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RESEARCH ARTICLE / ARAŞTIRMA MAKALESİ

Quality of Life Index: Istanbul 2020

Yaşam Kalitesi Endeksi: İstanbul 2020

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ABSTRACT
This paper is based on a quality of life index study comparing 39 districts in Istanbul. The study is the third of a series of studies, where the first study was conducted and published in 2011 and the second in 2016. The results of the periodic research reveal the transformation of districts in Istanbul in terms of quality of life. The study, carried out on the same methods and parameters, aims to monitor the quality of life at the district level in Istanbul over the years. The weighted average method was used in the analysis made with the district-level 2020 data in Istanbul. According to the index results, Kadıköy, Beşiktaş, Bakırköy, Üsküdar, and Şişli are the districts with the highest quality of life, while Gaziosmanpaşa, Esenler, Sultanbeyli, Sultangazi, and Arnavutköy districts are in the last place. As a result of the clustering study, when evaluated in terms of 5 clusters, it is observed that 4.8 percent of the population of Istanbul lives in the first level, which is the highest quality of life, while 15.9% are second, 31.5% are third, 36.2% are fourth, and 11.6% are in districts with a fifth level of quality of life.

Keywords: Quality of Life, Quality of Life Index, Social and Economic Index, Weighted Average Method
JEL Classification: I31, H70, Z13, Z18, C38

ÖZ
Bu çalışma ilki 2011 yılında ikincisi 2016 yılında yayınlanan İstanbul'da 39 ilçeyi karşılaştıran yaşam kalitesi endeksinin güncel verilerle yenilendiği ve geçmiş yıllarla karşılaştırmaların yapıldığı bir araştırmadır. Periyodik olarak yapılan araştırmanın sonuçları İstanbul'daki ilçelerin yaşam kalitesi açısından dönüşümünü ortaya koymaktadır. Aynı yöntem ve parametreler üzerinden gerçekleştirilen çalışma yıllar itibariyle İstanbul'da ilçeler düzeyinde yaşam kalitesinin izlenmesini hedeflemektedir. İstanbul'da ilçe düzeyinde 2020 verileri ile yapılan analizde ağırlıklandırılmış ortalama yöntemi kullanılmıştır. Endeks sonuçlarına göre Kadıköy, Beşiktaş, Bakırköy, Üsküdar ve Şişli yaşam kalitesinin en yüksek olduğu ilçeler iken, Gaziosmanpaşa, Esenler, Sultanbeyli, Sultangazi ve Arnavutköy ilçeleri sıralamada sonlarda yer almıştır. Yapılan kümeleme çalışması sonucunda 5 küme açısından değerlendirildiğinde, İstanbul nüfusunun yüzde

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4,8'inin en yüksek yaşam kalitesi olan birinci düzeyde yaşadığı gözlenirken, %15,9'u ikinci, %31,5'i üçüncü, %36,2'si dördüncü ve %11,6'sı beşinci düzeyde yaşam kalitesine sahip ilçelerde bulunmaktadır.

Anahtar kelimeler: Yaşam Kalitesi, Yaşam Kalitesi Endeksi, Sosyal Ve Ekonomik Endeks, Ağırlıklandırılmış Ortalama Yöntemi
JEL Sınıflaması: I31, H70, Z13, Z18, C38

Introduction

The concept of quality of life, which has many definitions in the literature, is examined at different levels in terms of different disciplines. This study has emerged as a product of research in Istanbul for more than 10 years, in which the parameters on the axis of quality of life have been compiled and followed in an index model. In the first part of the study, it has been revealed how the quality of life has been transformed and shaped according to which indicators, especially in metropolitan cities. In the second part, the literature review on quality of life indices is summarized. In this context, articles containing the previous results of the research are also included. In the last part of the study, the research methodology, data set, and findings are explained. It should not be forgotten that the study is a continuation of two previously published publications, and the results of the research should be evaluated in this context.

1. Quality of Life and the Metropolitan Contexts

Quality of Life in cities has been a long-term research and policy interest since the 1960s (Schneider, 1975; Lloyd and Auld , 2003), and its popularity has somewhat increased instead of vanishing due to the rapidly changing urban agenda, especially in the post-2000s (Phillips, 2006, p.11; Bache, 2013). Provision of a higher quality of life has become of strategic importance now, not only for Western cities, but for many emerging cities elsewhere. The importance of quality of life as a factor for competitiveness and economic development of cities has increased (Rogerson, 1999). Whether a city envisions itself as a smart, slow, safe, or global city, most aspects of quality of life are the main concern for most if not all of the stakeholders engaging in strategic urban development (Mora, Deakin, & Reid, 2019; Craglia, Leontidou, Nuvolati, & Schweikart, 2004; Macke, Casagrande, Sarate, & Silva, 2018; Mayer & Knox 2009).

