and F6, where F6 has the lowest score. F5-F7-F34-F72 are significantly different than F6.
- Three subsets and six groups on nighttime safety. F7-F34 received the highest scores. They are followed by F72, F2, F1, F5 and F6 respectively. F7-F34 and F72 are significantly different than F6.
- Four subsets and five groups on safety for raising children. F7-F34 again received the highest scores, followed by F72-F2, F1, F5 and F6 respectively. F7-F34, F72-F2 are significantly different than F6 and F5.

- Three subsets and four groups on safety for disabled and old people. F72-F7-F34 have the highest scores, followed by F2-F1, F5 and lastly by F6. F72-F7-F34 are significantly different than F6 and F5.

Appendix 11: Homogeneous Subsets of Tukey for Satisfaction with Social Relations in Urban Fabrics

Parameters of Social Relations	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
I know most of my neighbors	F1, F2, F6, F34, F72, F7	F6, F34, F72, F7, F5	F1, F2 < F6, F34, F72, F7 < F5
I spend time with my neighbors, friends, or relatives in my neighborhood	F1, F72, F2, F7, F34, F6	F2, F7, F34, F6, F5	F1, F72 < F2, F7, F34, F6 < F5

Tukey Post-Hoc test produces:

- Two subsets and three groups on knowing most of the neighbors, where F5 has the highest score. F7-F72-F34-F6, then F2-F1 follow F5. F5 is evaluated significantly higher than F1-F2.
- Two subsets and three groups on spending time with friends or relatives in the neighborhood. F5 received the highest score again. It is followed by F6-F34-F7-F2 and F72-F1. The scores of this parameter are quite low, but it is significantly lower in F72-F2 than F5.

Appendix 12: Homogeneous Subsets of Tukey for Satisfaction in General in Urban Fabric Classes

Parameters of Satisfaction in General	TUKEY Subsets			Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	
How satisfied are you with your current dwelling	F5F6, XF6, F6, XF1, F34	XF6, F6, XF1, F34, XF2, F7		F5F6 < XF6, F6, XF1, F34 < XF2, F7
My neighborhood is a calm place to live	XF1, XF6, F5F6, XF2, F34, F6	XF6, F5F6, XF2, F34, F6, F7		XF1 < XF6, F5F6, XF2, F34, F6 < F7
My neighborhood has a lively environment	F6, XF6, F5F6, F34	XF6, F5F6, F34, XF2, XF1	F5F6, F34, XF2, XF1, F7	F6 < XF6 < F5F6, F34 < XF2, XF1 < F7

Tukey Post-Hoc test produces:

- Two subsets and four groups on dwelling satisfaction. Participants living in XF2-F7 are the ones who are satisfied the most with their dwellings. They are first followed F34-XF1-F6-XF6, then by F5F6. The participants living in the fabrics XF2-F7 are significantly more satisfied with their dwelling than the ones in F5F6.
- Two subsets and three groups on evaluation of calmness of the neighborhood F7 being the calmest, followed by F6-F34-XF2-F5F6-XF6 then by XF1. There is a significant difference between F7 and XF1.
- Three subsets and five groups on having a lively environment, where F7 evaluated the highest, XF1-XF2, then F34-F5F6, then XF6 and lastly F6 follow it. F7 and XF1-XF2 are significantly different than F6.

Appendix 13: Homogeneous Subsets of Tukey for Satisfaction with Accessibility in Urban Fabric Classes

Parameters of Accessibility	TUKEY Subsets				Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	Subset 4	
How would you rate the accessibility to important points in your neighborhood	F5F6, XF6, F6, F7	XF6, F6, F7, XF1, F34	F7, XF1, F34, XF2		F5F6 < XF6, F6 < F7 < XF1, F34 < XF2
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	F5F6, XF6, F34, XF1	XF6, F34, XF1, F7	F34, XF1, F7, F6, XF2		F5F6 < XF6 < F34, XF1 < F7 < F6, XF2
Services like shops, schools, health center, cinema etc. are quite close to my house	XF6, F5F6, F34	F34, F6, XF2, XF1, F7			XF6, F5F6 < F34 < F6, XF2, XF1, F7
As I go out of my house, I can easily access to green areas where I relax or do sports	F5F6, XF6	XF6, F6,	F6, F34, XF1	F34, XF1, XF2, F7	F5F6 < XF6 < F6 < F34, XF1 < XF2, F7
Green areas where I relax or do sports are quite close to my house	F5F6, XF6	F6, F34, XF1	F34, XF1, XF2	XF1, XF2, F7	F5F6, XF6 < F6 < F34 < XF1 < XF2 < F7
As I go out of my house, I can easily access to public transportation	XF6, F5F6, F34, F6	F5F6, F34, F6, F7, XF2, XF1			XF6 < F5F6, F34, F6 < F7, XF2, XF1

Public transportation modes around my housing are quite reliable, comfortable, and not crowded	F5F6, XF6, F34	XF6, F34, F6, F7, XF1, XF2			F5F6 < XF6, F34 < F6, F7, XF1, XF2
I can easily access to where my friends and relatives live	XF6, F34, XF1	F34, XF1, F7, F5F6, XF2, F6			XF6 < F34, XF1 < F7, F5F6, XF2, F6
My friends and relatives live quite close to me	XF6, F34, XF1, F7	F34, XF1, F7, F5F6, XF2, F6			XF6 < F34, XF1, F7 < F5F6, XF2, F6
As I go out of my house, I easily access to main roads which is connected to the city center	F5F6, XF6, F6, F7, F34	F6, F7, F34, XF2, XF1			F5F6, XF6 < F6, F7, F34 < XF2, XF1
Traffic jam is not an issue in my neighborhood	XF1, XF2	XF2, F34	F34, F5F6, XF6	F5F6, XF6, F7, F6	XF1 < XF2 < F34 < F5F6, XF6 < F7, F6
I can easily find a parking place close to my house	XF1, XF2	XF2, F34	F34, F5F6	F5F6, F6, F7, XF6	XF1 < XF2 < F34 < F5F6 < F6, F7, XF6
I enjoy walking in the close vicinity of my house	F6, F5F6, XF6	F5F6, XF6, F34, XF1	XF6, F34, XF1, XF2, F7		F6 < F5F6 < XF6 < F34, XF1 < XF2, F7
I walk to reach various destinations in my neighborhood	F5F6, XF6, XF1, F7	XF6, XF1, F7, F34, XF2, F6			F5F6 < XF6, XF1, F7 < F34, XF2, F6
I walk to exercise or for recreation in my neighborhood	F5F6	XF6, F34, F6, XF2, XF1, F7			F5F6 < XF6, F34, F6, XF2, XF1, F7
I reach various destinations in my neighborhood on bike	F7, F6, F5F6, XF6, F34, XF2	XF2, XF1			F7, F6, F5F6, XF6, F34 < XF2 < < XF1
I cycle to exercise or for recreation in my neighborhood	F7, F6, F5F6, XF6, F34, XF2	F5F6, XF6, F34, XF2, XF1			F7, F6 < F5F6, XF6, F34, XF2 < XF1

