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Segregation in Istambuł: Measuring segregation in an ever changing city

MUZEUM HISTORII POLSKI

Segregation in Istanbul:
Measuring segregation in an ever-changing city[1]

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Abstract

There has been little academic interest in measuring segregation in non-Western geographies since the bulk of the literature on the measurement of residential segregation originates from the Western context with methods specifically designed for Western style datasets and spatial divisions. This article is thus an attempt to examine segregation indices, a well-used statistical method in international segregation literature, in the case of a city on the move, Istanbul, where little empirical information is available on residential segregation. Although Istanbul is characterised by many as a 'divided city' with its image as a growing globalised metropolis, the article suggests that as far as five dimensions of segregation are concerned, segregation levels found in Istanbul can be regarded as 'moderate' on the international scale. Average segregation scores are evidently close to those of Central European cities, slightly lower than European levels and correspond to moderate levels by American standards. From index scores it is concluded that higher social groups with better education and high-status occupations represent much higher segregation than that of lower social groups, which indicates a stronger tendency on the part of the former to be segregated from the rest of the city. This can also be characterised by local patterns of segregation; better-off education groups concentrated in the coastal enclaves and in areas closer to the city centre whereas lower social groups are widespread in the peripheries with lower segregation degrees. The study also reveals that segregation along the line of education is stronger than that originating from any other attainment for every dimension of segregation in Istanbul.

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[1] The editors of the *Przestrzeń Społeczna (Social Space)* journal contributed considerably to the improvement of the original version of this text.

1. Introduction: a metropolis on the move

Any study of segregation in Istanbul should at the outset deal with three main issues. The first one is about the 'dynamic' structure of Istanbul which makes it greatly different from Western metropolises where the rules are structured around not the exceptions but the stabilities. The second issue is the lack of urban studies which attempt to analyse segregation in Istanbul in analytical and empirical ways. And the last one is the difficulty of measuring segregation in a dynamic metropolis using the methods developed and used so far mainly for the Western cities. Based on these grounds, this article is an attempt to analyse the levels and the patterns of residential segregation in an ever changing city and it is, particularly, interested in measuring segregation in Istanbul using segregation indices on which there exist a voluminous literature. To do this, the five dimensions of segregation that D. S. Massey and N. A. Denton (1988) define are used. By doing this, the article does not attempt to analyse urban, social or economic processes that are effective, but to examine a well-known method of segregation literature in order to take a *snap-shot* of segregation levels and patterns of a city on the move. The key findings of the article, thereby, suggest that Istanbul can be characterised as a highly divided city as far as it is analysed by its local patterns. However, when the global segregation measures are concerned, segregation levels found in Istanbul can be regarded as 'moderate'.

Before going into the details about the methods and the findings, main issues of studying segregation in Istanbul need to be discussed. First and foremost, Istanbul is literally a city of dynamism; a site of never-ending destruction and reproduction processes not only as physical terms but also in terms of social action, spatial divisions, and high mobility (Işık, Pınarcıoğlu, 2009). Istanbul is not only a 'laboratory' for Turkish urban studies, where many forms of social, spatial and cultural transformations have been first experienced, but also very distinct from Western metropolises with its dynamic socio-spatial structure of its own. This dynamic structure of Istanbul can, first, be illustrated with its population changes over time. One-third of

the urban population of Turkey lives in Istanbul. As the largest metropolis, Istanbul has the population of 10 mln (10,000,000) in 2000. This figure was 7.3 mln (7,300,000) in 1990 and 13.8 mln (13,800,000) in 2012. Note that an average growth of 35% in a decade is a rate that has long been the history in many Western cities. According to *Euromonitor*, for instance, Istanbul will be the fastest growing city and the largest Western European metropolis, overtaking even Moscow and London, with its population growth rate of 14.5% in 2020 (Euromonitor 2014). In terms of internal migration, Istanbul has also been the most-preferred destination for decades. Of total migrant population in Turkey (for 2000), 17.3% moved to Istanbul. This massive population growth of Istanbul initially paves the way of huge physical destruction and reproduction processes based on the eradication of the housing stock of previous periods. According to a Population and Housing Survey carried out by the Turkish Statistical Institute (hereafter TurkStat) in 2011, the proportion of housing stock built in the recent twenty and ten years in Istanbul is 52.4% and 19.9%, respectively. The boom in the construction of mass housing projects (publicly known as TOKİ projects), especially after the 2000s, and the mushrooming of large-scale investments in the urban areas, e.g. colossal infrastructure investments in transport (e.g. Marmaray, third Bosporus bridge or third airport projects), giant shopping malls, and luxury residences are just few examples that would give an idea on the dynamic structure and the massive growth of Istanbul.

Istanbul is built in a unique geographical setting in Asia and Europe with two different geographical areas separated by the Golden Horn and this, undoubtedly, defines the distinctiveness and dynamism of the city. It was once a mono-centric city until the second half of the twentieth century. There were available abundant public lands ready for occupation, which also plays an important role for *gecekondu* dwellers which constituted almost half of the total population (Ministry of Reconstruction and Resettlement, 1966) to occupy in the larger peripheries of the city in the early times (i.e. the 1960s) of its urbanisation process. In the earlier times, the city was clear enough with a distinction of the wealthier inner areas and the poorer peripheries. However, after the 1970s, the construction of peripheral highways and bridges, sub-urbanisation, and a new form of commercial development and development of tele-

communication technology caused multi-centred development of the city in its unique geography. As a polycentric city, Istanbul now becomes a metropolis divided into three geographical units where the residential patterns are generated based on this division of the city (Dökmeci, Berköz, 1994; cf. Figure 1). The settlement geography of the city is reshaped under massive concentration of upper classes and exclusionary land regulations to the detriment of the deprived groups, international migrant flows and higher consumerism (Keyder 1999). Decentralisation process has been already started in Istanbul both by the urban poor located in the peripheries and by the coalition of middle and upper income groups, developers, as well as state actors (Geniş 2007). Especially after the 1990s, Istanbul is said to have produced an increased polarisation between the rich and the poor and residential divisions between two poles of society became more visible than ever before (cf. the segregation studies by Güvenç, Işık, 1996, 1997, 2002; Güvenç 1998; Işık, Öncü, 1999; Güvenç 2000; Güvenç 2001; Kurtuluş 2005; Geniş 2007; Pınarcıoğlu 2009). This means that the binary spatial structures of the earlier terms, which can be defined in the division of the centre and the periphery, gave way to a more divided and fragmented urban fabric where the wealthier and the poorer neighbourhoods tended to be more segregated than ever before. As H. Kurtuluş (2005) claims, the speed of the construction of the gated communities, for instance, can compete with that of the first generation *gecekondus* in the 2000s.