Due to the complexity and emergent properties of metropolitan cities, the evaluation of the quality of life remains a challenge, which hinders the development of effective metropolitan strategies. As the number of metropolitan

governments is on the rise, pressures on these governments to support quality of life of their constituent communities are also increasing. National strategy documents also force or support local governments' focus on the issue (Janssen - Jansen, 2011; Albrechts, Balducci, & Hillier, 2016).

"Quality of Life" represents a cluster of complex concepts, which are themselves subject to rapidly changing global and local contexts. Many global cities , such as Vienna, Austria or Stockholm, and Sweden assess their quality of life not only for their citizens, but also for long and short-term visitors like international students, business, culture, and leisure tourists, and use such information in their latest strategy documents. The concept of quality of life provides an anchor in an environment where the sources of economic growth have become highly diversified (Hall, 1995, p.20). In addition, while higher levels of quality of life could be strategic assets, they could also introduce new challenges due to increased attractiveness for (illegal or legal) migrants (Mbaye, 2014) and illegitimate businesses as they may have particular expectations regarding the high-quality of life target metropolitan city. Hence, both the provision and the sustainment of high levels of quality of life have become the main concerns for metropolitan cities. The outbreak of the Covid-19 pandemic has introduced further challenges as economies deteriorate and needs for social support rise.

From a local policy perspective, understanding the spatial characteristics of change in the quality of life concerning different social groups or professional groups in particular geographic units is a prerequisite to develop strategic intelligence. Even a static, one-time evaluation may provide inputs for decision-making processes. It supports strategy makers in deepening their understanding of how specific policies could further nourish or hurt the quality of life and competitiveness in different places in a city or the whole. It also helps to shape options for a reorganization of the internal components of a city and associating them with other connected cities and higher hierarchy agendas, which ultimately improves the overall relative position of the subject city (see Healey, 2009). Furthermore, such knowledge is needed for a range of national or state-level strategic planning works with different objectives. Ultimately, sustaining a high

quality of life nourishes relevant local and central governments' legitimacy, which helps them survive and thrive in an ecosystem of institutions.

The management of cities has always been a quality of life issue since the early cities in history. Quality of life may refer to the intersection point of personal attitude against life in general, individual perceptions on the quality of living conditions, and what is available for that person to sustain a life in a particular environment. Yet, in larger cities, the latter has been more of a concern for practical purposes, especially during the 19th century, as observed in the "hygiene movement" in Europe that targeted improving physical aspects of urban services to improve living conditions.

The quality of urban life concept was born during the Social Indicators Movement of the 1960s as a framework that aimed to investigate the assumed relationships between economic well-being and social well-being of individuals and society (National Research Council, 2002). Onward, quality of life has also become an essential concern of academics. An early example is Havighurst (1963), suggesting that the quality of life of a person includes personal subjective feelings about life or internal factors as well as measurable behavioral factors (such as social contact) and external factors (such as social activities). Shin and Johnson (1978) suggest that quality of life is about how an individual satisfies personal desires, participates in social activities, benefits from opportunities for personal development, and has access to resources that they perceive as adequate and sufficient. Andrews and Whitney (1976) suggest that the level of quality of life is equivalent to the satisfaction level of an individual in their social relations. Campbell, Converse, and Rodgers's (1976) study aimed to construct an indicator representing various satisfaction domains that summarize individuals' general well-being and satisfaction. These domains are health, marriage, family life, government, friendship, home, work, society, religion-belief, recreation and sports, and financial situation. A contemporary review would introduce a similar perspective, conceptualizing the Quality of Life of individuals as a multi-faceted phenomenon, including domains such as (1) physical health and capabilities, (2) mental health and capabilities, (3) family or group life, (4) social life and social

capabilities, (5) economic status, (6) work and professional life, and (7) the living environment in general (Wan, Heng, & Wong, 1991; Spilker 1992; Evans, 1994; Doward and McKenna 2004; Chow 2005; Low, Stimson, and Chen, 2017; Ng et al., 2017).

The interactions between each domain mentioned above remain highly complex and context-dependent, which is the central issue in assessing the relationship between quality of life and individual well-being. These issues are exacerbated when the assessment addresses areas with large populations. Despite the great set of quality of life benchmarks of cities available today, often they are found irrelevant by different layers of administration as these benchmarks focus on a set of cities through some assumptions that are instead shaped by the interests of the party that conducts the study.

