Dirençlilik Dergisi
7(2), 2023, (209-220)
ISSN: 2602-4667
DOI: 10.32569/resilience.1352951

Resilience Journal
7(2), 2023, (209-220)
ISSN: 2602-4667

-Araştırma Makalesi-

Sosyoekonomik Değişkenlerin ve Sosyal Donatıların Mekansal Kümelenmesinin Mahalle Düzeyinde İncelenmesi: Körfez-Derince-İzmit Örneği

Deniz GERÇEK[1]
ORCID: 0000-0003-4818-9802

Öz

Sosyoekonomik değişkenlerin mekansal kümelenmesi ve sosyo-mekansal ayrışma, sosyoekonomik statüleri birbirinden farklı olan nüfus gruplarının yer seçimlerindeki farklılaşmanın bir sonucudur. Mekânsal ayrışmanın tipik olarak, kentin belirli bölgelerinde çoğunlukla vasıfsız göçmenlerden oluşan düşük gelirli grupların yerleştiği alanlar ile sosyoekonomik düzeyi yüksek grupların toplumun geri kalanından izole edilmiş bölgeler olarak ortaya çıkar. Bu çalışma, kitlesel göçe maruz kalmış bir sanyi kentinin konut alanları üzerinde yürütülmüştür. Çalışmanın amacı, benzer sosyoekonomik özelliklere sahip mahallerde mekansal kümelenme olup olmadığını, sunulan tesis ve hizmetlerde bir kümelenme olup olmadığını değerlendirmek, var ise bu mekansal ayrışmanın deecesini ölçmektir. Ayrıca, sosyoekonomik değişkenler ve sunulan hizmetler arasındaki ilişki de incelenerek sosyoekonomik düzeyi düşük ve hizmetleri yetersiz olan yoksul mahallelerin belirlenmesi sağlanmıştır. Ampirik bulgular, Türkiye'nin birçok metropolünde olduğu gibi bir örüntü sergileyen bir sosyo-mekansal ayrışmanın olduğunu göstermektedir. Mikro düzeyi temsil eden sosyoekonomik göstergeler kentsel mekân genelinde bir kümelenme gösterirken, makro düzeyi temsil eden mahallelerdeki hizmetlerin dağılımı kayda değer düzeyde bir kümelenme göstermemektedir. Ancak, sosyoekonomik düzeyi düşük mahallelerde sunulan hizmetlerin de miktarı ve çeşitliliğinin düşük olduğu tespit edilmiştir. Duruma ilişkin mikro ve makro düzeydeki göstergelerin ilişkisi, özellikle düşük sosyoekonomik statüye sahip mahalleler için bu ayrışmanın derinleşmesine katkıda bulunmuş gibi görünmektedir.

Anahtar Kelimeler: Mekansal kümelenme, sosyo-mekansal ayrışma, sosyoekonomik göstergeler, hizmetler

Assessment of Spatial Clustering of Socioeconomic Variables and Facilities at District Level: The Case of Körfez-Derince-İzmit

Abstract

Spatial clustering of socioeconomic variables and socio-spatial segregation is a result of the differentiation in choices of the living environment of population groups that differ from each other in their socioeconomic status. Typical examples of spatial segregation are the residential areas of the low-income groups, commonly composed of unqualified immigrants, in certain areas of the city, and higher socioeconomic status communities occupying places isolated from the rest of the society. The present study, conducted on the residential areas of an

[1] İzmir Yüksek Teknoloji Enstitüsü, İzmir, Türkiye
* İlgili yazar/Corresponding author: denizger@gmail.com
Gönderim Tarihi / Received Date: 31.08.2023
Kabul Tarihi / Accepted Date: 04.12.2023

Bu makaleye atıf yapmak için- To cite this article
Gerçek, D., (2023). Sosyoekonomik Değişkenlerin ve Sosyal Donatıların Mekansal Kümelenmesinin Mahalle Düzeyinde İncelenmesi: Körfez-Derince-İzmit Örneği. Resilience, 209-220.

industrialized city that was subject to mass immigration. Aim of the study is to evaluate if there is a spatial clustering of the districts with similar socioeconomic characteristics and if there is a clustering of facilities, services, and housing to understand and quantify the degree of segregation. The interrelationships among the socioeconomic variables and the services provided were also evaluated to determine the deprived districts of low socioeconomic status and insufficient services. Empirical findings suggest that as in most of the metropolises of Turkey, there is a socio-spatial segregation that exhibits a pattern. The socioeconomic indicators that represent a micro level show a clustering across the urban space whereas the distribution of services per district that represent a macro level doesn't show a substantial clustering. However, the low socioeconomic status districts are found to be characterized by low amount and diversity of services provided. This relationship of micro and macro level indicators for the case might have well contributed to the deepening of segregation, particularly for low socioeconomic status districts.

Keywords: Spatial clustering, socio-spatial segregation, socioeconomic indicators, services

1. Introduction

Spatial clustering and segregation has a long history dating back to the ancient cities, where diverse pattern of production and consumption reflected on space as differentiation across space. However, the socio-spatial processes that upsurge the spatial segregation have become deeper than ever before in the 21st century. Increasing social heterogeneity and inequalities in the era, their driving factors, spatial differentiation and their consequences on the socio-spatial structure of contemporary cities have become a growing interest in recent years (Tammaru et al., 2021; Haandrikman, 2023; Van Ham et al.,2021).