Segregation has, therefore, always been a hot topic for Istanbul, though not as an academic branch of study but as a political and cultural issue with reference to the socio-economic, political and even cultural divisions characterising Turkish society. One often reads in newspapers and hears in public platforms that Istanbul is a highly polarised metropolis along socio-economic lines. However, although Istanbul is characterised by many as a 'divided city' with its image as a growing globalised metropolis, the knowledge about the extent of this division or segregation is still limited and partial. Turkish cities in general, and Istanbul in particular, are those in which the dynamics, patterns and outcomes of segregation are rarely attempted to be analysed and explained with systematic empirical methods, although segregation is one of the most frequently discussed issues on the agenda mostly based on socio-spatial

divisions of different income, ethnic or even religious groups. When Turkish literature is reviewed, the fact that only few studies could be found that deal with segregation academically and directly supports this view as well. Although much has been written about social and spatial segregation through the issues of gated communities, slum areas and urban regeneration (major Turkish studies about these issues include: Erder 1996; Keyder 1999; Göle 2000; Işık, Pınarcıoğlu, 2001; Şenyapılı 2003; Kurtuluş 2005; Geniş 2007; Ayata 2008), only few studies have been carried out dealing directly with the question of segregation in Istanbul (exceptions made by Güvenç, Işık, 1996, 2002; Güvenç 1998, 2000; Işık, Pınarcıoğlu, 2009). This signifies that there has also been less academic interest yet in what levels social and spatial segregation exits in Istanbul and what kinds of residential patterns have developed.

On this ground, this article is an attempt to understand residential segregation in Istanbul in an analytical way using segregation indices. The article is thereby arranged as follows. In Section 2, an argument is made about the methodologically distinctive features of Istanbul from Western and many other cities from developing world and the data, the groups and the methods (indices) used in the article are also explained and discussed briefly in this section. Empirical results, which document the levels (global index scores) and the patterns (local index scores) of social and residential segregation in Istanbul, are presented at length in Section 3 and Section 4, respectively. The article concludes with a discussion on the key findings of the article in Section 5.

2. Segregation indices, data and variables

Indices of segregation, mainly developed for American cities and also widely used by European scholars, underpin the empirical tradition of Anglo-Saxon segregation literature. However, in a dynamic city like Istanbul, there are some main challenges confronted by the researchers about the applicability of segregation indices. First challenge applies to the definition of the enumeration unit in Turkey. Segregation indices are developed for static units of Western cities, e.g. blocks, tracts or neighbourhoods, which have optimum populations with almost never-changing borders. However, the definition of official enumeration units in Turkish concept is

rather different from those of Western metropolises. TurkStat defines the neighbourhood as the smallest geographic unit used in the census for the purpose of providing data on small areas and it is accepted as the official smallest statistical and administrative unit of the country. Although neighbourhoods are expected to represent an optimum amount of population with relatively permanent boundaries as the socially homogenous units of the cities in all around the world, in Turkey the context of neighbourhoods is far from representing a static structure. Nor can they be defined as compact, recognisable and homogenous territorial units. In Istanbul, for instance, neighbourhood populations vary from 50 to 60,000 in the 2000 census. Moreover, the number, border and size of neighbourhoods in Istanbul change from one census year to another. In concrete terms, whereas Istanbul had 550 neighbourhoods in 1990, it increased to 720 in 2000, and yielded to 782 in 2007. This dynamism in definition of neighbourhood in Istanbul makes temporal or year-based comparisons or spatial comparisons in data analyses difficult.

The second challenge applies to the structure of the data. Segregation is computed using micro-level census data which include the characteristics of people, households or neighbourhoods, e.g. literacy, home ownership, employment, professions, and the like on the basis of specific geographical units (for the major studies on measuring segregation with census data see Duncan, Duncan, 1955; Taeuber, Taeuber, 1976; Massey, Denton, 1988; Morrill 1991; Wong 1993, 2005; US Census Bureau 2002). In Turkey, however, the structure of the micro-level data set is very limited. Unlike in Western countries, data on religion and ethnicity are not collected at all by TurkStat in the micro-level nor does it in the census, and migration and income data are also unavailable on the neighbourhood level. Moreover, the latest extensive micro-level census data set applies to 2000 and is also used in this article. After 2000, TurkStat changed the method of census from traditional to register-based system and the population statistics of Turkey have been collected with an on-line application, called as Address Based Population Registration System (ABPRS). Although the on-line system has the advantage of reducing the costs of producing statistics and enabling annual updates, there are some main constraints originating from the characteristics of the data collected. As it is announced by TurkStat annually from 2008 on, in

the micro-level (neighbourhood-level) only three sets of data are available, viz. education level, marital status and age groups, which makes harder to understand and explain the basic characteristics of the local population, and causes crucial constraints in employing a bulk of measuring techniques in social sciences.

Since income data are not available in Turkey, socio-economic groups are *defined as education groups, occupation groups* and *a household related group*, which can be deemed as the proxies to understand socio-economic differences in Istanbul (cf. the works by Işık, Pınarcıoğlu, 2009; and Ataç 2013, where the students have shown that education, employment and demograpy are the strongest variables in defining socio-economic differences in Turkey). For education groups, female illiterates and university graduates are used, and for occupational groups – working females, finance, insurance, real estate and business service employees, manufacturing sector employees, finance and business sector employees, top level white collar workers, scientific, technical, professional and related employees, and the employers are used. The latest social group comprises of people who live in the households sized three or below. This group is also expected to render a broad understanding about household structures in Istanbul.