On the other hand, assessment and benchmarking of quality of life at sub-metropolitan units by a given, relevant actor may be considered less problematic since all these units are subject to more or less overlapping institutional dynamics. Though, the flexible framework of strategic spatial planning may resolve discrepancies in the agendas of metropolitan cities (Albrechts, 2016). Hence, evaluation of the quality of life in sub-metropolitan units may instead focus on domains relevant to the institutional characteristics of the relevant metropolitan unit and significant policy objectives that overarch a more extended period, taking into account the position of the metropolitan city in a larger spatial context. As an example, metropolitan cities like London or Sydney, which have a long history of the struggle between their constituent "cities" and the "metropolitan structures," or metropolitan areas like Helsinki, which are governed by a collective of "cities," may focus on different domains. In the case of Turkey, the metropolitan government is a strong, hierarchical unit below the central government, and is above its constituents, the district municipalities. The planning hierarchy further adds strength to the decisions of the metropolitan government, which may have strong detrimental effects on the quality of life in specific localities. For such a metropolitan government, it becomes crucial to evaluate the quality of life of sub-metropolitan units taking into account the hierarchical spatial structure that allows

the diffusion of decisions to lower hierarchies in a legitimate way, which also allows the district municipal governments' participation in relevant strategies and actions. In other words, it becomes possible to perceive opportunities at different spatial levels pertinent to technical, social, and economic change (Fromhold-Eisebith, 2015) through the vertical integration or horizontal consolidation or both of municipal services that create value for a metropolitan city's citizens and visitors, as in the case of smart cities.

But how can different constituents of a metropolitan city be benchmarked against each other? While a metropolitan government may have countless options, legitimate options are few. The comparison requires indicating paths of development and the relative position of each spatial unit in the metropolitan area, where, as mentioned above, the relationship between each domain is highly complex. Indicator systems and indices of quality of life are helpful as the simulation of such complex systems would not be a practical option, given the solid dynamic spatial and temporal nature of such relationships. A periodical indicator system may provide factual information on how the sub-components of a city are faring relative to each other under the application of policy tools, or through the routine operations of urban services, under changing socioeconomic contexts, such as intensifying immigration of refugees to specific entry points, or the agglomeration of creative industries at critical locations. How the indicator system gains further strategic meaning is an issue that has to be addressed by spatial strategy makers (Healey, 2009; Wong, 2014) as spatial agendas have to be shaped, established, and maintained by these actors. Furthermore, the quality of life benchmark does not only reveal simple information about the status of each spatial unit for these actors. It also allows them to perceive specific opportunities that are likely to arise through the creative rearrangement of spatial interactions between these units through the introduction of innovative urban infrastructure and associated services.

From this perspective, the agility, validity, and reliability of such benchmarking study matter more than the dimensions it may cover since the lifespan of the information derived from the study is short. In other words, an assessment of the

quality of life in sub-metropolitan units provides value only when it can provide fresh and relevant inputs to spatial strategy making.

The European Council ratified the European Urban Act in 1992 based on the Universal Declaration of Human Rights ratified in 1948. It identifies the following as fundamental human rights in a city and the city's competences (Yener and Arapkirlioğlu, 1996): A safe and secure living, an unpolluted - healthy environment where nature and natural resources are protected, just employment opportunities, accessible, affordable housing that provides privacy, mobility of users of different transport modes which are enabled without the introduction of interferences, a supportive environment for mental and physical health of citizens accessible recreation, leisure and sports opportunities for people from all ages, and with different capabilities and income levels, provision of intercultural dialogue for a peaceful living, condition of highly aesthetic, harmonious places and buildings through appropriate conservation of historical assets and application of contemporary architectural approaches, harmony between living, work, travel and social activities, participation of individuals to governmental processes and collaboration between institutions, direct or indirect, responsible involvement of all local governments to economic development, agreement between local governments on the means of sustainable development, provision of quality goods and services both by local governments and the private sector, wise and just use and management of local resources and values by local governments to the benefit of residents, provision of urban conditions that support the social, cultural, moral and psychological development of individuals, freedom on the cooperation between local governments, and provision of adequate and sufficient financial resources, mechanisms and structures to support all the above mentioned issues.

The introduction of Sustainable Development Goals and the New Urban Agenda has recently offered an approach that identifies a new relationship between rural and urban areas to provide a higher quality of life for present and future generations. This approach has been well-received and adopted by many local governments. In the context of large metropolitan cities, a redefinition of

such relations nevertheless requires further understanding of the complex relations between the rural and urban constituents.

Yet, the quality of life indicators themselves may introduce further complexities, which is criticized strongly by Gill and Feinstein (1994). Briefly, they address more visible issues like introducing an unnecessarily large number of domains, scales, items, and instruments and less visible issues like how such domains are represented. They suggest that study groups doing the benchmark should construct an operational definition of quality of life suitable to their interests. In contrast, the respondents to the study should be allowed to state a general level of satisfaction and identify dimensions and domains that are more relevant to their well-being. Ideally, incorporating such respondents' choices would be highly beneficial. On the other hand, efficient incorporation of respondents and collection of such information may not be possible or may require extensive resources in the case of large, dynamic metropolitan regions.

2. Quality of Life In Istanbul: A Literature Review

There have been a number of attempts to measure general or specific aspects of Quality of Life in Istanbul (Dülger-Türkoğlu et al, 2009; Şeker, 2011; Şeker, 2016; Baypinar et al, 2018; Salihoğlu and Türkoğlu, 2019; Bilir, 2019).

