

MOSQUE USE DENSITY AND PHYSICAL ENVIRONMENTAL CHARACTERISTICS AROUND THE MOSQUES IN HISTORICAL AND NEW DEVELOPMENT AREAS OF IZMIR-TURKEY*

Emine Duygu KAHRAMAN¹
Ebru ÇUBUKÇU²
Beyza KARASU³
Mustafa TAŞÇI⁴

Abstract

This paper aims to compare the mosque use density and physical environmental characteristics around mosques in two types of areas: in historical city centres and in contemporary areas in the periphery are compared. A total of ten mosques were analyzed; seven were located in the city centre (Kemeraltı district), three were located in new development areas (Mavişehir-Şemikler district). Results showed differences in street network pattern and physical environmental characteristics in two areas. In parallel, use density was higher in historical city centres than that in contemporary areas. Despite the methodological limitations (small sample size etc.), this study is important in highlighting the relation between physical environment and people's behaviour in the case of mosque use.

Keywords: Accessibility, Environmental psychology, Mosques, Space syntax, İzmir

TARİHİ VE YENİ GELİŞME ALANLARINDA CAMİLERİN KULLANIM YOĞUNLUKLARI VE FİZİKSEL ÇEVRE ÖZELLİKLERİ İZMİR-TÜRKİYE

Özet

Bu çalışma tarihi kent merkezindeki ve yeni gelişme alanındaki camilerin kullanım yoğunlukları ile yakın çevrelerindeki fiziksel çevre karakteristikleri arasındaki ilişkiyi tartışmaktadır. Tarihi kent merkezindeki camileri temsil etmek üzere İzmir kenti Kemeraltı Bölgesinde konumlanan yedi adet cami ve yeni gelişme alanlarındaki camileri temsil etmek üzere İzmir kenti Mavişehir-Şemikler Bölgesinde yer alan üç adet cami seçilmiştir. Seçilen on adet cami için kullanım yoğunluğu ve anılan camilerin yakın çevresindeki mekânların morfolojik özellikleri analiz edilmiştir. Sonuçlar tarihi kent merkezinde ve yeni gelişme alanlarında konumlanan camilerin yakın çevrelerinde fiziksel çevre özelliklerinin (arazi kullanımı ve sokak dokusu ve erişilebilirliği) farklılaştığını göstermiştir. Bu sonuçlara paralel olarak, kullanım yoğunluğu da tarihi alanlarda yeni gelişme alanlarına göre daha yüksektir. Metodolojik eksikliklerine (rağmen küçük örneklem büyüklüğü vb.) bu çalışma, camilerin kullanım yoğunluğu ve mekânsal özellikler arasındaki ilişkiyi analiz ederek, mekân ve insan davranışları arasındaki ilişkiyi irdeleyen çevre psikolojisi disiplinindeki araştırmalara örnek teşkil etmektedir.

1 MSc, Dokuz Eylül University, kahramanduy@gmail.com.tr

2 Prof. Dr, Dokuz Eylül University, ebru.cubukcu@deu.edu.tr

3 Bsc, Dokuz Eylül University, beyzakarasu@gmail.com

4 Bsc, Dokuz Eylül University, mustafat.optimumgd@gmail.com

* A different version of this study is presented in 17th IPHS Conference (IPHS: The International Planning History Society), July 17-21, 2016, Delft/Netherlands.

Anahtar Kelimeler: Erişilebilirlik, Çevre psikolojisi, Camiler, Mekân dizimi, İzmir

Introduction

Cultural differences have influenced the spatial organization of settlements since the ancient times. Religious structures and their organizations (density, location) could symbolize the cultural values and life styles in a society. Holy structures were built on the hills in ancient cities of Greece and Rome, likewise mosques were located in the hearth of a Muslim settlements (Saoud et al, 2002, p. 4).

There is a two-way interaction between culture and human behaviour; culture influences human behaviour and human behaviour influences culture. This reciprocal interaction applies to interaction between the physical environment and religion. No doubt; religion influences lifestyle and choices such as clothing, eating habits, family structure (and in return residential size), density and location of religious structures. In other words, religion influences people's life style and behaviour, which in return shape the physical environment (Mazumdar and Mazumdar, 2004, p. 385). For example in settlements where cultural activities are dominated by religious activities the density of religious structures are high and they are located in the centre of neighbourhood, where most of the social activities take place.