Tukey Post-Hoc test produces:

- Three subsets and five groups on overall satisfaction with accessibility in the neighborhood, XF2 being the highest and followed by F34-F1, F7, F6-XF6, and F5F6, respectively. XF2 is significantly higher than F6-XF6, and F5F6.
- Three subsets and five groups on access to services, where XF2-F6 received the highest scores and they are followed by F7, XF1-F34, XF6, and then by F5F6. XF2-F6 are significantly higher than XF6, and F5F6.
- Two subsets and three groups on closeness to services. F7-XF1-XF2-F6 are evaluated the highest, followed by F34, and F5F6-XF6. F7-XF1-XF2-F6 are significantly higher than F5F6-XF6.
- Four subsets and five groups on access to green areas. F7-XF2 have the highest satisfaction, followed by XF1-F34, F6, then XF6 and lastly F5F6. The scores of F7-XF2 are significantly higher than F5F6, XF6, and F6.
- Four subsets and six groups on closeness to green areas, where F7 has the highest score. XF2, XF1, F34, F6 and XF6-F5F6 follow it, respectively. F7, and XF2 have significantly higher scores than F5F6-XF6, F6 and F34.
- Two subsets and three groups on access to public transportation. XF1-XF2-F7 have the highest scores. F6-F34-F5F6, and XF6 follow them. XF1-XF2-F7 are significantly higher than XF6.
- Two subsets and three groups on quality of public transportation. XF2-XF1-F7-F6 have higher scores than F34-XF6 and F5F6 respectively, but significantly higher than only F5F6.
- Two subsets and three groups on access to friends and relatives, where F6-XF2-F5F6-F7 received the highest scores. They are followed by XF1-F34 and XF6. F6-XF2-F5F6-F7 are significantly higher than XF6.
- Two subsets and three groups on closeness to friends and relatives, where F6-XF2-F5F6 received the highest scores. They are followed by F7-XF1-F34 and XF6. F6-XF2-F5F6 have significantly higher scores than XF6.
- Two subsets and three groups on access to city center where XF1-XF2 have the highest scores. They are followed by first F34-F7-F6, then XF6-F5F6. XF1-XF2 are significantly higher than F5F6-XF6.
- Five subsets and five groups on traffic jam. The participants in F6-F7 do not find traffic jam an issue in their neighborhood. The participants in XF6-XF5, then in F34 it is evaluated moderately, followed by XF2 and XF1. The scores of F6-F7 are significantly higher than XF1, XF2, F34.
- Five subsets and five groups on finding a parking place. The participants in XF6-F7-F6 are satisfied with the issue. They are followed by F5F6, F34, XF2, and XF1, respectively. The participants are dissatisfied in XF1 and XF2. XF6-F7-F6 are significantly higher than XF1, XF2, F34.
- Three subset and five subsets on enjoy of walking in the close vicinity. F7-XF2 have higher scores than XF1-F34, XF6, F5F6, and F6, respectively. F7-XF2 are significantly different than F6 and F5F6.
- Two subsets and three groups on frequency of walking to reach some destination. F6-XF2-F34 received the highest scores, and followed by F7-XF1-XF6, and F5F6. F6-XF2-F34 have significantly higher scores than F5F6.
- Two subsets and two groups on frequency of walking for exercise. F7-XF1-XF2-F6-F34-XF6 have significantly higher scores than F5F6.
- Two subsets and three groups on frequency of biking to reach some destination. Although it is low in general, the frequency of biking in XF1 is the highest. It is followed by XF2, F34-XF6-F5F6-F6-F7. F7, F6, F5F6, XF6, F34 received significantly lower scores than XF1.

- Two subsets and three groups on frequency of biking for exercise. XF1, which has the highest score again and it is followed by XF2-F34-XF6-F5F6, then F6-F7. F34. In F7-F6 the scores are significantly lower than XF1.

Appendix 14: Homogeneous Subsets of Tukey for Satisfaction with Physical Characteristics in Urban Fabric Classes

Parameters of Physical Characteristics	TUKEY Subsets				Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	Subset 4	
How would you rate the general appearance of your neighborhood	F5F6, XF6, XF1, F6	F6, F34, F7	F34, F7, XF2		F5F6, XF6, XF1 < F6 < F34, F7 < XF2
Physical conditions in the close vicinity of my house are convenient for walking	F5F6, F6, XF1, XF6	XF1, XF6, F34	F34, F7, XF2		F5F6, F6 < XF1, XF6 < F34 < F7, XF2
With its all built elements my neighborhood is beautiful and attractive	F5F6, XF6, XF1, F6	XF6, XF1, F6, F34	F6, F34, XF2	F34, XF2, F7	F5F6 < XF6, XF1 < F6 < F34 < XF2 < F7
My neighborhood is clean and well-maintained	F5F6, XF1, XF6	XF1, XF6, F6, F34, XF2	F6, F34, XF2, F7		F5F6 < XF1, XF6 < F6, F34, XF2 < F7
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	F5F6, XF6	XF6, XF1	XF1, F6, XF2, F34	F6, XF2, F34, F7	F5F6 < XF6 < XF1 < F6, XF2, F34 < F7
The building sizes (width and height) in my neighborhood are coherent with each other	F5F6, XF6	XF6, F6, XF1	XF1, F34, XF2	F34, XF2, F7	F5F6 < XF6 < F6 < XF1 < F34, XF2 < F7
The building facades in my neighborhood are coherent with each other	F5F6, XF6, F6	XF6, F6, XF1	XF1, XF2	XF2, F34, F7	F5F6 < XF6, F6 < XF1 < XF2 < F34, F7
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	XF1, F6, F34, XF2, F5F6	F6, F34, XF2, F5F6, XF6	F34, XF2, F5F6, XF6, F7		XF1 < F6 < F34, XF2, F5F6 < XF6 < F7
The amount of buildings and green areas in my neighborhood is quite balanced	XF1, F5F6, F6, XF6	F5F6, F6, XF6, F34	F6, XF6, F34, XF2	XF2, F7	XF1 < F5F6 < F6, XF6 < F34 < XF2 < F7
It is easy to pass from a building to a building, from building to the street	XF1, F5F6, F7	F5F6, F7, XF2, XF6, F34, F6			XF1 < F5F6, F7 < XF2, XF6, F34, F6
There is a visual diversity and richness in my neighborhood	F5F6, XF1, XF6	XF1, XF6, F6, F34	F34, XF2, F7		F5F6 < XF1, XF6 < F6 < F34 < XF2, F7
Steepness of the streets in my neighborhood is comfortable for walking	F6, F5F6, XF6	XF1, F7, XF2, F34			F6, F5F6, XF6 < XF1, F7, XF2, F34
Pollution is not an issue in my neighborhood	XF1, F34, F5F6, XF2	F34, F5F6, XF2, XF6, F7, F6			XF1 < F34, F5F6, XF2 < XF6, F7, F6