Previously, Şeker (2011) evaluated the quality of life in Istanbul at the district level. Later, (Şeker, 2016) he used three main categories of indicators in the assessment of Quality of Life in 39 districts of Istanbul: human and social capital indicators (44 indicators), economic structure (43 indicators), and environment-infrastructure -transportation (13 indicators) categories. This study is a good example, including indicators relevant to the local context and concerns. As an example, shopping malls have become important attractions for consumers in post-2000 Istanbul due to their locational advantages, provision of parking, and provision of various consumer products, which allowed major planned shopping trips for higher-income groups. On the other hand, during that period, shopping malls also provided popular socialization places for lower-income groups in cities

like Istanbul and Izmir with scarce cultural amenities or green areas (see also Uzun, 2008). Şeker's (2016) study demonstrates that the quality of life in Istanbul (on both Asian and European sides) has been highest in the metropolitan core and in the post-1960s planned suburban districts, which have become internal components of the metropolitan city today. Squatter areas that started to develop during the 1950s and transformed heavily during the 1980s and 1990s had a mediocre quality of life compared to the core and old suburbs. In contrast, urban sprawl areas that rapidly developed during the post-2000s due to international migration had the lowest quality of life, indicating that different waves of global dynamics and episodes of national–local policies play an essential role in shaping the spatial structure of quality of life.

In another study commissioned by the Greater Municipality of Istanbul, Baypinar, Taş, and Şeker (2018) have utilized a variety of subjective and objective indicators to assess the quality of living and working comparatively in 7 potential financial districts in Istanbul. Their evaluation of these districts was structured according to a higher level evaluation in the same study, which assessed the overall quality of life in Istanbul Metropolitan City against nine other global financial cities. The benchmarking allowed the spatial strategy makers in Istanbul to evaluate the potentials and pitfalls of each locality both in metropolitan and global contexts.

3. Research Methodology

Thirty-nine districts in Istanbul are evaluated in this study. Urban life quality indices are derived from methods that enable the abstract and multi-dimensional concept of life quality to become tangible, one-dimensional, and measurable. The weighted average technique is used to derive the index scores.

3.1. Data

The data in the analysis are organized on the basis of primary categories such as human and social capital indicators, economic structure and infrastructure, and

transportation. There are 45 indicators in the category of human and social capital, 33 indicators in the category of economic structure, and 16 indicators in the category of infrastructure and transportation. As a result, a total of 94 indicators are compiled for this research.[1]

- **Human and Social Capital Indicators**
  - o Demographic Structure
  - o Education
  - o Health
  - o Social Life and Environment

- **Economic Structure**
  - o Economic Capacity
  - o Commercial Potential

- **Infrastructure and Transportation/Accessibility**
  - o Transportation/Accessibility
  - o Infrastructure

Demographic structure, social life, environment, education, and health in the human and social capital category are the basic indicators in this research. There are 18 indicators under demographic structure, eight indicators under education, seven indicators under health, and 12 indicators under social life and environment. Unlike Şeker's (2016) study, the number of immigrants variable was added to the demographic structure indicator. The number of theaters, the number of licensed athletes, and the crude mortality rate variables were added to the social life and environment indicator. A total of 45 indicators are compiled in the human and social capital category.

[1] The indicators are collected from municipalities' reports, the central and local government offices.

Table 1: Human and Social Capital Indicators

Demographic Structure	Social Life and Environment
- Total Population - Area (km2) - Urbanization rate - Average Household Size - 2015 – 2020 Population Growth Rate - Population density - 0-14 Age Group / Population - 15-64 Age Group / Population - 65 Years and Over / Population - Divorce rate - Literacy Rate - Literate Women Rate - High School Graduate Rate - University Graduate Rate - Female University Graduate Rate - Ph.D Graduates / Population (in thousands) - Master and Ph.D. Graduates / Population (in thousands) - Number of immigrants	- Number of the international sports centers - Number of the national sports centers - Number of the local sports centers - Total number of sports centers - Number of museums - Number of libraries - Number of cinemas - Number of theaters - The active green area/parks per person - Percentage of green areas in the city - Local Election Participation Rate - Number of licensed athletes
Education	**Health**
- Private Sector Investment Index in Education - Total student population / Total - Number of students per classroom - Number of students per teacher - Number of students per teacher in early childhood education - Number of students per teacher in primary education - Number of students per teacher in secondary education - Number of students per teacher in high school classroom	- Population per pharmacy - Population per health center - Crude Mortality Rate - Infant Mortality Rate (per thousand) - Crude Birth Rate - Number of suicide - Adolescent Fertility Rate (per thousand)

Source: Municipalities Report, TÜİK, Istanbul Province National Education Offices, Istanbul Health Offices.

The economic structure consists of two parts. There are 13 indicators for economic capacity and 20 indicators for commercial potential. Unlike Şeker's (2016) study, new variables regarding the number of insured individuals, the number of deed owners, the number of green card owners, and the number of applications for IBB aids are added to the economic capacity indicator. A total of 33 indicators are compiled in the economic structure category.