Segregation in societies primarily rely on ethnic, racial, or religious grounds. Spatial segregation, on the other hand, is residential separation of communities of an urban population (van Kempen and Özüekren, 1998). While social segregation is described on the basis of socioeconomic characteristics, spatial segregation is considered as the realization of this differentiation over space. Accordingly, urban space differentiates for the communities of high and low socioeconomic status. Spatial separation is a process that places different communities at different parts of a city (Saltman, 1991, where members of a group are disproportionately concentrated in a particular urban area. These groups are differentiated on the basis of characteristics such as income, education, age, race, ethnicity, professions, or different family compositions and at various spatial scales (district, municipality, neighborhood, block (Massey, et al., 2009).

These different population groups may have different socioeconomic characteristics, different professions, or different family compositions (Calder and Greenstein, 2001). Spatial segregation particularly with an industrialization history for the cities is inevitable (Alver et al., 2010). All advanced societies exhibit social inequality and, as a spatial outcome of it, occurs residential segregation (Jürgen, 1998). Therefore, urban population distributed across space homogeneously is rather exceptional and even utopic. Yet the main concern is the level of segregation. Spatial segregation usually manifests as socio-spatial exclusion and isolation among social groups (Boal, 1987). Residential segregation of social classes is a distinctive feature of the capitalist city that appeared in its present form only with the rise of industrial capitalism (Harris, 1984). In the early stages of capitalism, social inequality was not as intense, and hence the spatial segregation. However, globalization and neo-liberal policies introduced after the 1980s increased the gap between income distribution. Most of the industrial cities then have been subject to deindustrialization that reflected its new dynamics on space. The city center attracted the interest of the capital. Due to increasing inequality, particular groups

have begun to live in isolation and apart from each other. Moreover, social state/welfare state policies that target the welfare of society by reducing the differences between segments of society were gradually abandoned. With a decrease in public spaces in quality and quantity which are determinants of the quality of life, spatial clustering and segregation deepened and distracted societies away from sustainability goals (Brorström, 2015). Sustainable Development Goal 11, “to make cities and human settlements inclusive, safe, resilient and sustainable”, recognizes that urban areas still face numerous challenges. Rapid urbanization leads to the formation of slums and deprived neighborhoods that are inadequate in infrastructure and services. The report also highlights the importance of facilities and public spaces where their lack or insufficiency can cause spatial segregation. Rapid urbanization accompanied by neoliberal policies manifested as the separation of living environments of different income groups in urban space. Cities became more stratified in character and community clusters began to live in different areas of the city, especially in cities that receive intense migration. Residential segregation is also very closely related to urban poverty (Massey, 2007) and social vulnerability to natural hazards (Kim et al., 2021).

Jürgen (1998) suggests that there are three main conditions that determine the severity of separation: income inequality, education, and discrimination in two scales, micro and macro. The processes that create social segregation at the micro level are, income, education, lifestyle, religious or ethnic characteristics of the individuals and communities. Education and income constitute the basis for how much of the resources such as housing and a high-quality living environment the individuals can access. In the field of housing, opportunities are unequally distributed across the urban area. At the macro level social inequality has a spatial outcome, resulting from the housing opportunities provided, services and amenities of the residential areas.

This study focuses on spatial segregation of an industrial city, İzmit, that is subject to a long process of industrialization, migration and rapid urbanization. 1999 Marmara Earthquake caused a massive destruction of the city, where consequent rapid interventions and haphazard planning did not make the situation any better. İzmit city today is still facing problems and a reduced urban quality of life, that is seemingly not even across the urban environment. The urban environment of the city is assessed for its spatial segregation at the districts (mahalle) level, based on socioeconomic and demographic attributes that characterize communities of the residents.

2. İzmit City and Its Process of Spatial Segregation

Izmit has been Turkey's leading industrial city since 1950s. The city with suitable physical conditions and convenience in logistics was subject to a heavy industrialization leap by the government in 1950s (Payne, 1993). In the 1960s-1980s, industrial development accelerated rapidly with industrial interdependency getting stronger to replace agriculture and services (Börtücene-Öncel, 1996) However, the deindustrialization period triggered the process of decentralization of Istanbul’s industry in the 1980s (Kule and Es, 2002). Izmit at the hinterland of İstanbul oddly took its share of the deindustrialization process by industrializing. This situation has caused polluting industries e.g. the petrochemical, paint, and pharmaceutical, to move away from Istanbul to settle in the Gebze-Dilovası-İzmit-Sakarya corridor.

Due to rapidly developing and intensifying industrialization, İzmit has become a city of hope for the unskilled and unemployed. This development, which was previously considered beneficial for employment and development in the region, with the progressing neoliberal policies and rise of the services sector, reduced its pace. The working class, which previously migrated and established their slums who were necessary for the continuity of the industrial

era, was gradually pushed out with the transformation of the system. Deindustrialization casts out a portion of skilled jobs of workers while increasing high-wage jobs that require higher qualifications and unskilled very low-wage jobs. İzmit experienced a similar progress that turned the working class into communities of low incomes commonly lacking regular jobs who accumulated in the deprived areas of the city. On the other side, as the quality of life in the city decreases, the neighborhoods lose their character, and the more educated or higher income segments of the society were pushed towards alternative housing, "Gated communities" (Firidin-Özgür, 2006). Gated communities in Turkey have primarily emerged because of neoliberal policies that promote the high-income segment seeking prestige (Yıldız and Alkan-Bala, 2022). Study area is subject to these new forms of housing production, claimed to provide security, but they also produce spaces that create privileged conditions contributing to the deepening of spatial segregation.