Tukey Post-Hoc test produces:

- Three subsets and five groups on satisfaction with general appearance of the neighborhood, XF2 receiving the highest scores. It is followed by F7-F34, F6, XF1-XF6-F5F6. XF2, F7-F34 are significantly higher than F5F6-XF6-XF1.
- Three subsets and four groups on convenient physical conditions for walking, where XF2-F7 received the highest scores. F34, XF6-XF1, F6-F5F6 follow them, respectively. XF2-F7 and F34 are significantly higher than F5F6-F6.
- Four subsets and six groups on beauty and attractiveness of the neighborhood, where F7 has the highest score. It is followed by XF2, F34, F6, XF1-XF6, and F5F6. F7, XF2 and F34 are significantly higher than F5F6.
- Three subsets and four groups on cleanness and maintenance of the neighborhood, where F7 has the highest score. It is followed by XF2-F34-F6, XF6-XF1, and F5F6, respectively. F7, XF2-F34-F6 are significantly different than F5F6.
- Four subsets and five groups on imageability and legibility of the neighborhood. F7 received the highest score again. F34-XF2-F6, XF1, XF6, F5F6 follow it. F7, F34-XF2-F6 are significantly different than F5F6, and XF6.
- Four subsets and five groups on building size coherence. Having the highest score F7 is followed by XF2-F34, XF1, F6, XF6, F5F6. F7, XF2-F34 are significantly different than F5F6, XF6, F6.
- Four subsets and five groups on building facades coherence. F7 has the highest score, and it is followed by F34, XF2, XF1, F6-XF6, F5F6. F7, F34, XF2 are significantly different than F5F6, XF6, F6.
- Three subsets and five groups on feeling in appropriate closure when walking along the streets of the neighborhood. Having the highest score, the participants in F7 do not feel in an avoid or narrow area in the streets of the neighborhood. XF6, F5F6-XF2-F34, F6, and XF1 follow F7 respectively. F7 is significantly higher than XF1 and F6.
- Four subsets and six groups on balance of built and green area. F7 received the highest score. It is followed by XF2, F34, XF6-F6, F5F6, and XF1, respectively. F7 and XF2 are significantly different than XF1 and F5F6.

- Two subsets and three groups on ease to pass from building to building and to street. F6-F34-XF6-XF2 have the highest scores. They are followed by F7-F5F6, and XF1. F6-F34-XF6-XF2 are significantly higher than XF1.
- Two subsets and three groups on visual diversity and richness in the neighborhood. F7-XF2 have the highest scores. They are followed by F34, F6, XF6-XF1 and F5F6 respectively. F7-XF2, F34 are significantly higher than F5F6.
- Two subsets and two groups on steepness of the neighborhood. F34-XF2-F7-XF1 are significantly higher than XF6-F5F6-F6.
- Two subsets and three groups on pollution issue. F6-F7-XF6 are evaluated the highest. First XF2-F5F6-F34, then XF1 follow them. F6-F7-XF6 are significantly different than XF1.

Appendix 15: Homogeneous Subsets of Tukey for Satisfaction with Safety in Urban Fabric Classes

Parameters of Safety	TUKEY Subsets					Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	Subset 4	Subset 5	
How safe is your neighborhood	XF6, F5F6, F6, F7, XF1	F6, F7, XF1, F34	F7, XF1, F34, XF2			XF6, F5F6 < F6 < F7, XF1 < F34 < XF2
My neighborhood is a safe place in case of a disaster	XF1, XF2	XF2, F34, XF6, F5F6	XF6, F5F6, F7, F6			XF1 < XF2 < F34 < XF6, F5F6 < F7, F6
I feel safe when I walk around in the neighborhood during nighttime	F6, F5F6, XF6, XF1, XF2	F5F6, XF6, XF1, XF2, F7	XF6, XF1, XF2, F7, F34			F6 < F5F6 < XF6, XF1, XF2 < F7 < F34
My neighborhood is a good place to raise children	F5F6, XF6, F6	XF6, F6, XF1	F6, XF1, XF2	XF1, XF2, F34	XF2, F34, F7	F5F6 < XF6 < F6 < XF1 < XF2 < F34 < F7
My neighborhood is a good place for disabled and old people to live	F5F6, XF6	XF6, F6, XF1, XF2	F6, XF1, XF2, F34	XF1, XF2, F34, F7		F5F6 < XF6 < F6 < XF1, XF2 < F34 < F7

Tukey Post-Hoc test produces:

- Three subsets and five groups on overall safety of the neighborhood. XF2 received the highest score. It is followed by F34, XF1-F7, F6 and F5F6-XF6, respectively. XF2 and F34 are significantly different than XF6 and F5F6.
- Three subsets and six groups on safety in disasters, F6-F7 are evaluated the safest. They are followed by first F5F6-XF6, F34, XF2, and XF1, respectively. The participants are dissatisfied with the safety in case of disasters in XF1. The scores of F6-F7 are significantly different than XF1 and XF2.
- Three subsets and five groups on nighttime safety. F34 received the highest scores. It is followed by F7, XF2-XF1-XF6, F5F6, and F6 respectively. Scores of F34 and F7 are significantly different than F6.
- Five subsets and seven groups on safety for raising children. F7 received the highest scores, followed by F4, XF2, XF1, F6, XF6, and F5F6, respectively. F7, F34 and XF2 are evaluated significantly higher than F5F6 and XF6.
- Four subsets and seven groups on safety for disabled and old people. F7 have the highest scores, followed by F34, XF2-XF1, F6, XF6 and lastly F5F6. F7, F34 and XF2 are significantly different than F5F6.