Table 2: Economic Structure Indicators

Economic Capacity	Commercial Potential
- Potential Domestic Demand - Number of shopping malls - Number of private hospitals - Number of private universities - Number of state universities - Housing Sales - Housing Rents - Local Government Budget Expenditures Per Capita - Local Government Tax Income - Number of the insured persons - Number of deed owner - Number of green cardholders - Number of applications for IMM (IBB) aid	- Number of active companies / Total - 2012-2020 active firm increase (% - within the district) - 2012-2020 active firm increase (% - change in total by district) - Number of active companies per 1000 people - Diversity of banks - Population per branch bank - Payment amount of e-commerce shopping made by card - Payment amount of physical shopping made by card - Number of Arrivals to the facilities-Foreign - Number of Arrivals to the facilities-Native - Rate of overnight stay-Foreign - Rate of overnight stay-Native - Average Length of Stay-Foreign - Average Length of Stay-Native - Occupancy Rate-Foreign - Occupancy Rate-Native - Number of Five Star Hotels / Total - Number of Four Star Hotels / Total - Number of Three Star Hotels / Total - Number of museum

Source: Municipalities Report, TÜİK, Istanbul Chamber of Commerce, Istanbul Tax Offices, Reidin Housing Index, the Banks Association of Turkey.

The infrastructure and transportation/accessibility themes were studied under separate categories. Infrastructure category has nine indicators, and transportation category has seven indicators for this research. Different to Şeker's (2016) study, diversity of transportation, the number of traffic accidents, and the number of people with a driver's license variables were added to the transportation indicator. Drinking water, wastewater, the number of White Desk complaints about İSKİ, the number of White Desk complaints about İGDAŞ, electricity consumption per capita variables were added to the infrastructure indicator. A total of 16 indicators are compiled in the infrastructure and transportation category.

Table 3: Transportation/Accessibility and Infrastructure Indicators

Transportation/Accessibility	Infrastructure
- Connect to Metrobus - Connect to Metro/Light Metro/Tramway - Connect to railroad - Connect to sea transportation - Diversity of transportation - Number of traffic accidents - Number of people with a driver's license	- Drinking water (km) - Wastewater (km) - Earthquake Risk - Natural Gas User / Subscriber Ratio - Number of İSKİ water failures - Number of fire and rescue related incidents - Number of White Desk complaints about İSKİ - Number of White Desk complaints about İGDAŞ - Electricity Consumption Per Capita (Kwh)

Source: Municipalities' Report, TÜİK, İETT, İGDAŞ, İDO, İSKİ, İstanbul Ulaşım AŞ, AFAD.

3.2. Methodology

The unit measurement of most of the variables used in the study is different. For example, some variables can be expressed as a number, whereas others can be expressed as a rate. To eliminate this difference, firstly, the data obtained from the relevant sources are converted toratios by the data mining method used in the index. Then, the standardization method is applied to the converted data. Thus, data with different units of measurement are made suitable for standard definition (Şeker, 2016).

For standardization, $z=(x-\mu)/\sigma$ transformation has been applied, where μ means the arithmetic mean, and σ means standard deviation.

Commenting on variables with different units causes misleading results. Therefore, the variables are freed from the units of measure by the standardization method. In other words, the variables are made dimensionless by scaling at a certain threshold (Şeker, 2016).

An Expert Opinion Questionnaire is administered to a group of academics and experts. The data weights are decided by taking the average of the survey results. As a result of converting the data to the positive direction, the index is calculated with the specified weights (Şeker, 2016).

The index calculation by (∑*i* A*ji* X*ji*) / (∑*i* A*ji*); A*ji* means the weight of *i* lower variable of the *j* main variable, and X*ji* means the standardized value of the *i* lower variable of the *j* main variable.

3.3. Results and Discussion

The results suggest that the Kadıköy district, on the Asian side of the metropolitan core, was the district with the highest quality of life in Istanbul, with an index score of 0,98. Kadıköy was the first in the study in 2010 but fell to second place in 2015. Kadıköy is followed by its counterpart on the European side of the metropolitan core: Beşiktaş district. Another group of districts namely Bakırköy, Üsküdar, Şişli, and Sarıyer, follows Beşiktaş, respectively. Üsküdar is on the Bosphorus and is adjacent to Kadıköy on the Asian side. Şişli and parts of Sarıyer are attached to Beşiktaş. Üsküdar, Şişli, and Sarıyer accommodate older peripheral residential areas close to the inner metropolitan core, which are characterized by a gradual urban transformation from informal housing areas. Nevertheless, both Üsküdar and Sarıyer have attractive residential areas and business clusters, of which some are located at the Bosphorus. From a historical urban development perspective, Bakırköy district, located next to the Marmara Sea, to the west of Istanbul, is developed as a suburban settlement, similar to northern parts of Beşiktaş, namely Levent Neighborhood, which could be considered remote areas during the 1960s. These areas have become more integrated, denser areas as the city grew through the 1980s and were already in the highly urbanized area as early as the 1990s. From this point of view, it is not surprising that Bakırköy's quality of life level is on par with this group.