Moreover, due to the dynamic structure of population and the neighbourhoods of Istanbul, the groups are analysed in the article with a sole year, 2000, and multiple indices are used, including global, local, spatial and aspatial indices to reach a comprehensive understanding on segregation trends of a city on the move. Considering the challenges explained, the article methodologically proceeds in two main empirical stages, as the levels and patterns of residential segregation in Istanbul (the metropolitan area) is comprehensively understood in the segregation dynamics of the city. To do this, five dimensions of segregation, proposed by D. S. Massey and N. A. Denton (1988), are used, i.e. evenness, exposure, concentration, clustering, and centralisation. Under these dimensions, the levels of residential segregation of social groups are measured by one group global segregation indices while the patterns are generated by using a local index, location quotient (LQ). Within this two-fold methodological frame, global measures are meant to identify the character and the extent of residential segregation of social groups more spatially segregated, isolated or con-

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centrated than others whilst the latter phase is for to expand the depth of understanding on the levels of segregation in a visualised way by generating local segregation patterns of some specific social groups. Although these phases individually offer the opportunity to explore the nature of segregation with both its levels and spatial formations, it is the integration of these narratives which has the potential to provide a more comprehensive understanding of residential segregation specific of Istanbul.

3. The levels of segregation in Istanbul: global indices

Although several indices are possible, the main and the most widely-used indices of each dimension of segregation are selected in the article. For evenness, dissimilarity index (DI) and Gini coefficient (G) were chosen; for exposure – isolation index (xPx); for concentration – delta index (DEL); for clustering – absolute clustering index (ACL); and for centralisation – absolute centralisation index (ACE) are selected. For spatial indices (delta index, absolute clustering and centralisation indices), a geographic data based application developed by P. Apparicio et al. (2008) is used. The resulting global index values are provided in Table 1, which shows the segregation scores of social groups defined.

The first dimension of segregation analysed for Istanbul is *evenness*. This basically refers to differential distribution of a population group among spatial units (hereafter neighbourhoods) within a city or a metropolitan area. Importantly, it is not measured but scaled relative to some other population groups or the overall demographic composition of the city. The more unevenly a group is distributed across these neighbourhoods, the more segregated it is. For measuring evenness of social groups in Istanbul *dissimilarity index (DI)* and *Gini coefficient (G)*, known as the simplest forms of measuring segregation, are used. The index of dissimilarity is measured here according to Formula (1):

$$DI = 0.5 \sum_{i=1}^{n}(t_i \ / \ \mathrm{T}) - (\mathrm{p}_i / \ \mathrm{P}), \tag{1}$$

where:

t_i – total population of the group t in the unit i,

p_i – total population of the group p in the unit i,

T – total population of group x in the whole city,

P – total population of group y in the whole city.

The Gini index is calculated according to Formula (2):

$$G = \sum_{i=1}^{n} 0 \sum_{J=1}^{n} \left(t_i t_j \left| p_i - p_j \right| / 2T^2P(1 - P) \right),$$ (2)

where:

t_i – total population of the unit i,

p_i – group proportion of areal unit i,

t_j – total population of the unit j,

p_j – group proportion of areal unit j,

P – group proportion of the whole city,

T – population size of the entire city.

DI basically compares the population of neighbourhoods to the overall demographic composition of the city or metropolitan area. Neighbourhoods whose population more closely match the overall demographical composition contribute less to the index, while those that do not, contribute more (Massey, Denton, 1988). Gini gives the mean absolute difference between the proportions of the targeted groups weighted across neighbourhoods. Both indices vary between 0, indicating no segregation, and 1– referring a total segregation with no groups sharing any neighbourhoods at all. Note that two of these indices are the most appropriate indices for Turkish cases with their advantages of being compositionally invariant (infecting by the changing in the population compositions), easy to compute and understand, as well as their ability of making group comparisons easier.

The most notable feature about distribution of social groups across the city is relatively higher unevenness distribution degrees of high-status related groups, e.g. university graduates from education group, and professionals, finance sector employees, and top level white collar workers from employment groups. Among all education groups, university graduates need further attention.

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Table 1. Index values of Istanbul in five-dimension segregation

Dimensions of segrega-tion	Evenness		Expo-sure	Con-centra-tion	Clus-tering	Centralisation		
Groups / segregation indices*	IS	GINI	xPx	DEL	ACL	ACE_ Asian (Core a)	ACE_ Histori-cal (Core b)	ACE_ Euro-pean (Core c)
Female illiterates	0.16	0.22	0.05	0.46	0.03	0.20	0.25	0.27
University graduates	**0.43**	**0.56**	**0.16**	**0.53**	**0.09**	**0.43**	**0.39**	**0.39**
Working females	0.16	0.22	0.08	0.47	0.04	0.31	0.34	0.35
Manufac-ture sector employees	0.17	0.22	**0.12**	0.47	0.07	0.20	0.27	0.31
Finance sector employees	**0.28**	**0.39**	0.05	**0.49**	0.02	**0.41**	**0.38**	**0.39**
Profes-sionals	**0.33**	**0.43**	0.07	**0.50**	0.04	**0.39**	**0.39**	**0.38**
White collar employees	**0.28**	**0.38**	0.02	**0.49**	0.01	0.34	0.34	0.35
Employers	**0.26**	**0.36**	0.03	**0.49**	0.02	0.35	**0.37**	**0.38**
People in nuclear families	0.20	0.28	**0.31**	0.47	**0.16**	0.33	0.34	0.35
City aver-ages	**0.25**	**0.34**	**0.10**	**0.49**	**0.05**	**0.33**	**0.35**	**0.35**

* IS: segregation index (evenness); GINI: Gini coefficient (evenness); xPx: Isolation index (exposure); DEL: Delta index (concentration); ACL: Absolute clustering index (clustering); ACE: Absolute centralisation index (centralisation).