Appendix 16: Homogeneous Subsets of Tukey for Satisfaction with Social Relations in Urban Fabric Classes

Parameters of Social Relations	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
I know most of my neighbors	XF1, XF2, F34, XF6, F7, F6	F34, XF6, F7, F6, F5F6	XF1, XF2 < F34, XF6, F7, F6 < F7, F6, F5F6
I spend time with my neighbors, friends or relatives in my neighborhood	XF1, XF2, F7, F6, F34, XF6	F6, F34, XF6, F5F6	XF1, XF2, F7 < F6, F34, XF6 < F5F6

Tukey Post-Hoc test produces:

- Two subsets and three groups on knowing most of the neighbors, where F5F6-F6-F7 have the highest scores. First F6-F7-XF6-F34, then XF2-XF1 follow them. F5F6 has significantly higher scores than XF2-XF1.
- Two subsets and three groups on spending time with friends or relatives in the neighborhood, F5F6 received the highest score. It is followed by XF6-F34-F6 and F7-XF2-XF1. F5F6 is significantly higher than XF1-XF2-F7.

Appendix 17: Homogeneous Subsets of Tukey for Satisfaction in General in Different Locations

Parameters of Satisfaction in General	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
How satisfied are you with your current dwelling	3, 1	1, 2	3 < 1 < 2
My neighborhood has a lively environment	2, 3	1	2, 3 < 1

Tukey Post-Hoc test produces:

- Two subsets and three groups on dwelling satisfaction. Participants living in the semi-coastal area are the ones who are satisfied the most with their dwellings. This area is first followed by coastal, then by hinterland area. Satisfaction scores in semi-coastal area is significantly different than it is in hinterland.
- Two subsets and three groups on evaluation of aliveness of the neighborhood, the coastal area being the most alive, followed by the coastal, hinterland and semi-coastal. Aliveness of the neighborhood is significantly higher in the coastal area than it is in the hinterland and semi-coastal areas.

Appendix 18 : Homogeneous Subsets of Tukey for Satisfaction with Accessibility in Different Locations

Parameters of Accessibility	TUKEY Subsets			Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	
How would you rate the accessibility to important points in your neighborhood	3	2, 1		3 < 2, 1
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	3, 2	2, 1		3 < 2 < 1
Services like shops, schools, health center, cinema etc. are quite close to my house	3, 2	2, 1		3 < 2 < 1
As I go out of my house, I can easily access to green areas where I relax or do sports	3	2, 1		3 < 2, 1
Green areas where I relax or do sports are quite close to my house	3	2, 1		3 < 2, 1
Public transportation around my housing are quite reliable, comfortable, and not crowded	3	1, 2		3 < 1, 2
My workplace is quite close to my house	2, 3	3, 1		2 < 3 < 1
As I go out of my house, I easily access to main roads which is connected to the city center	3	2, 1		3 < 2, 1
Traffic jam is not an issue in my neighborhood	2, 1	3		2, 1 < 3
I can easily find a parking place close to my house	2	1	3	2 < 1 < 3
I enjoy walking in the close vicinity of my house	3	1, 2		3 < 1, 2
I walk to reach various destinations in my neighborhood	3	1, 2		3 < 1, 2
I walk to exercise or for recreation in my neighborhood	3	1, 2		3 < 1, 2
I reach various destinations in my neighborhood on bike	3, 1	1, 2		3 < 1 < 2
I cycle to exercise or for recreation in my neighborhood	3	1, 2		3 < 1, 2

Tukey Post-Hoc test produces:

- Two subsets and two groups on the parameters of overall satisfaction with accessibility, access and closeness to green areas, quality of public transportation, access to main roads which is connected to the city center, walking activities, and cycling to exercise. The participants living in the coastal and semi-coastal areas evaluated these parameters significantly higher than the ones living in the hinterland.
- Two subsets and two groups on access and closeness to services. In the coastal area, the scores are significantly higher than the scores in the hinterland.
- Two subsets and two groups on closeness to workplace. In the coastal area, the scores are significantly higher than it is in the semi-coastal area.
- Two subsets and three groups on traffic jam. The participants in the hinterland do not think that traffic jam is an issue in their neighborhood. In the semi-coastal and coastal areas, the scores are significantly lower than it is in the hinterland.
- Three subsets and three groups on finding a parking place. The participants are satisfied of the issue in the hinterland. The participants are dissatisfied in coastal and semi-coastal areas. The scores are significantly different in all three locations.
- Two subsets and three groups on cycling to reach some destination. In the semi-coastal area, the scores are higher than first the coastal area then the hinterland. In the coastal and semi-coastal areas, the scores are significantly higher than it is in the hinterland.