3. Materials and Methods

The Körfez-Derince-İzmit segment which constitutes the most concentrated residential area of the Gebze-Dilovası-İzmit-Sakarya industrial corridor was chosen as the study area. The study scale is set as the districts (mahalle) level. A total of 64 districts were included in the assessment. Cities are formed by the combination of those districts with different properties. A district is not only an administrative unit but also described as a social unit and a built environment. District level is considered adequate for the present study for being a relatively homogeneous area in terms of demography, socioeconomy and housing characteristics. Besides, accessibility of the district level data from census archives and other sources is convenient.

Based on Jürhen's (1998) multilevel model, social segregation is determined by individuals' characteristics at the micro level, and is also related to the accessible basic ameities in the space at the macro level. In this study following Jürgen's description spatial segregation, assessments were conducted both at the micro and the macro levels.

The dataset that is used to characterize each district of the study area at the micro level comprises (i) socioeconomic and demographic variables; i.e., sex, age, education (ii) variables of services, facilities, and housing opportunities per person provided per district at the macro level. Socioeconomic data was gathered for the year 2022 from the census archives of Turkish Statistical Institute (URL-1). Housing prices were extracted from the real estate data analytics web platform (URL-2). Macro-level data of district facilities were gathered from the metropolitan municipality city guide web portal (URL-3).

Methods of assessment for the study area include a correlation analysis to understand the bivariate relationship among all of the variables used in the study. Correlation is an inferential statistics to understand the data and how the variables in the dataset are related as a piece of initial information. As there is a bulk of variables both from micro and the macrolevel datasets, a Principal Components Analysis (PCA) was performed to reduce the variability of the dataset into its underlying dimensionality and directions. . A spatial autocorrelation measure was calculated to evaluate if there is spatial clustering of the components that characterize districts, and the strength of it. This measure helps understand if the districts that show similar properties are clustered across the study area, hence indicate socio-spatial segregation. Moreover, the components that represent micro and macro level variables were mapped to understand the spatial pattern of clustering if any.

4. Results and Discussions

There are two sets of variables namely, micro and macro variables. Both of the variables were calculated given the datasets for each of the 64 districts.
The micro-level dataset is based on individuals' characteristics, e.g., sex, age, and education. Abbreviations and descriptions of the variables are as below:

- childrate: percentage of the population at age ≤ 5
- CWR: Child Women Ratio, (population at age ≤ 5 / fertile aged women (15-49)* 10000)
- eldrate: percentage of the population at age ≥ 65
- activerate: percentage of the population at age 24-65
- gradrate: percentage of the population with an education level of university graduate (BSc) and over (MSc, PhD)

Macro-level dataset is based on the place characteristics, eg. facilities, services, and housing. Abbreviations and descriptions of the variables are as below:

- m2sale: housing price per square meter
- edu_per: number of education facilities per 10000 people
- health_per: number of health facilities per 10000 people
- rec_per: number of recreation facilities (parks, playgrounds, etc) per 10000 people
- sport_per: number of sports facilities per 10000 people

The following analyses are based on the variables of the two datasets per 64 districts of the study area (Table 1).