Source: the author

As can be seen in Table 1, the ones who hold a high education degree in Istanbul exhibit 43% of DI and 56% of Gini coefficient values as the highest scores of indices. With widely used interpretation of the indices of evenness, this means that 43% of university graduates would have to move in order for the whole population to be evenly and uniformly distributed across the neighbourhoods in Istanbul. In accordance with these evenness scores, university graduates tend to be more segregated

than any other groups found in Istanbul. As a benchmark, evenness degrees around 0.30 and 0.40 are generally close to many of European cities and can be defined as 'moderate' by US standards and they are relatively higher than that of Central European or post-socialist cities. According to D. S. Massey and N. A. Denton (1993), for US cities, values below 30 are considered low segregated, those between 30 and 60 are called moderate and those above 60 are considered as high segregated. For a similar study conducted with basic segregation indices for Polish cities see S. Marcińczak (2012). In this study, dissimilarity index is reported as 0.23 at core and peri-suburban levels and 0.19 at suburban zone for the Łódź functional urban region. For another study on residential segregation, trends of Budapest (Ladanyi 2002) report dissimilarity index scores of better-off employment groups as about 0.30 which is closer that of Istanbul as well.

Yet, this level of segregation can evidently be defined as 'high' when average index values of Istanbul are considered (0.25 for dissimilarity index and 0.34 for Gini index). On this account, other social groups defined here as 'highly unevenly distributed' in the city are professionals, top level white collar workers and finance sector employees from employment groups. For professionals, dissimilarity index value yields 0.33 with the Gini index value of 0.43. This figure is 0.28 among finance sector employees, top level white collar workers, and 0.26 for employers. As far as household size is considered as a good indicator of social status for Turkey, Istanbul exhibits a moderate evenness degree with the score of 0.20 for the people living in the households with three people and less. This is, more or less, an average segregation level of high-status groups found in European cities[2]. Yet, moderate index values belong to female illiterates (0.16), working females (0.16) and manufacture sector employees (0.17) as a proxy of low-status groups of the city. Therefore, as a result of evenness degrees presented for Istanbul, it is reasonable to assume that segregation along the line of education is stronger than that originating from employment. What is also interesting is that higher social groups represent much higher values of both dissimilarity index and Gini values than that of lower social groups which can be

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[2] See here the comparative study of S. Musterd (2005) in which segregation levels of European and American cities are measured both in ethnic and socio-economic lines. In accordance with this study, even for the high-status groups of European cities, segregation index values are lower than 0.20.

defined as an indication of the stronger tendency on the part of better-off groups to be unevenly distributed, in other words, more segregated from the rest of the city.

Exposure is the second dimension of analysed segregation. A population group can be uniformly and evenly distributed across the neighbourhoods in an urban area, but if this group constitutes a smaller share of the population of the city than it may subject to a higher degree of isolation regardless of the level of its even distribution. Exposure is, therefore, introduced as the second dimension of segregation which refers to the degree of potential contact or the possibility of interaction between minority and majority members within the city regardless of how evenly distributed they are. As the most widely-used and the basic measure of residential exposure, *isolation index (xPx)* is used here to find out the exposure degrees of each social group. The isolation index is measured as:

$$0_x (P)^*_x = \sum_{i=1}^{n} [x_i / X] [x_i / t_i], \tag{3}$$

where:

x_i – total population of the group *x* in the unit *i*,

t_i – the total population of unit *i*,

X – total population of group *x* in the whole city.

Like the dissimilarity index, the isolation index ranges from 0 to 1 where zero indicates no exposure, and 1 indicates high exposure that all members of the group are in the neighbourhoods where no other groups live.

The isolation index values of social groups found in Istanbul are provided in the third column of Table 1. Accordingly, the most notable asset of these results is the lower degrees of isolation for almost all of the groups. The average isolation degree of the city is 0.10 and there are three main groups – university graduates, manufacture sector employees and the people living in the households with three people or less – which have relatively higher isolation values than that of average threshold. It is important to note that the lower isolation index values presented here are also highly correlated with the shares of the groups within the city. Especially for the indices which are sensitive to changing in demographic compositions and relative size

of population groups, the resulting values also tend to be lower because of the smaller shares of the groups within an urban area. The isolation index is one of them sensitive to the relative shares and the overall number of the groups within an urban area. Yet with that in mind, isolation index scores are still effective even for this kind of groups to compare and contrast them with other groups or understanding their segregation trends as well. The isolation index values of those groups accounts for 0.16, 0.12 and 0.31, respectively, which means in this case that the probability of a university graduate, a manufacture sector employee or a nuclear family member interacting with another member of their type is between the percentages of 15 and 30, respectively. In absolute terms, 16 of every 100 people a university graduate meets another university graduate; 12 of every 100 people a manufacture sector employee meets another one; and 31 of every 100 people a member of a nuclear family meets another person who also live in a household of three people or less. However, even the three groups do not reach the high levels of isolation that can be found in many European or American cities. Yet, these scores of isolation are broadly similar to that of Central European cities where the isolation scores are around 0.12 and 0.14 for lower educated, and 0.19 for better educated groups as proposed in a similar article released for Polish cities (Marcińczak 2012). On the other hand, the higher isolation degrees of the three groups indicate that university graduates and the nuclear family members as the two main stronger indicators of high social status for Turkey are not only segregated but also isolated in the urban area although this is not the case for manufacture sector employees. As can be seen from evenness distribution values of employees of manufacture sector, one can assume that although they are much more likely to be evenly distributed across the city than any other employment group, they tend to be isolated in the urban area with higher values of exposure. It is, therefore, again the members of higher social groups who tend to be both segregated and isolated residentially in Istanbul.