In Muslim settlements mosques are the religious buildings for worshipping. According to Hamid et al. (2012, p. 50), a mosque is the landmark of the Muslim settlements. They are generally located at the intersection points and at the centre of the activities. Chiodelli (2015, p. 22) points out; the mosque can be defined as a place where Muslim people meet and pray. In parallel, Ayhan and Cubukcu (2010, p. 237) analysed the urban development and spatial distribution of mosque in a period of time and argued that the spatial distribution of mosques influences urban development. Besides its worshipping functions, mosques serve as an institute including marriage service, a platform for charitable donations and a platform for teaching activity (Saberı et al, 2016, p. 127).

Muslim men tend to visit mosques, which are in close vicinity of their house or work, daily. Fridays, Sacrifice Feast and Ramadan Feast are the days when the mosques reached their highest density (Saberı et al, 2016, p. 127). Yet, accessibility to mosques may differ from culture to culture, neighbourhood to neighbourhood. Kershen and Vaughan (2013, p. 14) mentioned that people are willing to be close to the buildings of their religion. Their study about immigrants in London showed that orthodox Jewish prefer to live in residential areas that are in walking distance to the synagogues, but being close to a mosque is not necessity for them.

In Turkey, mosques that were built in the Ottoman Period are still in use and mostly seen in historical districts. Islamic culture is the main factor shaping the Ottoman cities. In Ottoman period, most of the social life was occurred around mosques and bazaars (Şahinalp and Günay, 2012, p. 150). Economic functions were held mostly on public spaces, such as main streets (Saoud et al, 2002, p. 6). Mosques were located in the city centre and street network system is composed of cul-de-sacs and narrow streets. On the other hand, in contemporary cities in Turkey, population growth leads

to urban sprawl and suburbanisation. Thus, the periphery of cities has to deal with lots of social problems, such as lack of public space which leads to lack of a sense of belonging and independent family structures and social segregation. The dependency on motorized vehicles decreases the walking or cycling activities in the outside and limits the chance of meeting and interacting with others. The traces of this transformation in social life -from pedestrian oriented to motorized vehicle oriented life style- can be seen in spatial environment. In new development areas, street network is different than that of Ottoman period.

In Turkey, the street network and land use variation around religious buildings are planned by planning authorities via master plans. Nowadays, in new development areas the street network around mosques encourage the use of motorized vehicle more. In other words, accessibility to mosques as a public space is lower than it used to be. Looking into the past, mosques were at the heart of the centre with the bazaars and khans nearby them. Given that, this study aims to make the following comparisons aims to discuss whether mosques in contemporary urban areas are planned as public spaces as they used to be. City planners could benefit from such discussions and plan better environments around some special land uses (such as religious areas).

1. Compare the use capacities of the mosques on casual days or special events in historical city centres and new development (contemporary) areas?
2. Compare the use rate of the mosques on special events in historical city centres and new development (contemporary) areas?
3. Compare the street network and accessibility around mosques in historical city centres and new development (contemporary) areas?
4. Compare the land-use around mosques in historical city centres and new development (contemporary) areas?

Case Study

The case study was held in İzmir, which is located in the western part of Turkey where mostly Muslim dwellers used to live in. The mosques were selected from two districts; (1) Historical District (Kemeraltı) and (2) Contemporary Development (Mavişehir-Şemikler). Kemeraltı district has been occupied since the Byzantine period. Ottoman Turks settled in the area in 1425. In other words, Kemeraltı district represents the historical character and has been serving as the city centre for a long time. Mavişehir-Şemikler district represents the contemporary environment and located on the periphery of İzmir and dominated with high rise residential buildings which have been built since 1980s.

A total of ten mosques were analyzed; seven were located in the city centre (Kemeraltı district), three were located in contemporary areas (Mavişehir-Şemikler district) (Figure 1). For the use density, surveys were held with imam of each mosque and peak hour use densities were derived. For physical environmental characteristics, accessibility and land use around each mosque was investigated. Accessibility was calculated for the streets within 400 meter distance to each mosque via Space Syntax (Figure 2).