Table 1. Micro and macro variables of 64 districts of the study area

District	Sub province	childrate	eldrate	activerate	gradrate	CWR	m^2sale	edu_per	health_per	rec_per	sport_per
Sirintepe	izmit	5.0	13.6	51	26	26	16970	3.8	1.3	5.0	11.3
Kurucesme_F	izmit	5.4	10.7	51	21	28	15960	12.2	1.5	4.6	1.5
Kocatepe	izmit	7.1	6.1	55	24	34	18204	8.6	0.0	6.5	6.5
Hatipkoy	izmit	8.1	6.5	56	23	32	17930	0.0	0.0	10.5	0.0
Cumhuriyet	izmit	4.7	14.6	51	37	25	21714	3.8	0.0	3.8	7.5
Dogan	izmit	5.3	11.1	53	14	25	15947	0.0	0.0	6.7	2.2
Yeni	izmit	6.3	11.3	50	19	30	17615	4.4	1.1	2.2	3.3
Serdar	izmit	6.6	7.8	44	17	32	18961	10.8	0.8	6.1	5.4
Yenidogan	izmit	5.1	13.4	50	17	27	19012	5.0	3.3	8.3	8.3
Zabitan	izmit	5.8	13.7	51	16	30	13588	0.0	0.0	3.7	0.0
Gultepe	izmit	5.1	12.0	52	17	24	10900	8.8	5.9	8.8	5.9
Fatih	izmit	7.1	9.0	52	10	30	9100	0.0	0.0	6.3	3.1
Tuysuzler	izmit	8.0	5.3	53	30	30	25026	16.1	0.0	8.0	2.7
Kozluk	izmit	4.0	14.0	53	26	21	14225	3.8	1.3	6.3	6.3
Turgut	izmit	5.8	10.4	54	25	27	19468	1.2	1.2	5.9	4.7
Orhan	izmit	6.4	7.6	57	40	30	22598	1.9	0.0	5.6	7.4
Akcakoca	izmit	3.8	17.1	52	24	21	11364	10.2	0.0	10.2	0.0
Hacihasan	izmit	2.1	19.6	49	28	16	14049	0.0	0.0	11.8	5.9
Kemalpasa	izmit	0.0	19.4	50	30	18	12000	15.3	0.0	15.3	0.0
Tepecik	izmit	2.7	18.8	52	32	18	14287	8.1	8.1	24.3	0.0
Veliahmet	izmit	3.9	14.7	51	22	21	15116	2.8	8.4	0.0	0.0
Hacihizir	izmit	4.4	12.3	53	21	23	16058	4.7	0.0	4.7	2.4
Terzibayiri	izmit	5.5	13.1	49	8	25	12000	0.0	0.0	5.3	0.0
Cukurbag	izmit	4.5	14.3	52	23	22	13644	5.7	2.9	2.9	0.0
Omerega	izmit	2.0	17.4	49	30	12	15939	45.1	15.0	22.5	0.0
Karabas	izmit	3.2	19.3	49	31	18	15125	8.2	0.0	8.2	4.9
Cedit	izmit	3.4	14.4	53	22	18	18118	1.9	3.8	1.9	1.9
Topcular	izmit	8.1	6.3	54	31	36	24568	3.2	1.1	3.2	2.2
Korfez	izmit	4.8	12.9	48	22	27	12914	6.2	4.1	8.3	8.3
Kadikoy	izmit	4.9	12.5	51	21	24	15493	5.2	1.7	2.6	0.9
Memetalipasa	izmit	5.1	10.9	52	15	24	16862	8.2	1.8	2.7	4.6
Erenler	izmit	5.8	7.6	54	24	29	16791	3.5	0.9	2.6	0.9
Yirmisekizhaziran	izmit	5.4	8.5	55	21	26	20113	3.0	2.0	5.0	0.0
Bekirdere	izmit	5.7	10.4	52	9	27	12000	3.5	1.2	2.4	2.4
Tavsantepe	izmit	8.2	6.1	50	9	37	16991	2.4	0.8	4.0	1.6
Yenisehir	izmit	6.4	7.3	53	19	30	22634	5.4	1.7	3.3	2.1
Malta	izmit	5.4	11.9	53	21	25	18121	4.7	1.6	12.6	7.9
Gundogdu	izmit	11.3	4.7	56	25	43	21424	5.2	1.0	3.1	2.1
Yesilova	izmit	7.1	3.8	46	15	33	20938	4.5	0.6	5.8	7.1
Ayazma	izmit	5.1	7.7	55	31	22	17867	5.5	1.8	7.4	5.5

Tepekoy	izmit	7.5	5.8	52	19	34	19934	10.6	1.8	7.1	3.5
Karadenizliler	izmit	8.5	4.5	54	19	37	20838	10.3	3.4	6.9	0.0
Yahyakaptan	izmit	3.9	11.7	51	45	17	25305	11.0	2.6	17.7	4.4
Alikahya_Fatih	izmit	7.9	3.8	55	30	33	22533	6.5	0.0	4.3	5.4
Alikahya_Merkez	izmit	7.4	4.0	52	12	33	14000	0.0	0.0	0.0	0.0
Alikahya_Cumhuriyet	izmit	6.4	7.7	56	42	29	19262	4.6	1.5	6.2	1.5
Akarca	izmit	4.3	10.8	55	38	21	17805	0.0	0.0	23.4	14.0
Fevzi_Cakmak	izmit	4.6	7.9	55	37	22	17890	0.0	0.0	14.2	4.0
Mersincik	derince	6.3	9.7	51	22	30	20390	8.2	8.2	4.1	4.1
Cinarli	derince	6.8	10.1	52	18	31	18981	5.1	0.9	6.0	1.8
Cenedag	derince	6.4	9.5	52	14	30	15385	7.1	0.6	5.4	0.6
Dumlupinar	derince	6.0	10.7	51	24	29	15477	3.5	1.2	3.5	0.0
Sirripasa	derince	6.7	8.4	51	15	33	15728	2.9	1.0	3.9	1.0
Fatih_sultan	derince	7.6	6.8	51	12	36	16148	4.6	0.9	7.4	1.9
Yenikent	derince	5.5	10.6	52	26	27	19306	4.4	0.7	4.4	3.6
Ibnisina	derince	6.9	7.3	52	22	32	17249	3.8	2.5	5.7	3.8
Yavuz_sultan	derince	5.6	12.4	51	27	28	17073	5.1	0.6	4.6	3.4
Fatih	korfez	7.5	7.6	50	16	35	18018	4.2	0.7	4.9	2.1
Kuzey	korfez	7.2	9.2	50	14	33	17425	7.3	1.5	5.8	0.0
Esentepe	korfez	7.4	9.3	50	13	35	18739	4.1	2.0	4.1	2.0
Yavuz_Sultan_S	korfez	9.7	4.0	52	26	44	20030	4.1	0.8	1.2	0.4
Yeniyali	korfez	7.3	7.3	50	13	32	20009	4.0	1.6	4.8	2.4
Barbaros	korfez	7.3	8.1	50	14	35	18681	4.4	2.2	4.4	4.4
Camlitepe	korfez	7.2	8.8	47	11	35	16354	6.5	2.2	4.4	1.1

4.1 Bivariate correlations between the variables

The associations between the variables, their degree and direction were quantified using Pearson's r correlation coefficient. There are three sets of dual comparisons for the whole variables set. First is among the micro level variables, second is among the macro level variables, and third is between the micro and macro level variables as shown in Table 2.