Concentration, the third dimension of segregation defined by D. S. Massey, N. A. Denton, refers to relative amount of a geographic area occupied by a population group within an urban area. The groups which share smaller proportions of total area are said to be residentially concentrated. In other words, the less of an urban

area a group inhabits, the more concentrated it is (Massey, Denton, 1988). Therefore, it basically measures the extent of how densely the groups are crowded in the neighbourhoods. For instance, a population group found in a city may be evenly distributed across the neighbourhoods with an optimum degree of evenness index. However, if this group occupies smaller shares of an urban area, it is defined as highly concentrated. Indices of concentration thus basically define the characteristics of locational typologies of the groups, and since concentration is highly related with urban units, these indices are defined as 'spatial' in the related literature. In order to measure spatial concentration trends of social groups in Istanbul, *delta index (DEL)* is used. The index can be defined as the spatial version of the dissimilarity index and like DI, delta index scores range between 0 and 1, where 0 indicates maximum deconcentration which simply means that all members of a population group live in the larger neighbourhoods, and 1 indicates maximum concentration that all members of a population group live in smaller neighbourhoods within an urban area.

In the Istanbul case, delta index scores are relatively higher for almost all of the social groups as can be seen in Table 1. In absolute terms, the average concentration score of groups is 0.49. This figure corresponds to 0.53 for group of university graduates and 0.50 for professionals, which means that more than a half of university graduates and professionals have to move across neighbourhoods in order to achieve an even distribution throughout the urban area. High-status occupational groups, e.g. finance sector employees and top level white collar workers, also have the concentration degree of 0.49 which evidently indicate a clear trend toward higher residential concentration for better-off groups. For female illiterates, this figure yields to 0.46 as the lowest concentration degree among all groups. These scores, thus, simply show that although all of the group members in Istanbul tend to live in relatively smaller areal units with higher concentration scores, members of upper social groups (high status education and occupation groups) are more likely to be densely resided in certain neighbourhoods within the urban area. This is mainly because of the fact that high social groups are more likely to occupy the coastal areas or in places which are closer to the central areas of Istanbul in relatively smaller and dense neighbourhoods, whereas low social groups inhabit the urban fringe in larger areal units. This

locational choice of those groups can be best seen in the local patterns of education groups provided in Figure 1 and Figure 2. This can also be inferred from centralisation scores which yield higher in high status social groups. Among those groups, the university graduates is the one which has the highest scores of segregation indices measured so far (evenness, isolation, concentration) indicating that better educated groups are not only segregated and isolated in Istanbul, but also concentrated in relatively small neighbourhoods. Moreover, it should be noted that the trend of higher concentration scores in high status groups is definitely a feature of Istanbul that is exclusively on its own. In Western cities, it is mainly low-status groups tend to live in smaller neighbourhoods with a densely population. In accordance with an extensive segregation index study of US Census Bureau (2000) conducted for American cities, ethnic groups of African Americans and Hispanics are those who are more likely to concentrate in the central areas of cities. This trend seems dissimilar in the case of Istanbul. In the latter city, concentration scores suggest, however, that better off groups are slightly more residentially concentrated than the residents of lower social status.

Clustering is another spatial dimension of segregation that D. S. Massey and N. A. Denton define ash referred to the distribution of the members of a population group across an urban area relative to each other considering the spatial contiguities of the neighbourhoods. A high score in a clustering index indicates a spatial configuration of a group where the neighbourhoods inhabited by are contiguous and the group members adjoin to one another to form a cluster or an enclave in this place. The more contiguous neighbourhoods a group inhabits, the more clustered it is. For measuring clustering trends of Istanbul, *absolute clustering index (ACL)* is used, which ranges from 0 as a sign of minimum clustering to a maximum clustering degree of 1 that it never equals to.

Table 1 shows the extent of residential clustering of social groups in Istanbul. Accordingly, clustering scores of Istanbul are said to be lower at a first glance. An average value of clustering measured for the groups is 0.05, which indicates that the neighbourhoods inhabited by specific social groups in Istanbul seem broadly scattered around the urban area. However, as also seen in isolation scores, exposure and

clustering indices are highly insensitive to the relative shares of groups within the city. When groups that share smaller proportions of total population are considered as in Istanbul, these scores are inherently expected to be at low levels. Notwithstanding the methodological problem mentioned, resulting scores allow to make comparisons with intra-city social groups in terms of clustering trends. As can be seen in Table 1, the highest clustering scores belong to university graduates (0.09) and the members of the families of three people or less (0.16), which simply means that the neighbourhoods with high proportions of university graduates or nuclear family members are located adjacent to other neighbourhoods with high proportion of that group. It is, therefore, again the residents with higher social status that are more likely to be clustered or grouped together in urban area. The clustering trend of higher social groups become more significant when the local index (LQ) values of this group is mapped. It is also for this reason that local patterns of geographical concentration of university graduates are provided in the previous section. However, the slightly higher clustering score of manufacture sector employees (0.07) from employment group show that living as groups or clusters can also be seen for lower social groups of Istanbul. Since around 0.05 is defined as the average clustering score of the city, better-off groups of finance sector employees, top level white collar workers or professionals seem hardly likely to be grouped or clustered in urban area. In other words, the members of high-status related employment groups are able to be more dispersed across the city. All this implies that there are some 'inverse' groups in terms of clustering within education and employment groups. In terms of education, better educated people are more likely to be grouped together, whereas female illiterates exhibit an inverse trend. In what follows, it is the employees of manufacture sector from employment groups which have higher tendency on clustering in a certain place than high-status employment groups, e.g. top level white collar workers or finance sector employees. Nevermore, one can evidently say that manufacture sector employees and the members of the nuclear families of three people or less are not only highly isolated but also highly clustered in Istanbul in accordance both with isolation and clustering index scores provided in Table 1.

As the last dimension of segregation, *centralisation*, captures the extent to which a population group is residentially located close to the city centre. In other words, it simply measures the degree of a population group's proximity to the central business district (CBD) of an urban area. The closer a group to the city centre, the higher centralised it is. Among widely-used centralisation indices, *absolute centralisation index (ACI)* is used. A centralisation score of 0 indicates higher tendency on centralisation of a population group whilst index score of 1 means that all members of that group reside in the central areas of the city.