In contrast to a higher quality of life in core areas and their immediate vicinities along the coast of Marmara and the Bosphorus, the lowest quality of life scores belong to typical peripheral residential silos, which have attracted large groups of internal immigrants as well as international migrants and refugees. These areas have significantly different spatial qualities and lifestyles than core districts and are located in north of the D100 (E5) highway. Arnavutköy ranks last in the quality of life index with an index score of -0,75. Sultangazi, Sultanbeyli, Esenler,

Gaziosmanpaşa, Bağcılar, and Esenyurt are other districts with lowest quality of life. These findings also suggest that quality of life differences are firmly entrenched and probably attached to social class differences if Güvenç's (2000) work is taken into account, which has empirically found a higher clustering of working-class beyond D100 (E5) highway to the north during the 1990s.

Table 4: Istanbul Quality of Life Index

Ranking	District	Score	Ranking	District	Score
1	Kadıköy	0.980	21	Eyüpsultan	-0.011
2	Beşiktaş	0.915	22	Beykoz	-0.048
3	Bakırköy	0.681	23	Kağıthane	-0.078
4	Üsküdar	0.570	24	Küçükçekmece	-0.153
5	Şişli	0.537	25	Silivri	-0.161
6	Sarıyer	0.505	26	Zeytinburnu	-0.166
7	Maltepe	0.317	27	Bayrampaşa	-0.178
8	Ataşehir	0.281	28	Avcılar	-0.180
9	Fatih	0.198	29	Güngören	-0.203
10	Pendik	0.168	30	Çatalca	-0.248
11	Ümraniye	0.166	31	Sancaktepe	-0.329
12	Kartal	0.159	32	Şile	-0.343
13	Beyoğlu	0.158	33	Esenyurt	-0.366
14	Beylikdüzü	0.156	34	Bağcılar	-0.371
15	Tuzla	0.064	35	Gaziosmanpaşa	-0.391
16	Adalar	0.023	36	Esenler	-0.614
17	Bahçelievler	0.012	37	Sultanbeyli	-0.649
18	Başakşehir	0.004	38	Sultangazi	-0.668
19	Çekmeköy	-0.004	39	Arnavutköy	-0.750
20	Büyükçekmece	-0.010			

The demographic structure index, which is one of the sub-components of the quality of life index, is constructed based on variables regarding the demographic structure of the districts, such as education level, age dependency ratio, household size, urbanization rate, and share of the immigrant population. Beşiktaş, Kadıköy, Bakırköy, Üsküdar, and Maltepe are the prominent districts in the demographic structure index with high values. Both central business districts and newly emerged business centers are located along major transport corridors. While Beşiktaş is on the European Side, it is easy to access the central business district via multiple modes of transport via Kadıköy and Üsküdar on the Asian side, which possesses

high-quality neighborhoods close to the coast for members of higher socioeconomic status groups. As mentioned, Bakırköy and parts of Beşiktaş on the European side similarly contain higher quality residential areas, again close to the coast.

The education sub-index, based on relevant variables, reveals that on the European side Bakırköy, Sarıyer, and Beşiktaş districts, and on the Asian Side, Kadıköy and Üsküdar districts score highest. These neighborhoods have been primary locations during the modernization of public education services due to their central locations and the presence of public real estate that was converted easily to education facilities such as military barracks or former government offices that were left idle when Ankara replaced Istanbul as the capital city. In time, newer public education facilities, professional organizations, and private education facilities continued to agglomerate in these core areas, especially after the 1990s. Typically there are many residential areas established by cooperatives of creative class or knowledge-intensive sectors, such as press and publishing, media, legal services, engineering services, academics, and the like, which are still present in large numbers in neighborhoods such as Etiler, Levent, Konaklar communities in Beşiktaş, or Bostancı in Kadıköy as well known examples. Despite ongoing urban transformation works, a kind of path dependency likely holds, and such professionals still prefer to accommodate in these places. As an example, a field study by Baypinar, Şeker, and Taş (2018) that was conducted in 7 primary and secondary core regions in Istanbul has also found that the Konaklar Community of Beşiktaş district had one of the highest concentrations of highly educated residents in Istanbul.

The health sub-index is based on variables related to primary health services, infant mortality rate, number of suicides, adolescent fertility rate, and others. Beşiktaş, Sarıyer, Bakırköy, Üsküdar and Ataşehir ranked highest in the health index. These results are not surprising as characteristic features of these districts are already discussed. Northern sections of Sarıyer have attracted upper class residential real estate investments, which accelerated recently. Ataşehir, a sizeable new city developed on the Asian side close to Kadıköy, has also attracted

professionals and self-employed or business people in large numbers and is still a major source of commuting between the European and Asian sides. Thus, the results are found to represent spatial and demographic differences and clustering of similar socioeconomic status groups well.