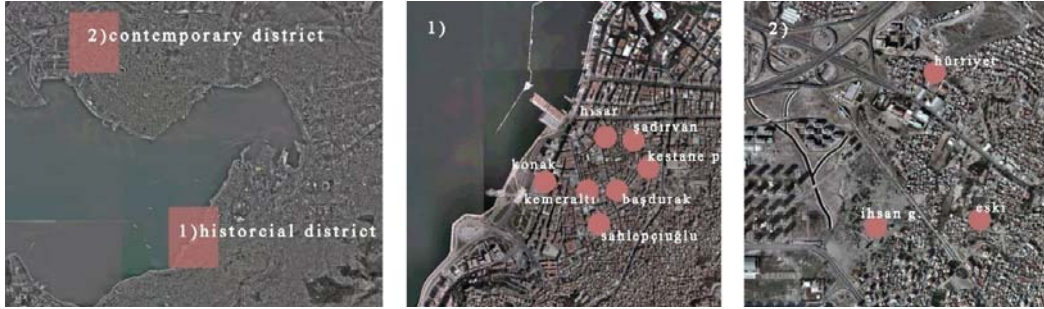


Figure 1. Mosques located in (1) historical and (2) contemporary district.

According to spatial planning and construction regulations of Turkey 2014, approximate walking distance of mosques should vary between 250 to 400 meters based on the size of the mosque. Thus, 400 meter buffer zones were created in order to calculate accessibility (based on street network) in their service area. In historical city centre, these 400 meter buffer zones were overlapping as mosques were located in close distance to each other. However, in contemporary districts the 400 meter buffer zones were geographically separated (Figure 2).

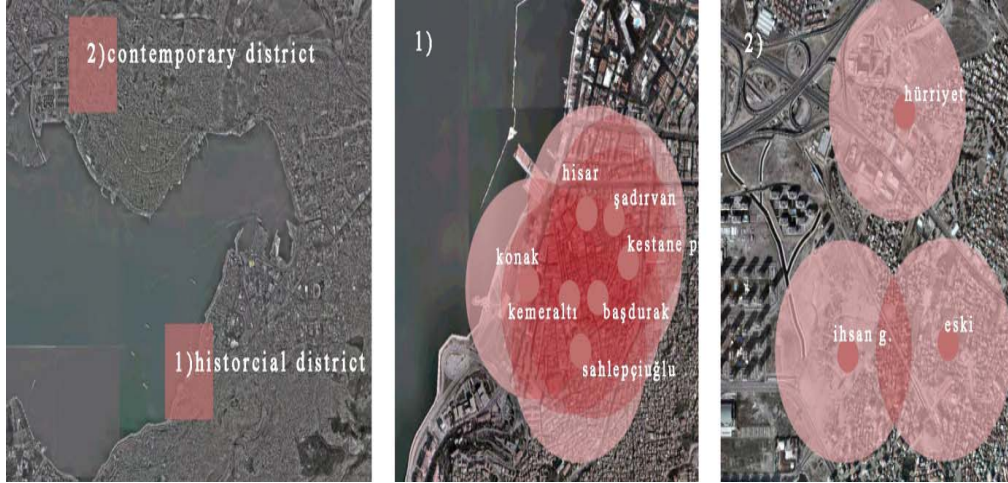


Figure 2. 400 meter buffer zone of Mosques.

Results

Mosque Use Density

Considering worshipping requirements for Muslims, people tend to use Mosques in two ways. Some people worship in mosques daily (five times a day). Some others, tend to worship in mosques only on special occasions such as Fridays and Festivals. In Turkey, Muslim men tend to worship in mosques on Fridays and Festival days more often than they do on causal days. Thus, mosques reach their highest density on those special occasions and may host people beyond their capacity.

Even though it varies seasonally, daily worshipping times are like this: the morning praying time is approximately between 05.00 am and 06.00 am, the noon praying time is approximately between 12.00 pm and 14.00 pm, the afternoon praying time is approximately between 15.00 pm and 17.00 pm, the evening praying time is approximately between 18.00 pm and 20.00 pm and the midnight praying time is approximately between 20.00 pm and 22.00 pm. Friday is the holy day for Muslims that majority of Muslim men tend to go to mosques at noon on Fridays for praying. Likewise, majority of Muslim men tend to go to mosques at morning time for Festivals, not only for worshipping, but also celebrate each other's festival that occurs two times a year.

Table 1. The Mosque's capacities and user frequencies in historical district (Kemeraltı).

Mosque Name	Capacity of Worshipper	Number of Worshippers on Casual Days					Number of Worshippers on Special Occasions (peak time)			Use rate at the peak time (%) *
		Morning	Noon	Afternoon	Evening	Night	Friday	Noon Time	Festival	
1 Başdurak	400	-	120	100	60	20	600	150	% 150	
2 Hisar	2000	20	400	300	200	50	2000	1500	% 100	
3 Kemeraltı	750	1	300	250	50	10	1000	200	% 133	
4 Kestane Pazarı	2000	30	250	250	100	40	1000	500	% 50	
5 Konak	70	6	120	120	30	20	200	60	% 286	
6 Şadırvanaltı	1000	20	200	150	50	20	1500	120	% 150	
7 Sahlepçioğlu	2000	1	100	75	30	10	2500	500	% 125	

* Use rate was calculated by dividing capacity of mosque by Friday noon time mosque usage per mosque.