(1) Among the micro level variables, correlations between the for age groups are fairly expectable. However, education and age-related variables are worth noting. Rate of the graduated population is negatively correlated with the child rate and CWR. The graduate rate is positively correlated with active population rate.

(2) Micro and macro variables comparison show that m2sale is only negatively correlated with the age group elderly, which indicates the districts where elderly people reside are commonly offering low-priced housing, probably low-quality old housing as well. Significant empirical studies show that CWR is negatively correlated with income and used as proxy for income in its lack (Işik, 2021). Higher childrate together with high CWR is an indication of low socioeconomic status and they are negatively correlated with important macro-level facilities including education, health, and recreation. Elderly districts seem to have more of facilities. Districts of more educated communities represented by graduate shows a strong positive correlation with recreation areas and sport facilities. This is attributed to the higher income level associated with higher level of education. These part of the society have the flexibility to chose a better living environment that is providing more of the facilities.

(3) Macro variables' correlation show that the number of education, health, and recreation facilities tends to increase or decrease in relation to the districts' population. However, housing prices did not seem associated with any of the facilities offered in the districts.

Table 2. Bivariate correlation of all variables

	childrate	CWR	eldrate	activerate	gradrate	m2sale	edu_per	health_per	rec_per	sport_per
childrate	1	.945**	-.880**	0.181	-.345**	.435**	-.265*	-.298*	-.504**	-0.127
CWR		1	-.819**	0.051	-.409**	.350**	-.279*	-.334**	-.538**	-0.150
eldrate			1	-.287*	0.210	-.524**	0.218	.300*	.398**	0.041
activerate				1	.426**	.262*	-0.230	-0.172	0.024	0.013
gradrate					1	.393**	0.178	0.062	.466**	.312*

m2sale						1	0.053	-0.073	-0.071	0.194
edu_per							1	.622**	.427**	-0.149
health_per								1	.318*	-0.140
rec_per									1	0.237
sport_per										1

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed). Blue shades show positive, red shades show negative significant correlation.

4.2 Principle Components Analysis on variables

Principal Component Analysis (PCA) was performed to reduce the variability of the data to identify the principal directions in which the data vary, by transforming a set of correlated indicators into a small set of uncorrelated 'components' that represent the underlying dimensionality of the data (Table 3). Accordingly, PCA, reduces micro variables into two Factors/components F1, F3, and macro variables into two factors/components F2, F4.

The highest factor loadings (variables' correlation with each component) help in understanding the underlying meaning of those components/factors. Accordingly, Factor 1 is related to families with many children, accompanied by a high CWR that is an indication of a low socioeconomic status. There is also a strong negative correlation with old population. Factor 3 is about the active population and education level. This factor denotes a working population with qualifications and possibly higher income. Factor 2 is related to facilities offered including education, health, and recreation. Factor 4 is independently about the sports facilities offered.

Table 3. Principle Components matrix and factor loadings

	Component			
	1	2	3	4
childrate	0.931	-0.230	-0.055	-0.120
eldrate	-0.917	0.176	-0.099	0.030
activerate	0.135	-0.212	0.866	-0.152
gradrate	-0.213	0.231	0.786	0.356
CWR	0.891	-0.266	-0.181	-0.121
m2sale	0.653	0.156	0.444	0.310
edu_per	-0.051	0.919	-0.047	-0.085
health_per	-0.160	0.796	-0.081	-0.211
rec_per	-0.409	0.569	0.258	0.346
sport_per	-0.046	-0.072	0.044	0.939
facil_per	-0.253	0.898	0.081	0.304
eigenvalue	4.42	2.10	1.73	1.01
% variance	29.56	26.29	15.40	12.92

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

4.3 Spatial clustering

This part of the study is devoted to understanding if there is any clustering of similar characteristics of districts. Global Moran's I is a measure that quantifies spatial dependence between values of the same variable across space, that is spatial autocorrelation. Global Moran's I index ranges between -1 +1, where higher values indicate a high spatial dependence of variables. P value < 0.05 indicates the significance of the clustering at 95% confidence interval (Table 4).

Global Moran's I statistic shows that only Factor 1 and Factor 3 which are the components of the micro level are clustered across the space. Factor 2, and 4 which are the components of the macro level on the other hand do not show a significant clustering. Facilities distribution for districts doesn't seem to be clustered at particular regions across the urban environment. However, micro-level variables that characterize the communities cluster at some parts of the study area, where people with similar characteristics tend to reside closer to each other.