Appendix 19 : Homogeneous Subsets of Tukey for Satisfaction with Physical Characteristics in Different Locations

Parameters of Physical Characteristics	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
How would you rate the general appearance of your neighborhood	3	1, 2	3 < 1, 2
Physical conditions in the close vicinity of my house are convenient for walking	3	1, 2	3 < 1, 2
With its all built elements my neighborhood is beautiful and attractive	3	1, 2	3 < 1, 2
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	3	2, 1	3 < 2, 1
The building sizes (width and height) in my neighborhood are coherent with each other	3	2, 1	3 < 2, 1
The building facades in my neighborhood are coherent with each other	3	2, 1	3 < 2, 1
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	1, 2	2, 3	1 < 2 < 3
The amount of buildings and green areas in my neighborhood is quite balanced	2, 3	3, 1	2 < 3 < 1
There is a visual diversity and richness in my neighborhood	3	1, 2	3 < 1, 2
Steepness of the streets in my neighborhood is comfortable for walking	3	1, 2	3 < 1, 2
Pollution is not an issue in my neighborhood	1, 2	2, 3	1 < 2 < 3

Tukey Post-Hoc test produces:

- Two subsets and two groups on the parameters of satisfaction with general appearance of the neighborhood, physical conditions for walking, beauty and attractiveness, imageability and legibility, building sizes and facades coherence, visual diversity and richness, and steepness of the neighborhood. The participants living in the semi-coastal and coastal areas evaluated these parameters significantly higher than the ones living in the hinterland.
- Two subsets and three groups on feeling of in an appropriate closure and pollution issue. The participants living in the hinterland do not criticize their neighborhood in terms of wideness of the streets and pollution compared to first the semi-coastal area, then to coastal areas. Scores in the hinterland is significantly higher than the ones in the coastal area.
- Two subsets and three groups on balance of built and green areas. In the coastal area the score is the highest and it is followed by first the hinterland and the semi-coastal area. The scores in the coastal area is significantly different than it is the semi-coastal area.

Appendix 20: Homogeneous Subsets of Tukey for Satisfaction with Safety in Relation to Location:

Parameters of Safety	TUKEY Subsets			Reclassification based on Intersected Subsets
	Subset 1	Subset 2	Subset 3	
How safe is your neighborhood	3	2, 1		3 < 2, 1
My neighborhood is a safe place in case of a disaster	2	1	3	2 < 1 < 3
I feel safe when I walk around in the neighborhood during nighttime	3, 2	2, 1		3 < 2 < 1
My neighborhood is a good place to raise children	3	2, 1		3 < 2, 1
My neighborhood is a good place for disabled and old people to live	3	2, 1		3 < 2, 1

Tukey Post-Hoc test produces:

- Two subsets and two groups on overall safety of the neighborhood, safety for raising children and safety for disabled and old people. The participants living in the coastal and semi-coastal areas evaluated these parameters significantly higher than the ones living in the hinterland.
- Three subsets and three groups on safety in disasters. It is evaluated moderately safe but the safest in the hinterland among all locations. Followed by the coastal, and semi-coastal areas, respectively, the scores of this parameter significantly differ in all three locations.
- Two subsets and three groups on walking in the neighborhood during nighttime. In the coastal area the score is the highest scores, followed by the semi-coastal area, and then the hinterland. The coastal area has a significantly higher score than the hinterland.

Appendix 21 : Homogeneous Subsets of Tukey for Satisfaction with Social Relations in Relation to Location

Parameters of Social Relations	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
Do you feel a part of this neighborhood	1, 3	3, 2	1 < 3 < 2
I know most of my neighbors	1, 2	3	1, 2 < 3
I spend time with my neighbors, friends, or relatives in my neighborhood	1, 2	3	1, 2 < 3

Tukey Post-Hoc test produces:

- Two subsets and three groups on feeling a part of the neighborhood. In the semi-coastal area, the scores are significantly higher than first the hinterland then the coastal area. The scores are significantly different in the semi-coastal and the coastal areas.
- Two subsets and two groups on knowing most of the neighbors and spending time with friends or relatives in the neighborhood. The participants living in the hinterland evaluated these parameters significantly higher than the ones living in the coastal and semi-coastal areas.

Appendix 22: Homogeneous Subsets of Tukey for Satisfaction in General in Location Classes

Parameters of Satisfaction in General	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
How satisfied are you with your current dwelling	3, 4, 1	4, 1, 2	3 < 4, 1 < 2
My neighborhood has a lively environment	4, 3, 2	3, 2, 1	4 < 3, 2 < 1

Tukey Post-Hoc test produces:

- Two subsets and three groups on dwelling satisfaction. Participants living in the semi-coastal area are the ones who are satisfied the most with their dwellings. Satisfaction scores in semi-coastal area is significantly different than it is in the hinterland.
- Two subsets and three groups on evaluation of aliveness of the neighborhood, the coastal area being the most alive. Aliveness of the neighborhood is significantly higher in the coastal area than it is in coastal/semi-coastal area.

Appendix 23: Homogeneous Subsets of Tukey for Satisfaction with Accessibility in Location Classes

Parameters of Accessibility	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
How would you rate the accessibility to important points in your neighborhood	3	2, 4, 1	3 < 2, 4, 1
As I go out of my house, I can easily access to services like shops, schools, health center, cinema etc.	3, 2, 4	2, 4, 1	3 < 2, 4 < 1
Services like shops, schools, health center, cinema etc. are quite close to my house	2, 3, 4	4, 1	2, 3 < 4 < 1
As I go out of my house, I can easily access to green areas where I relax or do sports	3, 2	2, 1, 4	3 < 2 < 1, 4
Green areas where I relax or do sports are quite close to my house	3, 2	4, 1	3, 2 < 4, 1
Public transportation around my housing are quite reliable, comfortable, and not crowded	3, 2	2, 1, 4	3 < 2 < 1, 4
My workplace is quite close to my house	2, 4, 3	4, 3, 1	2 < 4, 3 < 1
As I go out of my house, I easily access to main roads which is connected to the city center	3, 2	2, 4, 1	3 < 2 < 4, 1
Traffic jam is not an issue in my neighborhood	4, 1, 2	3	4, 1, 2 < 3
I can easily find a parking place close to my house	4, 1, 2	3	4, 1, 2 < 3
I enjoy walking in the close vicinity of my house	3, 2	2, 4, 1	3 < 2 < 4, 1
I walk to reach various destinations in my neighborhood	3, 2, 1, 4		3, 2, 1, 4
I walk to exercise or for recreation in my neighborhood	3, 4, 2	4, 2, 1	3 < 4, 2 < 1
I reach various destinations in my neighborhood on bike	3, 2, 1	2, 1, 4	3 < 2, 1 < 4
I cycle to exercise or for recreation in my neighborhood	3, 2, 4	2, 4, 1	3 < 2, 4 < 1

Tukey Post-Hoc test produces:

- Two subsets and two groups on the parameters of overall satisfaction with accessibility. The participants living in the coastal, coastal/semi-coastal, and semi-coastal areas are evaluated significantly higher than the ones living in the hinterland.
- Two subsets and three groups on access to services, walking and cycling to exercise. The coastal area received the highest scores. There is a significant difference between the scores of the coastal and the hinterland areas.