Beyoğlu is ranked first in the social life and environment index, including indicators of culture, art and sports facilities, library, museum, and green space. Kadıköy, Şişli, Üsküdar, and Beşiktaş are other districts that stand out in the field of social life and environment. Şişli, Beşiktaş, Kadıköy, Sarıyer, and Bakırköy were ranked first in the economic capacity index, which consists of indicators that reveal the economic capacity and status of the district, and Fatih, Beyoğlu, Şişli, Beşiktaş and Kadıköy in the commercial life index. In the transportation and accessibility index, Kadıköy, Üsküdar, Bakırköy, Beşiktaş, and Beyoğlu districts lead the ranking. In the infrastructure index, Kadıköy, Beşiktaş, Bakırköy, Beylikdüzü, and Kartal districts have the highest index scores.

Table 5: Sub-indexes of Quality of Life

Demographic Structure		Education		Health		Social Life and Environment	
Beşiktaş	1.15	Bakırköy	1.19	Beşiktaş	0.92	Beyoğlu	1.53
Kadıköy	1.12	Kadıköy	1.04	Sarıyer	0.91	Kadıköy	1.26
Bakırköy	0.57	Sarıyer	0.90	Bakırköy	0.76	Şişli	1.15
Üsküdar	0.48	Beşiktaş	0.82	Üsküdar	0.67	Üsküdar	0.72
Maltepe	0.46	Üsküdar	0.78	Ataşehir	0.45	Beşiktaş	0.64

Economic Capacity		Commercial Potential		Transportation/ Accessibility		Infrastructure	
Şişli	1.44	Fatih	2.19	Kadıköy	1.43	Kadıköy	0.77
Beşiktaş	1.15	Beyoğlu	1.43	Üsküdar	1.39	Beşiktaş	0.57
Kadıköy	0.87	Şişli	1.20	Bakırköy	1.21	Bakırköy	0.22
Sarıyer	0.78	Beşiktaş	0.82	Beşiktaş	0.95	Beylikdüzü	0.20
Bakırköy	0.75	Kadıköy	0.55	Beyoğlu	0.69	Kartal	0.20

Table 6: Quality of Life Levels in Istanbul

1. Level		2. Level		3. Level		4. Level		5.Level	
Kadıköy	0.980	Üsküdar	0.570	Fatih	0.198	Kağıthane	-0.078	Esenler	-0.614
Beşiktaş	0.915	Şişli	0.537	Pendik	0.168	Küçükçekmece	-0.153	Sultanbeyli	-0.649
Bakırköy	0.681	Sarıyer	0.505	Ümraniye	0.166	Silivri	-0.161	Sultangazi	-0.668
		Maltepe	0.317	Kartal	0.159	Zeytinburnu	-0.166	Arnavutköy	-0.750
		Ataşehir	0.281	Beyoğlu	0.158	Bayrampaşa	-0.178		
				Beylikdüzü	0.156	Avcılar	-0.180		
				Tuzla	0.064	Güngören	-0.203		
				Adalar	0.023	Çatalca	-0.248		
				Bahçelievler	0.012	Sancaktepe	-0.329		
				Başakşehir	0.004	Şile	-0.343		
				Çekmeköy	-0.004	Esenyurt	-0.366		
				Büyükçekmece	-0.010	Bağcılar	-0.371		
				Eyüpsultan	-0.011	Gaziosmanpaşa	-0.391		
				Beykoz	-0.048				

A cluster analysis on the sub-index reveals that Kadıköy, Beşiktaş, and Bakırköy were included in the cluster with the highest quality of life. A secondary cluster consisted of Üsküdar, Şişli, Sarıyer, Maltepe, and Ataşehir districts. Of the 39 districts in Istanbul, 14 are clustered at the third level and 13 at the fourth level. Esenler, Sultanbeyli, Sultangazi, and Arnavutköy took place in the cluster with the lowest scores. The majority of districts are clustered at the third and fourth clusters, which is reflected in spatial-temporal changes in the metropolitan city, where rapid growth in peripheral regions, primarily through immigration under weak zoning regulations, has created settlements with low-quality of life where masses are concentrated. In contrast to only 4,8% of the urban population living in the first cluster with the highest quality of life, the combined share of those living in the fourth and fifth clusters with the lowest quality of life is 47,8%.

Compared to our previously published studies, current results point out complex changes in the city. Maltepe and Çekmeköy enjoy a higher quality of life at present, compared to 2015, probably due to the increased appeal of these locations. These locations are more appealing likely due to improved transport opportunities based on intercontinental transport projects such as the third bridge on the Bosphorus, third airport in the north, and a motorway tunnel and Marmaray rail tunnel in the south connecting the European and Asian sides.