Mosques are built in different sizes and shapes. Thus, their use capacity could vary. Surveys were held with Mufti to derive the capacities of each selected mosque in both historical and contemporary district. Table 1 shows the capacity and general number of worshippers (derived from Mufti) observed in casual days and special occasions in the historical district. Hisar, Kestane and Sahlepçioğlu have the highest capacity of worshipper (2000 people) that located in the historical district. On the other hand, Konak Mosque is located in the city center, in the middle of a well-known square (Konak Square) and has a landmark value for the residents of İzmir. Yet, Konak Mosque has the lowest capacity of worshipper (70 people). For casual days, lowest number of worshippers is observed in the morning. Highest number of worshippers is usually observed at noon times. Hisar Mosque is the most used one in a casual day at noon time. On special occasions Sahlepçioğlu Mosque and Hisar Mosque, have highest worshippers on Fridays. Hisar Mosque has the highest worshippers in Festival days in comparison to the other mosques. Besides frequencies, when we analyze the occupancy rate at peak times (Friday Noon), all mosques are used beyond their capacity (more than %100). On special occasions, Hisar Mosque is used just about its capacity and Konak Mosque is used three times its capacity.

Table 2. The Mosque's capacities and user frequencies in contemporary district (Mavişehir-Şemikler)

Mosque Name		Capacity of Worshipper	Number of Worshippers on Casual Days					Number of Worshippers on Special Occasions		Use rate at the peak time (%)
			Morning	Noon	Afternoon	Evening	Night	Friday Noon Time	Festival	
111	Eski	1000	60	120	90	25	70	600	1500	% 60
2	İhsan Gültekin	350	15	20	10	20	10	150	500	% 43
3	Hürriyet	350	35	85	55	40	38	300	-	% 86

* Use rate was calculated by dividing capacity of mosque by Friday noon time mosque usage per mosque.

Table 2 shows the capacities and user frequencies of each mosque in the contemporary district. Eski Mosque has the highest capacity of worshipper (1000 people). On the other hand, İhsan Gültekin Mosque and Hürriyet Mosque have the same capacity of worshipper (350 people). Similar to the mosques in the historical district, mosques in the contemporary districts host lowest number of people in the morning prays and highest number of people at noon prays. Eski Mosque has the highest users on Fridays. Similarly, Eski Mosque has the highest number of worshippers in Festivals.

Besides frequencies, when we analyze the occupancy rate at peak times (Friday Noon), all mosques are used below their capacity (less than %100).

Land Use Around Each Mosque

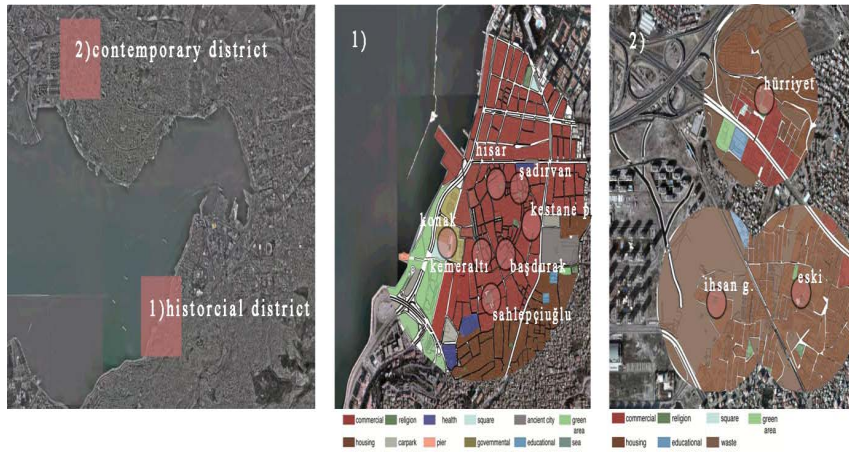


Figure 3. Land use in historical and contemporary district.



Figure 4. Mosques located in historical and contemporary district.