- Two subsets and three groups on closeness to services. The scores of the coastal area is significantly higher than the semi-coastal and hinterland areas.
- Two subsets and three groups on access to green areas, quality of public transportation, access to the city center, and enjoying walking in the close vicinity. Coastal/semi-coastal and coastal areas receive the highest scores. The scores of the coastal/semi-coastal and coastal areas are significantly higher than hinterland.
- Two subsets and two groups on closeness to green areas, where coastal area received the highest score and it is significantly higher than semi-coastal and hinterland areas.
- Two subsets and three groups on closeness to workplace. In the coastal area, the scores are significantly higher than it is in the semi-coastal area.
- Two subsets and two groups on traffic jam and finding a parking place issues. The semi-coastal, coastal, and coastal/semi-coastal areas have significantly lower scores than the hinterland.
- One single subset on walking to reach various destinations in the neighborhood. This parameter is found significantly different between location classes through ANOVA test, but Tukey test did not produce homogeneous subsets.
- Two subsets and three groups on cycling to reach some destination. In the coastal/semi-coastal area, the scores are significantly higher than the hinterland.

Appendix 24: Homogeneous Subsets of Tukey for Satisfaction with Physical Characteristics in Location Classes

Parameters of Physical Characteristics	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
How would you rate the general appearance of your neighborhood	3	4, 2, 1	3 < 4, 2, 1
Physical conditions in the close vicinity of my house are convenient for walking	3, 2	2, 1, 4	3 < 2 < 1, 4
With its all built elements my neighborhood is beautiful and attractive	3, 2, 1, 4		3, 2, 1, 4
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	3, 4, 1	4, 1, 2	3 < 4, 1 < 2
The building sizes (width and height) in my neighborhood are coherent with each other	3	2, 4, 1	3 < 2, 4, 1
The building facades in my neighborhood are coherent with each other	3, 4	4, 2, 1	3 < 4 < 2, 1
When I walk along the streets in my neighborhood, I feel appropriate closure (neither too wide nor too narrow).	1, 4, 2	4, 2, 3	1 < 4, 2 < 3
There is a visual diversity and richness in my neighborhood	3, 2, 1	2, 1, 4	3 < 2, 1 < 4
Steepness of the streets in my neighborhood is comfortable for walking	3	1, 2, 4	3 < 1, 2, 4

Tukey Post-Hoc test produces:

- Two subsets and two groups on the parameters of satisfaction with general appearance of the neighborhood, coherence of building sizes, and steepness of the streets in the neighborhood. The participants living in the coastal, semi-coastal, and coastal/semi-coastal areas evaluated these parameters significantly higher than the ones living in the hinterland.
- Two subsets and three groups on convenient physical conditions for walking. Coastal/semi-coastal and coastal areas have the highest scores. The scores of the coastal/semi-coastal and coastal areas are significantly higher than the scores of the hinterland.
- One single subset on beauty and attractiveness of the neighborhood. The parameter is found significantly different between location classes through ANOVA test, but Tukey test did not produce homogeneous subsets.
- Two subsets and three groups on imageability and legibility of the neighborhood, where the semi-coastal area has the highest scores. Semi-coastal area has significantly higher scores than the hinterland.
- Two subsets and three groups on coherence of building facades. The coastal and the semi-coastal areas have the highest scores. The scores of coastal and semi-coastal areas are significantly higher than the scores of the hinterland.
- Two subsets and three groups on feeling in an appropriate closure, where the hinterland has the highest scores. The hinterland has significantly higher scores than the coastal area.
- Two subsets and three groups on visual diversity and richness of the neighborhood. The participants living in the coastal/semi-coastal area is evaluated the highest. The coastal/semi-coastal area received significantly higher scores than the hinterland.

Appendix 25: Homogeneous Subsets of Tukey for Satisfaction with Safety in Relation to Location Classes

Parameters of Safety	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
How safe is your neighborhood	3	4, 2, 1	3 < 4, 2, 1
My neighborhood is a safe place in case of a disaster	4, 1	2, 3	4, 1 < 2, 3
I feel safe when I walk around in the neighborhood during nighttime	4, 3, 1	1, 2	4, 3 < 1 < 2
My neighborhood is a good place to raise children	3, 4	4, 1, 2	3 < 4 < 1, 2
My neighborhood is a good place for disabled and old people to live	3, 1	1, 2, 4	3 < 1 < 2, 4

Tukey Post-Hoc test produces:

- Two subsets and two groups on overall safety of the neighborhood. The coastal, semi-coastal and coastal/semi-coastal areas are evaluated significantly higher than the hinterland.
- Two subsets and two groups on safety in disasters. The scores of the hinterland and the semi-coastal areas are significantly higher than the coastal and the coastal/semi-coastal areas.
- Two subsets and three groups on walking in the neighborhood during nighttime. In the semi-coastal area, the scores are the highest. The semi-coastal area has significantly higher scores than the hinterland and the coastal/semi-coastal areas.
- Two subsets and three groups for raising children. It is evaluated the highest in the coastal and the semi-coastal areas. The scores in the coastal and the semi-coastal areas are higher than the scores of the hinterland.
- Two subsets and three groups on being a good place for disabled and old people. In the coastal/semi-coastal and the semi-coastal areas, the scores are the highest and they are significantly higher than the ones in the hinterland.

Appendix 26: Homogeneous Subsets of Tukey for Satisfaction with Social Relations in Relation to Location Classes

Parameters of Social Relations	TUKEY Subsets		Reclassification based on Intersected Subsets
	Subset 1	Subset 2	
Do you feel a part of this neighborhood	1, 3, 4	3, 4, 2	1 < 3, 4 < 2
I know most of my neighbors	4, 1, 2	1, 2, 3	4 < 1, 2 < 3
I spend time with my neighbors, friends, or relatives in my neighborhood	1, 4	2, 3	1, 4 < 2, 3
I prefer to spend time in the neighborhood for weekend activities	4, 1, 3	1, 3, 2	4 < 1, 3 < 2

Tukey Post-Hoc test produces:

- Two subsets and three groups on feeling a part of the neighborhood. It is evaluated highest in the semi-coastal area among all location classes. The scores in the semi-coastal area are significantly higher than the coastal area.
- Two subsets and three groups on knowing most of the neighbors. In the hinterland, the scores are the highest. The scores are significantly different in the hinterland and the coastal/ semi-coastal areas.
- Two subsets and two groups on spending time with friends or relatives in the neighborhood. In the hinterland and the semi-coastal area, the scores are significantly higher than the coastal/semi-coastal and the coastal areas.
- Two subsets and three groups on having the weekend activities in the neighborhood. In the semi-coastal area, the scores are the highest. The scores are significantly different in the semi-coastal and the coastal/semi-coastal areas.