Before presenting the results of centralisation measures of Istanbul, two main challenges need to be explained by the application of centralisation index to the case. First, because of the fact that centralisation indices are developed for American cities where the poor and the racial and ethnic minorities concentrate near central areas, proximity to the city centre acquires a negative meaning and centralisation is, thereby, deemed as highly correlated with 'deprivation' in American measurements. However, this situation is different in Turkish context. Like in many cities of Turkey, in Istanbul, living in the areas nearer to the CBD is still a sign of prestige as it is further explained with reference to centralisation scores provided in the last two columns of Table 1. In other words, contrary to American cities, the closer the groups to the city centre the higher status they may have in Istanbul. On this basis, interpreting centralisation indices of Istanbul would also be different that of US or European cities in terms of the groups that have higher centralisation degrees. The second challenge confronted in using centralisation indices in Istanbul is based on the unique geography of the city. As can also be seen in the local patterns of the city provided in Figure 1 and Figure 2, Istanbul is built in a unique geography between Asia and Europe. There are, therefore, three main central areas, one of which is located in the Asian and the other two in European sides of the city. Due to being a polycentric city (as discussed before), the centralisation trends of Istanbul is measured considering both of these three central areas as 'ACL score for European core (a)', 'ACL score for Historical core (b)' and 'ACL score for Asian core (c)' although similar results are reported (see also Figures 1 and 2).

The centralisation index scores of Istanbul make it clear that university graduates tend to have relatively high levels of centralisation (around 0.40), followed closely by the groups of finance sector employees, professionals and employers who mostly refer upper-middle class occupations in Turkey. Top level white collar workers as the highest status occupation group exhibit low centralisation index values with the score of 0.34 for Asian and Historical, 0.35 for European cores and lower social groups, e.g. female illiterates and manufacture sector employees follow those with the lowest centralisation scores around 0.20. Looking at the centralisation levels, one can see that upper-middle social groups are more likely to reside in the central areas than the lower social groups whereas two ends of society, the highest and the lowest social groups, have a strong tendency to live in the peripheral areas. Besides, better-off groups located in the central areas of Istanbul are those who have the higher degrees of segregation in evenness, exposure and concentration dimensions, which simply indicate that the central well-to-do areas of Istanbul are the concentration and isolation residents of those better-off groups as well.

4. Segregation patterns of Istanbul: a local index of location quotient (LQ)

Global index measures are followed by the calculation of a local index, location quotient (LQ), in order to visualise the spatial divisions that social groups generate and to assess whether global segregation scores are expressed geographically. Resulting settlement patterns of Location Quotient calculation are illustrated by Figures 1 and 2.

Local segregation patterns provide useful insights into characteristic of spatial divisions and they are, on the other hand, useful tools in order to alter 'low-share problem' found in clustering and exposure measures mentioned before. The location quotient (LQ) as one of the local indices of segregation is, therefore, employed to generate local residential patterns of social groups found in Istanbul. Location quotient used here is calculated as:

$$LQ = (x_i / t_i)/(X / T), \tag{4}$$

where:

x_i – the number of people of group X in spatial unit i,

t_i – the total population of unit i,

X – the total population of group X,

T – the total population of city.

LQ basically and simply compares the relative share of a population group located in a neighbourhood with its share within the city as a whole and it identifies each neighbourhood in an urban area where a population group is over-represented (when LQ is greater than 1) or under-represented (if it is smaller than 1). In order to identify more precisely the residential segregation trends of Istanbul, local index of LQ is measured for two groups – university graduates and female illiterates – since segregation levels of education are relatively higher in global index results. Figure 1 illustrates neighbourhood level LQ pattern of university graduates whereas Figure 2 presents that of female illiterates.