In historical district, “Konak Mosque” was located at the seashore before the land filling operation. After the land filling, the mosque is surrounded with a public space (Konak Square) which includes the clock tower and it is adjacent to the Kemeraltı Bazaar. Some of the other mosques are located next to the old bazaars or khans (çarşı / han) as in Ottoman culture. For example, “Kestane Mosque” is just next to the “Zahireciler Bazaar (çarşı)”, “Sahlepçioğlu Mosque” is just next to the “Sahlepçioğlu Bazaar (çarşı)”, and “Başdurak Mosque” is just next to the “Batakhan Khan (han)” (Figure 3

and 4). In other words, mosques in the historical district are mostly surrounded by commercial areas such as bazaars, khans, shops. Thus, shopkeepers and the customers form the user profile of these historical mosques.

Unlike the historical district, in the contemporary district the mosques are surrounded by the vacant land or residential areas. Eski Mosque is surrounded by residential landuse, İhsan Gültekin Mosque surrounded by vacant land and residential areas, and Hürriyet Mosque is surrounded by public services, commercial and residential areas (Figure 3 and 4).

Street Network Pattern Around Each Mosque: Space Syntax Analysis

Space Syntax is a scientific, human-focused approach that searches relations between the social life and space. Spatial organizations may bring people together or separate them due to their shapes. Research team of Hillier and Hanson in the late 1980's purpose to answer the question of how spatial organization effect social life in terms of movement, confrontation, route choice and walking tendencies of pedestrians and cognition. Space syntax calculations are based on geographical information about edges and nodes (streets and intersections) (Ratti, 2004, p.1).

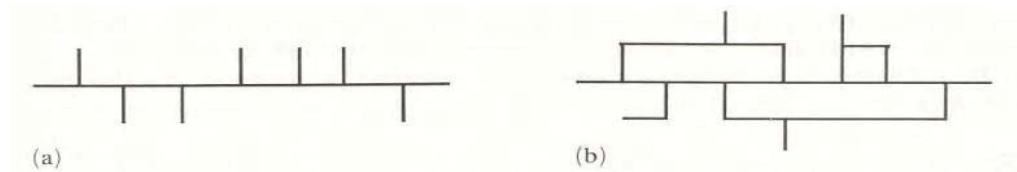


Figure 5. Main street, connections and peripheral streets (Hillier et al, 1993, p. 29).

One of the most important concepts in space syntax theory is the natural movement. Natural movement accepts that space directs the movement and people tend to choose the shortest path in the network system. Urban configuration (spatial organization) is the primary generator of the pedestrian movement is the main argument of natural movement. According to Hillier et al, (1993, p.29), (1) the most central segment likely to be used more, (2) peripheral segments likely to be used less and (3) movement tend to flow in straight lines (Figure 5). Space syntax analyses revealed 6 scores: integration (global), integration R3 (local), choice (global), choice R3 (local), connectivity and line length scores. Each score can be described as follows (Klarqvist, 1993, p. 11):

“Integration score is the average distance (depth) between the spaces. IntegrationR3 score is the average depth between the 3 syntactic steps. (Change of a direction from one line to another, it is called syntactic step). Connectivity score is the number of lines connected the given line. Choice score is the number of times one passes through the line to reach to any destination via shortest path. The score describes the potential flow for each segment in the global flow. ChoiceR3 score shows the local flow and contains 3 syntactic steps. Line Length is the length of the axles between the intersection points”.

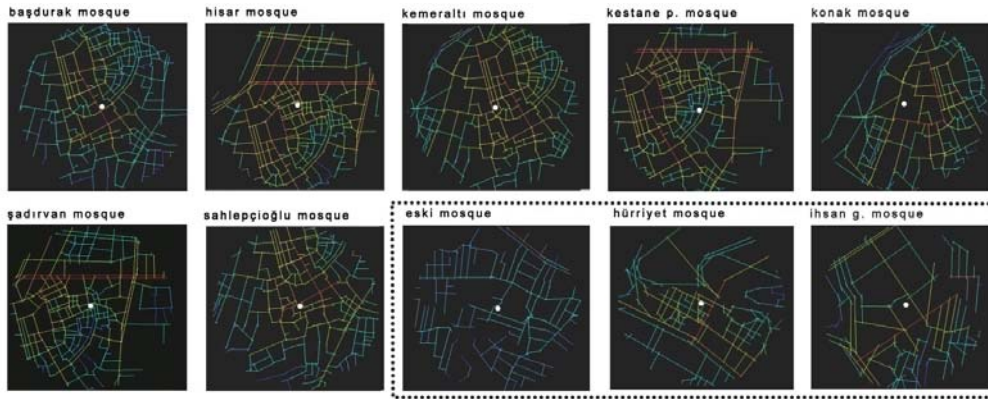


Figure 6. Integration analysis of the street network pattern in the 400 meter buffer zone of each mosque (Red lines main streets, Yellow lines connections, blue lines peripheral streets).