Table 4. Spatial autocorrelation, Moran's I measure

	Moran's index	Zscore	P value
Factor 1	0.930953	12.020118	0
Factor 2	0.087445	0.087445	0.107284
Factor 3	0.227285	3.087641	0.002018
Factor 4	0.099977	1.486437	0.137164

$p < 0.05$ significant at 95% confidence interval

Figure 1 shows the clustering of child rate and CWR across space where the green color shows a low-low clustering. These neighborhoods are located near the center of the city and are occupied by elderly or working singles and couples. Moving away towards the peripheries orange and red colors indicate the opposite. These districts are of lower socioeconomic status. The districts shown in green color are well known as occupied mostly by people who have immigrated to the city for working in the industrial sector in the period 1950-1970. Mostly initiated as informal housing, the districts are still home to low income working class in unqualified jobs. Factor 1 shows clustering of the elderly in the city center and surrounding that offer old and low quality housing that dates back to a construction period of around 1960s. Part of the city is occupied by a medium to high socioeconomic status clustered around the outer ring of the city center. According to Factor 1, the lowest socioeconomic status communities are seen in the urban peripheries, e.g., Yavuz Sultan Selim, Tüysüzler, Gündoğdu, and Karadenizliler. Both Factors show that the eastern part of the study area that falls under the İzmit municipality borders is home to the working class of higher qualifications.

Figure 2 shows the clustering Factor 3, the educated and active population in color green. These districts with higher rates of university graduates are working in qualified jobs and live in a better urban environment. These characteristic is urbane and only found in "İzmit" subprovince, rather than the other two subprovinces, Derince and Körfez. Factor 3 represents the middle and upper class characterized by education level and active population cluster in the outer ring of the city center, but is not peripheral. These districts shown in green color, e.g. Yahhakaptan, Cumhuriyet, and Orhan are well known for their gated communities provided for "urban elites".

Figure 3, and 4 although the clustering of the factors is not statistically significant, particularly in Figure 3 (Factor 2) quantity of facilities per 1000 people is low in a region composed of several districts shown in color orange. These districts, despite their high population density, are short of basic facilities.

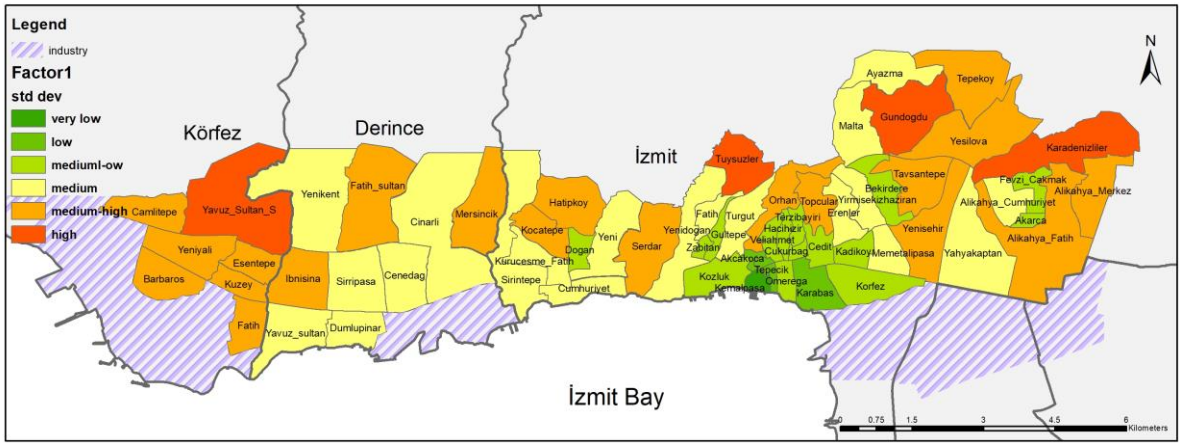

Figure 1. Factor 1 Child-CWR (red shades show high child rate and CWR)

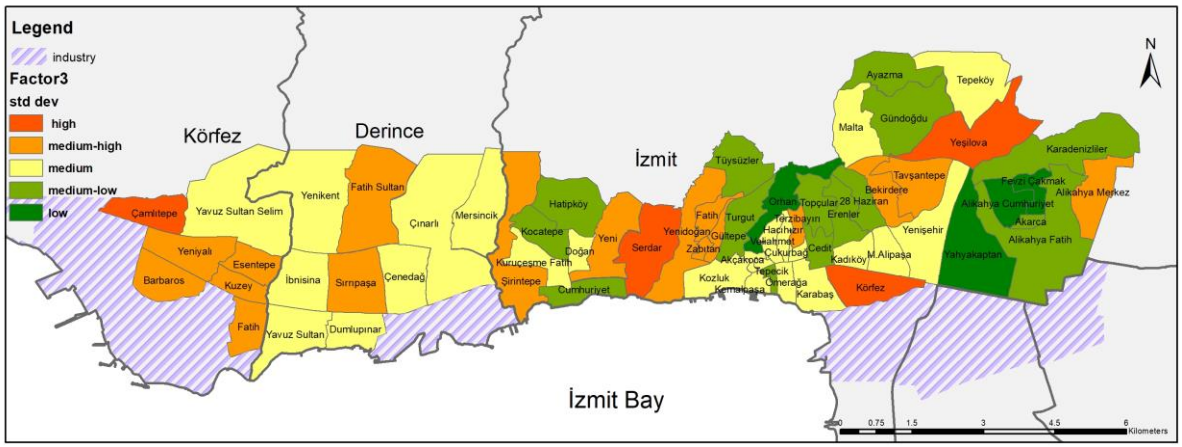

Figure 2. Factor 3 educated-active (red shades show a low rate of educated and low rate of active population)