As can be seen in Figures 1 and 2, social geography of Istanbul reveals high residential segregation with great clarity in education line. Segregation maps of university graduates and female illiterates, to this end, represent two adverse residential distributions; high educated people predominantly locate in the southern part of the city whilst low educated groups are dispersed widely in the northern fringe. Note that these two groups are hardly likely to come closer in urban area. Nevertheless, the basic determinant of this divided pattern is evidently the 'proximity to the sea'. University graduates as the representatives of the well-to-do groups, almost without exception, concentrate in the coastal areas whereas female illiterates, and, in a sense, lower-status groups inhabit the peripheries. With some exceptions, one can clearly see that better-off education groups settle in neighbourhoods along the sea coast while lower status social groups occupy areas in peripheries. It is, therefore, reasonable to assume for Istanbul that the greater the proximity to the sea, the higher the socio-economic status. This flawless divided picture can thus be defined for Istanbul as the most characteristic feature of its segregation pattern.
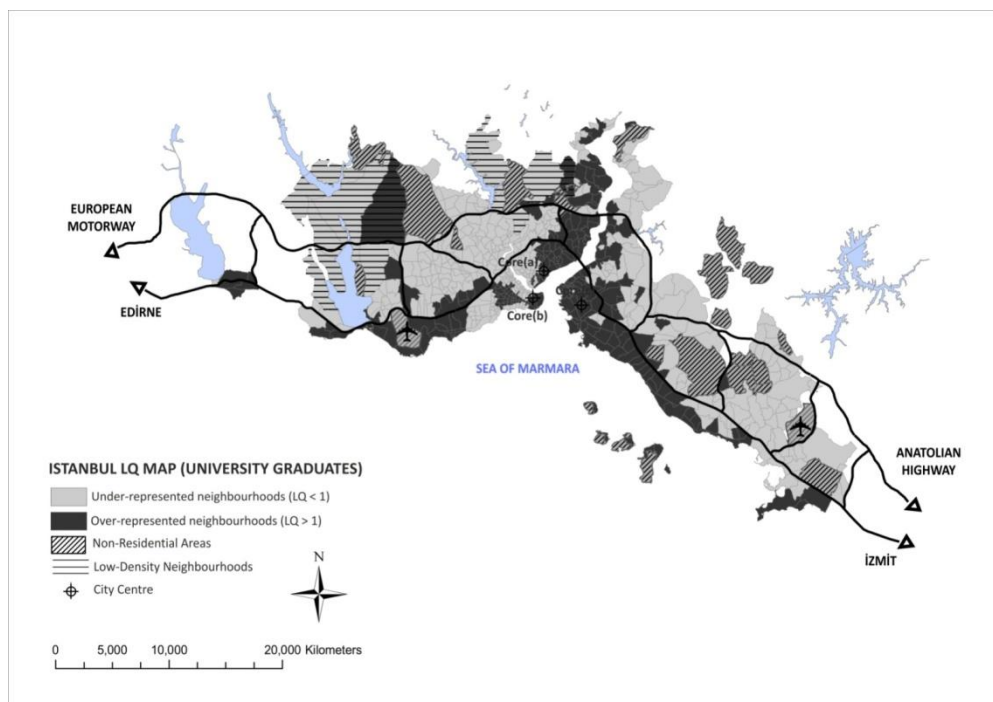
Figure 1. Location Quotient (LQ) pattern of university graduates in Istanbul
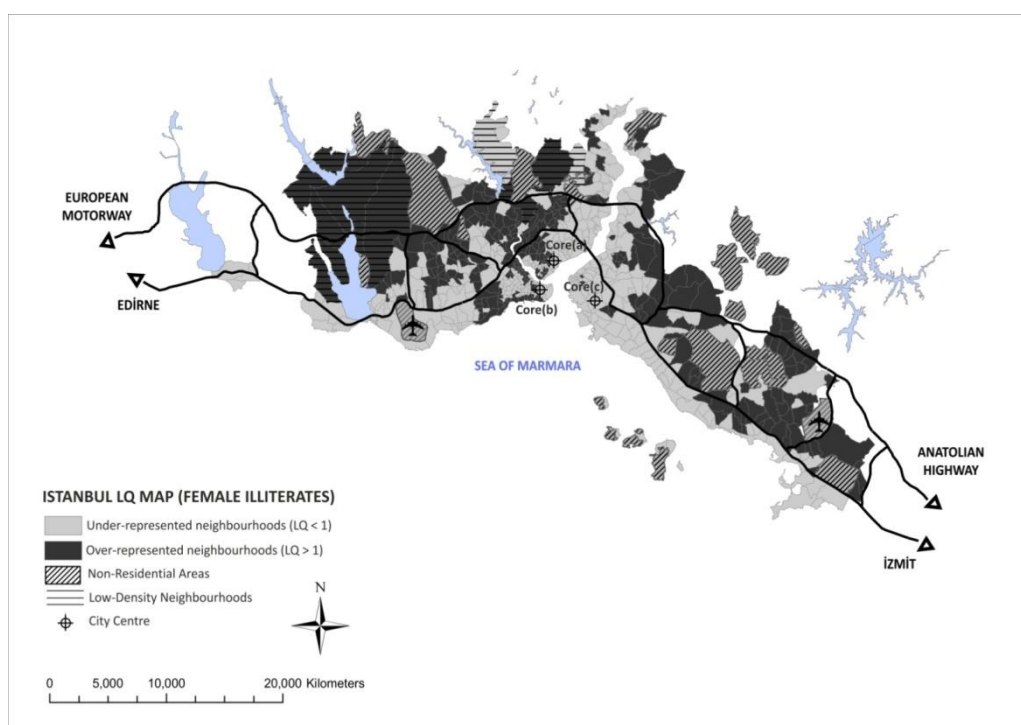
Source: the author

Figure 2. Location Quotient (LQ) pattern of female illiterates in Istanbul

Source: the author

It is interesting to note that residential segregation patterns of education groups are highly related with the physical barriers of the city as LQ maps present. In these patterns, Edirne-Izmir highway surrounds the neighbourhoods dominated by university graduates located in the coastal areas of the city and acts as a barrier which allocates high-status neighbourhoods from the low-status sides of the city. European and Anatolian highways are, in a similar fashion, distinctive figures to distinguish the regions in different social status. These examples, eventually, indicate that locational choices of social groups are also highly correlated with the city form, and physical barriers can rule and reinforce the spatial divisions in Istanbul.

The LQ patterns of Istanbul also provide useful insights into patterns of isolation and clustering which are initially explained by global indices. Accordingly, high and low education groups are seemed to choose to isolate themselves from the rest of the city, as well as to segregate from each other in Istanbul. The isolation forms of them are, however, rather different. As can be seen in the segregation patterns, high educated population appears to have the ability to come together to form spatial collocation in the coastal areas whereas low status groups widely dispersed across the city can only inhabit the residual places where better-off groups do not choose to locate. It is, therefore, reasonable again to assume for Istanbul that it is predominantly the well-to-do groups that tend to be –voluntarily – more segregated and isolated in the urban area.

An additional finding resulting from the segregation patterns applies to the spatial pattern of over-represented neighbourhoods with university graduates which has more central city orientation than that of female illiterates. As it is also explained by the absolute centralisation index values, it is predominantly high educated group that is more likely to be centralised for both sides (European and Asian) of the city. However, of the two central areas of Istanbul, Asian core (ACE of 0.43) seems to be a massive clustering area of high-educated people where European core (ACE of 0.39) serves as a buffer place between the high and low education groups. To this end, European core of the city can also be defined as one of the rare places where low status social groups are getting closer to the better-off segments of Istanbul.

5. Conclusion

Segregation levels of some social groups of Istanbul are examined in the article considering five dimensions of segregation. This attempt thus provides some main remarks about segregation trends of Istanbul especially when it is compared with other geographies. There are, first and foremost, two principal findings emanating from the analyses made by using global and local segregation indices. The first main finding is that although Istanbul is widely characterised as a 'highly divided city' with its city image as a growing globalised metropolis, index scores presented in the article show that as far as five dimensions of segregation are concerned the fragmentation found in Istanbul can be regarded as 'moderate' or 'milder' on the international scale. However, the picture becomes grimmer with the other principal finding based on the patterns of segregation. Segregation maps of Istanbul revealed by local indices that higher and lower social groups are highly unevenly distributed across the city. A closer examination of local maps facilitates to see that Istanbul has its own peculiar segregation pattern which can be referred to as 'the typical segregation pattern of Istanbul' where the better-off education groups who locate along the coast are strikingly detached from the lower groups reside in the peripheries.