Appendix 27: Homogeneous Subsets of Tukey Test for Neighborhood Satisfaction in terms of Age Groups

	TUKEY Subsets		Reclassification based on Intersected Subsets
Accessibility	Subset 1	Subset 2	
I reach various destinations in my neighborhood on bike	3, 2	1	3, 2 < 1
I cycle to exercise or for recreation in my neighborhood	3, 2	1	3, 2 < 1
Physical Characteristics			
The amount of buildings and green areas in my neighborhood is quite balanced	2, 3, 1		2, 3, 1
It is easy to pass from a building to a building, from building to the street	2, 3	3, 1	2 < 3 < 1
Safety			
My neighborhood is a good place for disabled and old people to live	2, 3, 1		2, 3, 1

Appendix 28: Homogeneous Subsets of Tukey Test for Neighborhood Satisfaction in terms of Number of People in the Household

	TUKEY Subsets		Reclassification based on Intersected Subsets
Accessibility	Subset 1	Subset 2	
I reach various destinations in my neighborhood on bike	2, 3, 1		2, 3, 1
I cycle to exercise or for recreation in my neighborhood	2, 3, 1		2, 3, 1
Physical Characteristics			
Pollution is not an issue in my neighborhood	2, 3	3, 1	2 < 3 < 1

Appendix 29: Homogeneous Subsets of Tukey Test for Neighborhood Satisfaction in terms of Number of People in the Household

Satisfaction in General	TUKEY Subsets Subset 1	Subset 2	Reclassification based on Intersected Subsets
How satisfied are you with your neighborhood in general?	3, 2, 1		3, 2, 1
Accessibility			
I meet my daily needs in the neighborhood	3, 2, 1		3, 2, 1
Physical Characteristics			
With its all built elements (facades, benches, lightings, paving, trash bins etc.) my neighborhood is beautiful and attractive	3, 1, 2		3, 1, 2
Pollution is not an issue in my neighborhood	3, 2	2, 1	3 < 2 < 1
Social Relations			
I know most of my neighbors	3, 2	2, 1	3 < 2 < 1

Appendix 30: Homogeneous Subsets of Tukey Test for Neighborhood Satisfaction in terms of Number of People in the Household

Accessibility	TUKEY Subsets Subset 1	Subset 2	Reclassification based on Intersected Subsets
I reach various destinations in my neighborhood on bike	2, 4, 5, 3	5, 3, 1	2, 4 < 5, 3 < 1
Physical Characteristics			
The streets, squares and other open spaces in my neighborhood are different than each other and easy to remember	2, 1	1, 4, 5, 3	2 < 1 < 4, 5, 3

Appendix 31: Original Survey Form

MAHALLE MEMNUNİYETİ ANKETİ

1. BÖLÜM

Eviniz ve evinizin etrafını kapsayan yürüme mesafeniz içerisinde, gündelik işlerinizi hallettiğiniz, yaşayanlarla yüz yüze ilişkiler kurduğunuz ve ortak değerler taşıdığınız, burası benim mahallem dediğiniz alanı çiziniz.

Lütfen aşağıdaki soruları çizdiğiniz bu alanı dikkate alarak cevaplayınız.

2. BÖLÜM

Adres: ....

Yaş
☐ 18 - 25
☐ 26 - 45
☐ 46 - 65

Cinsiyet
☐ Kadın
☐ Erkek

Evinizde kaç kişi yaşıyor: .....

Evinizde kaç çocuk var (18 yaş altı): .....

Mahallede ikamet süresi
☐ 2 yıldan az
☐ 2-5 yıl
☐ 6-10 yıl
☐ 11-25 yıl
☐ 26 yıl ve üzeri

Mal sahipliği durumu
☐ Mal sahibi
☐ Kiracı (lojman, bir tanıdığının evinde oturan vs.)

Evinizde <u>eğitimi en yüksek kişinin</u> eğitim durumu
☐ Okul bitirmemiş
☐ İlkokul mezunu
☐ Ortaokul mezunu
☐ Lise veya meslek okulu mezunu
☐ Lisans mezunu
☐ Lisansüstü mezunu

Evinizde <u>geliri en yüksek kişinin</u> mesleği

İşsiz	☐ Ev hanımı ☐ Emekli ☐ Geçici İşsiz
Kendi hesabına çalışan	☐ Nitelikli serbest meslek ☐ 0-5 çalışanlı tüccar ☐ 6-20 çalışanlı tüccar ☐ 20+ çalışanlı tüccar ☐ 1-9 çalışanlı şirket/imalathane sahibi ☐ 10-25 çalışanlı şirket/imalathane sahibi ☐ 25+ çalışanlı şirket/imalathane sahibi
Ücretli çalışan	☐ Üst düzey yönetici ☐ 10'dan az çalışanlı orta düzey yönetici ☐ 10'dan fazla çalışanlı orta düzey yönetici ☐ Nitelikli uzman, mühendis, teknik eleman ☐ Memur / ofis çalışanı ☐ İşçi/hizmetli

3. BÖLÜM

A. Aşağıdaki ifadelere ne ölçüde katıldığınızı yanlarındaki kutulara yazınız:

1. Kesinlikle katılmıyorum, 2. Katılmıyorum, 3. Ne katılmıyorum ne de katılıyorum, 4. Katılıyorum, 5. Kesinlikle katılıyorum