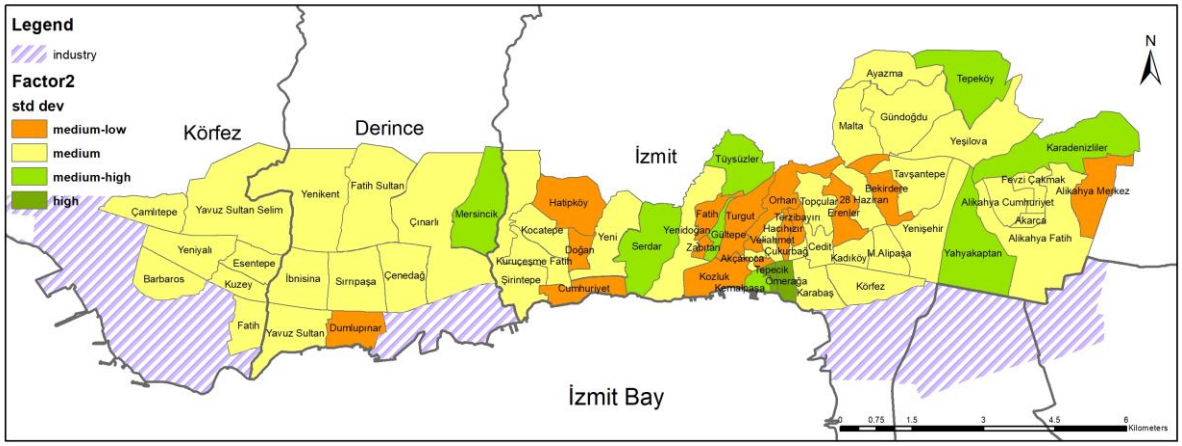

Figure 3. Factor 2 Facilities: Education, health, recreation per 1000 individual (red shades show a low rate of facilities)

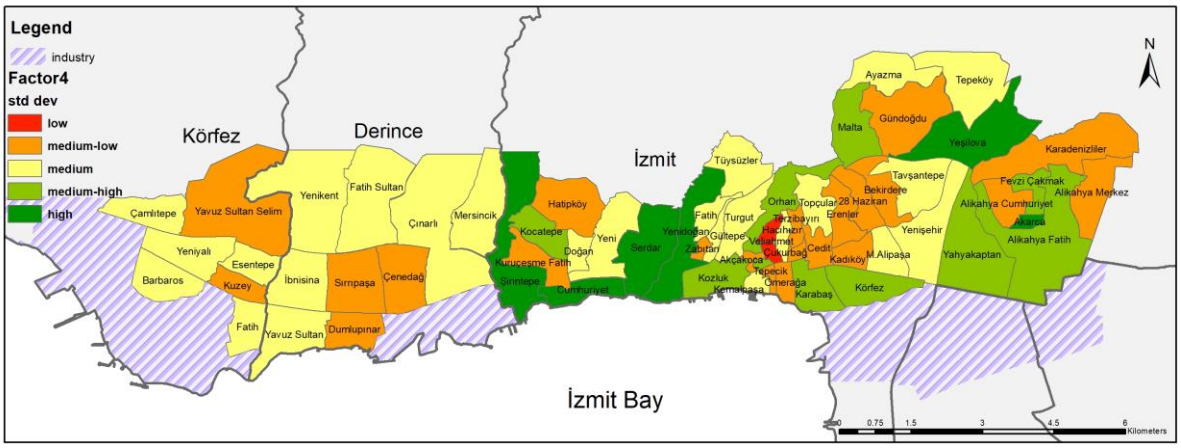

Figure 4. Factor 4 Facilities: sports per 1000 individual (red shades show low rate of facilities)

The findings show that there is a clustering and segregation as most studies suggest in the literature conducted for the Turkish cities (Akyol-Altun 2010; Işik and Pinarcioğlu, 2015; Mutlu and Varol, 2017; Işik, 2021; İncedere, 2022). Empirical results show a pattern of clustering that is also an indication of spatial segregation. Particularly, Factor 1, and 3 that are representing micro variables that characterize individual and household structure. However, this pattern is not very regular and may be conflicting in parts that are quite similar to the findings of Işik (2021) for residential segregation in İstanbul, where he reported that the inner city was partially reclaimed by the poor while some parts were gentrified led by the nascent urban elite. The urban periphery was partly occupied by the growing middle classes and was also home to the urban poor who were displaced by urban transformation projects. On the other hand, social facilities and services although there is no significant clustering that may indicate a segregation, are not equal at each district. The most striking finding is that low socioeconomic status districts are offered fewer facilities. Therefore, both micro and macro scale variables of segregation seem to be operating in the study area.

5. Conclusions

The empirical findings support that there is a clustering of micro-level variables that reprsent socioeconomic status across the city space. Lower socioeconomic status communities are the desents of the prior immigrants due to industrialization. Those districs were initialized as informal housing and city slums. These districts that were formerly in the peripheries of the city now remains deprived neighborhoods of the inner city that will most probably be subject to urban transformation in the near future. New communities of low status either live in these inner city districts or in the peripheries of the city. Determined by employment alternatives and deindustrialization, in certain regions of the city poverty become entrenched and fueled by continuous migration. Upper classes either move to the outer rings of the city for more “sterile” and “healthy” spaces offered by gated community housing projects or even if they have preferred staying in the city, they seek alternatives that completely isolate them from other social segments. The common feature of districts where low-income classes live is that fewer facilities are provided. The local governments' inadequacies in providing urban infrastructure and services lead to a decrease in the quality of urban life in parts of the cities. In addition, urban transformation projects when conducted inadequately contribute to segregation. It is not quite possible to modify the microscale characteristics of the societies or force the societies to be integrated. However, urban planners and decision-makers who shape the city have the tools to ensure a more equal distribution of services between the rich and poor ends of the city.