It is possible to make further discussions on those two key findings. This article, first and foremost, makes it clear that Istanbul has consistently higher levels of segregation on the dimensions of evenness, concentration and centralisation. Although index comparison with other geographies is somewhat difficult due to both the different targeted groups (social groups, ethnic groups or migrant groups) and the sensitivity of indices to population compositions, it can evidently be said that it is only the highest segregation scores (e.g. dissimilarity index score of university graduates) of Istanbul which are closer to those of European cities and correspond to low-segregation levels at US standards. It is mainly the segregation levels of ethnic or migrant groups measured for European and American cities in the related literature. Therefore, the comparison mentioned here is between the average scores of, broadly defined, different groups. However, in a broader view, average segregation scores of Istanbul are evidently closer to that of Central European cities although local segregation patterns of those two geographies are disparate. The LQ patterns of employ-

ment groups (white collar workers and the unemployed) are provided for Łódź (Poland) in a study conducted by S. Marcińczak and I. Sagan (2011). In comparison of these patterns to the local patterns of education groups in Istanbul, one can see that segregation maps of Istanbul reveal a more divided city picture than that of the Łódź case although the global segregation index scores are similar. However, as far as exposure and isolation indices as strong indicators of severe segregation and exclusion are concerned, Istanbul has relatively lower scores. The lower scores can be acceptable to a certain extend for Istanbul where the main form of segregation is not ethnic or racial but socio-economic. However, it is also important to bear in mind that lower scores of congregating (isolation and clustering) may additionally be explained by the methodological problems mentioned above. To restate, isolation and clustering indices are very sensitive to changes in demographic compositions and relative size of population groups, which means that resulting values of those indices tend to be inherently and methodologically lower in the Istanbul case where the considered groups are social groups that constitute very small shares of total population (finance sector employees and top level white collar workers who have the population percentages of 3.7 and 1.1, respectively, can serve as the best examples).

More striking results can be derived from segregation levels of Istanbul when a group-based evaluation is made. To begin with, looking at the segregation levels of social groups, one can see that there are significant differences in segregation trends of different groups. To illustrate this, the groups of the university graduates, as the best proxy of high status in Turkey, have the greatest index scores in every dimension of segregation. University graduates are more likely to be unevenly distributed across the city, to share common neighbourhoods with each other, to live in crowded and smaller neighbourhoods, to locate closer to the city centre and to form clusters in urban area than any other social group found in the city. In the contemporary literature, a group is considered as 'hyper-segregated' when it has the highest degrees on several dimensions of segregation (Massey, Denton, 1988; 1993). Hyper-segregated group of Istanbul, to this end, can evidently be characterised as university graduates.

Moreover, as can be seen from local segregation patterns that university graduates generate, spatial divisions are also very impressive. Since the LQ is meas-

ured for educational groups as university graduates who have the highest scores in global indices and female illiterates who have the lowest scores, it is clear that residential segregation of better educated people is more severe and rigid than that of lower educated people, although this is a finding less pronounced in clustering and isolation measures. As can be seen from segregation patterns, better educated people, almost without exception, occupy the coastal areas of the city staying away from the lower educated people located in the peripheries. Besides, residential pattern of the well-educated is more fragmented and exclusionary than that of the low-educated; they are highly concentrated in coastal enclaves where their concentration, isolation and clustering degrees are relatively higher. This inverse pattern of the highest and the lowest education groups show, *ceteris paribus,* that residential segregation in education line is very effective in understanding main axes of residential segregation in Istanbul and the city is, no doubt, a highly spatially segregated city along education lines.

The well-to-do occupation groups, e.g. finance sector employees, professionals and employers, are, on the other hand, the second most segregated groups in Istanbul. These groups have the highest scores in four of five dimensions indicating that better-off employment groups are more likely to be segregated from the rest of the city just as defined for better educated people. Note that in dimensions of concentration and centralisation, their segregation scores are almost at level of university graduates. On the other hand, however, female illiterates (who occupy the outlying areas of the city) and manufacture sector employees, as the representatives of low status groups, reveal an opposite trend. They have the lowest degrees in almost every dimension of segregation which simply means that lower groups are more widespread across the city, they are less likely to be centralised and less likely to share common neighbourhoods with their own types, when compared with higher groups.

Based on these findings it is right to claim that global index scores in five dimensions of segregation can summarise the main axes of residential differentiation in Istanbul. From the index scores, it can safely be concluded that higher social groups represent much higher index values of segregation than that of lower social groups

which can be deemed as an indication of the stronger tendency on the part of better-off groups to be unevenly distributed, concentrated, isolated, clustered, centralised, and eventually 'segregated' from the rest of the city. As well as global index scores, the LQ index also draws characteristics of residential segregation in Istanbul shaped on the basis of severe distinctions of two ends of total population as the highest and the lowest education groups. Note that among all groups, it is especially education groups that have strong ability to represent the residential division between higher and lower social groups of Istanbul with great clarity. As the maps reveal, residential segregation is woven on the basis of better educated and low educated people almost not touching one another in the city. On this basis, in accordance with both global and local measures of segregation, it is reasonable to assume for Istanbul that it is predominantly better-off social groups that are able to form segregated spatial configurations, especially in the urban areas closer to environmental amenities and partially around the city centre. Lower social groups, on the other hand, seem to prefer congregating in the certain areas of the city in order to get benefit from social networking which, traditionally, cuts back the harmful effects of urban poverty in Turkey (for the studies about the neighbourhood clusters of urban poor in Istanbul as a way to survive in urban life see Erder 1996; Işık, Pınarcıoğlu, 2001).

As has been explained so far with its segregation patterns and levels, it is especially the high segregation between the high and low education groups which defines the characteristics of segregation in Istanbul. In accordance with P. Marcuse (1998), in a society where higher and lower segments are in greater shares and highly residentially segregated, it can be interpreted as a sign of dual city. Although the term of 'dual city' has a more complex meaning, which also requires evaluating a city with its income inequalities, poverty rates or accessibility to urban services and the like, in terms of residential divisions, it can be claimed that Istanbul has strong indicators to be defined as a dual city as far as the socio-economic segregation is concerned.

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