	1. Evimden çıkınca alışveriş, okul, sağlık ocağı, sinema vb hizmetlere kolayca erişebilirim
	2. Alışveriş, okul, sağlık ocağı, sinema vb hizmetleri evime oldukça yakın
	3. Evimden çıkınca dinlenebileceğim ve spor yapabileceğim yeşil alanlara kolayca erişebilirim
	4. Dinlenebileceğim ve spor yapabileceğim yeşil alanlar evime oldukça yakın
	5. Evimden çıkınca toplu taşıma durağına kolayca ulaşabiliyorum
	6. Evimin yakınından bindiğim toplu taşım araçlarının saatleri oldukça sık, araçlar konforlu ve kalabalık değil
	7. Evimden çıkınca iş yerime kolayca erişebiliyorum
	8. Evim iş yerime çok yakın
	9. Arkadaşlarımın ve akrabaların yaşadığı yere kolayca erişebiliyorum
	10. Arkadaşlarım ve akrabalarım evime oldukça yakın yerde yaşıyor
	11. Evimden çıkınca kolayca kent merkezine gidecek bir ana yola ulaşabiliyorum
	12. Mahallemde trafik sorunu hiç yok
	13. Evimin yakınında kolayca park yeri bulabiliyorum
	14. Evimin yakın çevresinde yürümekten zevk alıyorum
	15. Evimin yakın çevresinde fiziksel koşullar (kaldırım genişliği, malzeme kalitesi, sürekliliği) yürüyüş için uygun
	16. Tüm yapısal elemanları (cepheler, banklar, aydınlatmalar, kaldırımlar ve yer döşemeleri, çöp kutuları vb) ile mahallem güzel ve çekicidir
	17. Mahallem temiz ve bakımlıdır
	18. Mahallemde sokaklar, meydanlar ve diğer açık alanlar birbirinden farklıdır ve hatırlanması kolaydır
	19. Mahallemde bina boyutları (genişlik ve yükseklik) birbiriyle uyumludur
	20. Mahallemde bina cepheleri birbiriyle uyumludur

	21. Mahallemdeki sokaklarda yürürken kendimi bir boşlukta ya da daracık alanda hissediyorum
	22. Mahallemdeki bina ve açık alanların miktarı oldukça dengelidir
	23. Bir binadan başka bir binaya ve binadan sokağa geçmek kolaydır
	24. Mahallem görsel anlamda hoş bir çeşitlilik ve zenginlik barındırmaktadır (binalar, mimari çeşitlilik, süslemeler, peyzaj elemanları, kentsel mobilyalar vb.)
	25. Mahallemdeki sokakların eğimi yürüyüş açısından rahattır
	26. Mahallem doğal afetlere karşı güvenli bir yerdir
	27. Mahallemde çevre kirliliği sorunu (denizin kokması, hava kirliliği) yoktur
	28. Mahallem yaşamak için sakin bir yerdir
	29. Mahallem hareketli ve canlı bir yerdir
	30. Komşularımın çoğunu tanıyorum
	31. Günlük ihtiyaçlarımı mahalle içinde karşılıyorum
	32. Gündüzleri mahallemde dolaşırken güvende hissediyorum
	33. Geceleri mahallemde dolaşırken güvende hissediyorum
	34. Mahallem çocuk yetiştirmeye uygun bir yerdir
	35. Mahallem engelli ve yaşlı insanların yaşamasına uygun bir yerdir

B. Aşağıdaki ifadelerde bulunan aktiviteleri ne sıklıkta yaptığınızı yanlarındaki kutulara yazınız:

1. Asla, 2. Ayda bir defadan fazla, 3. Haftada bir kere, 4. Haftada bir defadan fazla, 5. Her gün

	1. Mahallemde çeşitli noktalara ulaşmak için yürürüm
	2. Mahallemde egzersiz ya da keyif amaçlı yürürüm
	3. Mahallemde çeşitli noktalara bisikletle ulaşırım
	4. Mahallemde egzersiz ya da keyif amaçlı bisiklete binerim

4. BÖLÜM

1. Mahallemdeki komşum, arkadaşlarım veya akrabalarımla beraber vakit geçiriyorum.
A. Asla B. Ayda bir C. Ayda iki kez D. Haftada bir E. Her gün

2. Hafta sonu aktivitelerimi mahalle içinde geçiriyorum.
A. Neredeyse hiç B. Ayda 1 kere C. Ayda 2 kere D. Haftada 1 cumartesi ya da pazar E. Her cumartesi ve pazar

3. Genel olarak mahallenizden ne kadar memnunsunuz?
A. Hiç memnun değilim B. Memnun değilim C. Ne memnunum ne de memnun değilim
D. Memnunum E. Çok memnunum

4. Mahallenizde önemli noktalara erişim imkanını nasıl değerlendirirsiniz?
A. Çok zor B. Zor C. Ne zor ne kolay D. Kolay E. Çok kolay

5. Mahallenizin genel görünümünü nasıl değerlendirirsiniz?
A. Çok kötü B. Kötü C. Orta D. İyi E. Çok iyi

6. Kendinizi bu mahallenin bir parçası hissediyor musunuz?
A. Kesinlikle hayır B. Hayır C. Ne hayır ne evet D. Evet E. Kesinlikle evet

7. Mahalleniz ne kadar güvenlidir?
A. Çok güvensiz B. Güvensiz C. Ne güvensiz ne de güvenli D. Güvenli E. Çok güvenli

8. Mevcut evinizden ne kadar memnunsunuz?
A. Hiç memnun değilim B. Memnun değilim C. Ne memnunum ne de memnun değilim
D. Memnunum E. Çok memnunum

9. Bu mahalleden taşınmayı düşünüyor musunuz?

Evet □	**Hayır** □
□ Ekonomik (yaşam kalitemi arttıracak daha pahalı olan yerlerin kira/satış fiyatı vb. rahatlıkla karşılarım) □ Sosyal (Komşularımla aram iyi değil, kendimi buraya ait hissetmiyorum vb.) □ Fiziksel (Mahallenin genel görünümünden, altyapısı, ulaşımı vb.inden memnun değilim) □ Diğer …………………………………………………………	□ Ekonomik (Kirası daha yüksek bir eve çıkamam. Daha pahalı bir ev satın alamam vb.) □ Sosyal (Komşularım, mahalledeki akrabalarım ve arkadaşlarımla aram çok iyi, kendimi buraya ait hissediyorum vb.) □ Fiziksel (Mahallenin genel görünümünden, altyapısı, ulaşımı vb.inden çok memnunum) □ Diğer …………………………………………………………………