References

Alver, K. (2010). Siteril Hayatlar, Ankara: Hece Yayinlari.

Akyol-Altun, D. (2011). İzmir'de konut pratiğinin dönüşümü ve kapali konut sitelerinin ortaya çikişi. Ege Mimarlik, 2 (77), 26-32.

Işik, O., Pinarcioğlu, M. (2015). Nöbetleşe yoksulluk. (10. bs), İletişim Yayinlari.

Işik, O. (2021). Residential Segregation in a Highly Unequal Society: Istanbul in the 2000s. In: van Ham, M., Tammaru, T., Ubarevičienė, R., Janssen, H. (eds) Urban Socio-Economic Segregation and Income Inequality. The Urban Book Series. Springer, Cham.

Boal, F.W. (1987). Segregation. In, Ceri Peach (Ed.), Social Geography, New York: Progress and Prospect, 124-152.

Börtücene, İ.Ö., Lütfi A. (1996). Kocaeli İli Havza Stratejik Planlamasi

Brorström, S. (2015), "Implementing innovative ideas in a city: good solutions on paper but not in practice?", International Journal of Public Sector Management, 28(3), pp. 166-180.

Calder A., Rosalind G. (2001). "Land Policy, Land Markets and Urban Spatial Segregation", Land Lines, 13(6), 4-6.

Firidin-Özgür E. (2006). Sosyal ve Mekansal Ayrişma Çerçevesinde Yeni Konutlaşma Eğilimleri: Kapali Siteler, İstanbul, Çekmeköy Örneği. Planlama. 2006 (4), 79-95

Haandrikman K., Costa R., Malmberg B., Farner Rogne A. & Sleutjes B. (2023). Socio-economic segregation in European cities. A comparative study of Brussels, Copenhagen, Amsterdam, Oslo and Stockholm, Urban Geography, 44(1), 1-36, DOI: 10.1080/02723638.2021.1959778

Harris R. (1984). Residential segregation and class formation in the capitalist city: a review and directions for research. Progress in Human Geography, 8(1), 26-49.

İncedere L. (2022). Kentsel mekânda ayrişma: Mahalle ölçeğinde bir İnceleme-İzmir Örneği, Türk Coğrafya Dergisi, 81, 127-140.

Jürgen F. (1998). "Social Inequality, Segregation and Urban Conflict: The Case of Hamburg", Sako Musterd, Wim Ostendorf (ed.), Urban Segregation and the Welfare State, London: Routledge, pp. 168-190.

Kim, S.K., Bennett M.M., van Gevelt T., and Joosse P. (2021). Urban agglomeration worsens spatial disparities in climate adaptation. Scientific Reports 11(1), Article 8446.

Kule H. and Es M., (2002). Türkiye'de kentsel yoksulluk: Kocaeli Örneği. Journal of Social Policy Conferences , 0 (50) , 259-300.

Massey D.S. (2007). Residential Segregation and Persistent Urban Poverty. Redress for Historical Injustices in the United States: On Reparations for Slavery, Jim Crow, and Their Legacies, eds. Michael T. Yaquinto M. and M., New York, USA: Duke University Press, pp. 331-348.

Massey D.S., Rothwell J., Domina T. (2009) "The Changing Bases of Segregation in the United States", The Annals of the American Academy of Political and Social Science, 626, 74-90.

Payne, G. K. (1993). The Provision of basic services in Pakistan, Turkey and Egypt. Urbanization in Developing Countries: Basic Services and Community Participation, ed. Mohanty B., Concept Publishing Company, New Delhi, pp. 17-33.

Van Ham M., Tammaru T, Ubarevičienė R., Janssen H. (2021). Urban socio- economic segregation and income inequality: A global perspective. Springer.

Van Kempen, R., and Özüekren, A.S. (1998). Ethnic Segregation in Cities: New Forms and Explanations in a Dynamic World. Urban Studies, 35(10), 1631–1656.

Saltman J. (1991). Theoretical Orientation: Residential Segregation. Elizabeth D. Huttman (ed.), Urban Housing Segregation of Minorities in Western Europe and the United States, Durham: Duke University Press, pp. 1-20.

Tammaru, T., Sinitsyna A., Akhavizadegan A., van Ham M., Marcińczak S., and Musterd S. (2021). Income inequality and residential segregation in European cities. In Urban inequality and segregation in Europe and China: Towards a new dialogue, 1st ed., ed. G. Pryce, Y.P. Wang, Y. Chen, J. Shan, and H. Wei, 39-54. Cham: Springer.

Yildiz Ö. Alkan Bala H. (2022). Genius Logi: Towards the Phenomenology of Gated Community. DEPARCH Journal of Design Planning and Aesthetics Research, 1(2), 55-72

URL1: https://www.tuik.gov.tr/, accessed in August 2023

URL2: https://www.endeksa.com/tr/, accessed in August 2023

URL3: https://rehber.kocaeli.bel.tr/, accessed in August 2023