Similarly, the newly established Başakşehir has enjoyed the rising quality of life levels. Peripheral coastal districts of Pendik and Tuzla at the eastern end, which enjoy rapid rail systems and have much better connectivity to the core due to the Marmaray rail connection, have seen their status elevated. In addition, these areas also have better accessibility to cities like Bursa and Izmir due to new bridge and motorway infrastructures.

On the other hand, the quality of life in Beyoğlu district, a core district with historical sites, has decreased consistently since 2010, pushing it down to the second cluster in 2015 and the third cluster in 2020. While specific segments (such as Galata or parts of Kasımpaşa) saw significant gentrification either due to high-end restoration projects or high-rise mixed-use developments, a more significant part of the district has a decaying housing stock on rough terrain. In addition, the improvement of public transport may have led to a filtering out effect where middle-classes might have moved out of the core without increasing commuting times to the core areas. Similar features are observed in Fatih district, subject to a heavy influx of immigrants and refugees from the Near East, Middle East, and Sub-Saharan Africa. Quality of life in Bahçelievler, Beykoz, Kağıthane, Avcılar, and Sultangazi have decreased during this period, the reason of which reasons might be different for each district.

Table 7: Quality of Life Level - % of Population

% of population	
Level	4.8 %
Level	15.9 %
Level	31.5 %
Level	36.2 %
Level	11.6 %

Table 7: Quality of Life Level 2010-2015-2020

	2010 Level	2015 Level	2020 Level
Kadıköy	1	1	1
Beşiktaş	1	1	1
Bakırköy	2	1	1
Üsküdar	2	2	2
Şişli	1	1	2
Sarıyer	2	2	2
Maltepe	4	3	2
Ataşehir	2	3	2
Fatih	2	2	3
Pendik	4	3	3
Ümraniye	3	4	3
Kartal	4	3	3
Beyoğlu	1	2	3
Beylikdüzü	3	3	3
Tuzla	4	4	3
Adalar	2	4	3
Bahçelievler	3	3	3
Başakşehir	4	4	3
Çekmeköy	5	4	3
Büyükçekmece	3	3	3
Eyüpsultan	3	3	3
Beykoz	3	3	3
Kağıthane	3	4	4
Küçükçekmece	4	3	4
Silivri	3	5	4
Zeytinburnu	4	3	4
Bayrampaşa	5	3	4
Avcılar	4	4	4
Güngören	5	4	4
Çatalca	3	4	4
Sancaktepe	5	5	4
Şile	3	5	4
Esenyurt	5	4	4
Bağcılar	5	4	4
Gaziosmanpaşa	5	5	4
Esenler	5	5	5
Sultanbeyli	5	5	5
Sultangazi	5	5	5
Arnavutköy	5	5	5

Conclusions

Our results suggest the presence of urban decay in both core and peripheral areas, but probably due to very different reasons. The falling quality of life levels in Fatih and Beyoğlu is interesting, but whether this drop will continue remains questionable. Significant social infrastructure projects in the Fatih district and newly introduced limitations on refugee concentration may profoundly impact the quality of life levels, improving indicators relevant to health and education. On the other hand, the completion of key coastal urban regeneration projects in the Beyoğlu district and the construction of cultural complexes in Taksim may create more complex dynamics, which might further strengthen gentrification in historic sites and other sites where large scale mixed-use residential-commercial developments take place. In addition, the district continues to attract private cultural centers, municipal offices, and hotels, which are basically located on key transport lines.

Nevertheless, interior sections remain isolated, and urban transformation seems to be slow. In physical continuity to Beyoğlu district and Golden Horn, central parts of Kağıthane district have transformed from industrial areas to university campuses, middle-class residential areas, and recreation areas. However, there are still large pockets of quasi-informal regions or regions that transformed during the 1990s into dense residential areas. The urban transformation of these areas seems to be patchy and slow, which might be the reason for the decay.

Striking results of the impact of new intercontinental and national transport infrastructure in peripheral districts Tuzla, Pendik, and Çekmeköy require further investigation. The exact effect is not seen in the western peripheral districts. Still, the opening of the Çanakkale Bridge may increase the appeal of these regions, which would enjoy easy access to rapidly growing industrial and logistics centers in Tekirdağ and other industrial concentrations on the European side of Istanbul.

Our results indicate a complex structure in the large metropolitan area of Istanbul, not surprisingly. The integration of the city to higher-level structures,

such as intercontinental transport networks, clearly has a substantial impact on points of connectivity. Nevertheless, as Healey (2009) suggests, the clockwork of internal components also plays a crucial role in developing strategies to enhance the quality of life in metropolitan regions. The core districts of Fatih and Beyoğlu, and parts of Kağıthane seem to remain key areas of interest for understanding how urban transformation and coastal regeneration in historic districts will impact the quality of life in the core and older informal settlements that have transformed during the 1990s. We strongly suggest the conduction of qualitative-quantitative mixed studies that might help understand the more detailed aspects of quality of life in such particular locations.

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