Axial maps which composed of the longest and fewest lines pass through the streets were produced (Figure 6). The red colour axial lines shows the most integrated streets and the green and blue colour lines shows the least integrated ones.

For the study area, street network pattern in the 400 meter buffer zone of each mosque is digitized to be analyzed via space syntax (DEPTHMAP software was used). Figure 6 shows the main street, connections and peripheral streets around each mosque. Results showed that mosques in the historical city centre are surrounded more with main street and connections. On the other hand; mosques in the contemporary district are surrounded more with peripheral streets than main street and connections.

Comparisons

Table 3. Descriptive statistics of mosques integration values.

Mosque		N	Minimum	Maximum	Mean	Std. Deviation
Başdurak	choice	233	-1	20119	1368,66	2449,894
	coiceR3	233	-1	452	33,52	58,409
	connectivity	233	0	12	3,13	1,801
	integration	233	-1,000	1,506	0,866	0,303
	integrationR3	233	-1,000	2,928	1,496	0,552
	line_lenght	233	3,180	341,637	72,271	56,319
Hisar	choice	233	-1	20119	1368,66	2449,894
	coiceR3	233	-1	452	33,52	58,409
	connectivity	233	0	12	3,13	1,801
	integration	233	-1,000	1,506	0,866	0,303
	integrationR3	233	-1,000	2,928	1,496	0,552
	line_lenght	233	3,180	341,637	72,271	56,319
Kemeraltı	choice	234	-1	20137	1344,86	2475,090
	coiceR3	234	-1	451	30,38	51,678
	connectivity	234	0	10	3,07	1,706
	integration	234	-1,000	1,492	0,830	0,343
	integrationR3	234	-1,000	2,713	1,426	0,588
	line_lenght	234	0,740	341,637	73,715	55,331
Kestane	choice	214	-1	11708	1080,64	1860,411
	coiceR3	214	-1	454	33,31	59,287
	connectivity	214	0	11	3,10	1,906
	integration	214	-1,000	1,366	0,878	0,428
	integrationR3	214	-1,000	2,733	1,460	0,683
	line_lenght	214	2,309	596,376	78,332	79,129
Konak	choice	157	-1	9085	733,07	1400,229
	coiceR3	157	-1	315	32,61	52,637
	connectivity	157	0	11	3,13	1,892
	integration	157	-1,000	1,625	0,887	0,411
	integrationR3	157	-1,000	2,799	1,445	0,663
	line_lenght	157	1,807	341,637	85,255	69,550

Şadırvan	choice	198	-1	13577	1071,19	1852,161
	coiceR3	198	-1	594	37,02	66,786
	connectivity	198	0	13	3,27	2,022
	integration	198	-1,000	1,458	0,948	0,227
	integrationR3	198	-1,000	2,863	1,595	0,523
	line_lenght	198	0,371	736,488	89,952	98,256
Sahlepçioğ- lu	choice	236	-1	18346	1567,44	2717,626
	coiceR3	236	-1	474	29,83	59,192
	connectivity	236	0	13	2,93	1,785
	integration	236	-1,000	1,284	0,734	0,349
	integrationR3	236	-1,000	3,045	1,386	0,639
	line_lenght	236	0,407	430,592	69,836	57,814
Eski	choice	133	-1	4409	415,62	804,334
	coiceR3	133	-1	370	23,34	44,140
	connectivity	133	0	11	2,89	1,837
	integration	133	-1,000	3,490	0,786	0,472
	integrationR3	133	-1,000	3,490	1,363	0,709
	line_lenght	133	2,528	365,268	94,894	62,769
Hürriyet	choice	95	-1	1135	102,04	194,640
	coiceR3	95	-1	103	13,12	21,639
	connectivity	95	0	7	2,40	1,324
	integration	95	-1,000	1,792	0,760	0,462
	integrationR3	95	-1,000	2,260	1,035	0,615
	line_lenght	95	7,444	420,255	96,561	79,471
İhsan	choice	119	-1	1490	160,39	301,240
	coiceR3	119	-1	183	14,88	25,398
	connectivity	119	0	9	2,77	1,806
	integration	119	-1,000	3,499	0,887	0,716
	integrationR3	119	-1,000	3,499	1,179	0,785
	line_lenght	119	0,727	274,161	75,594	60,909

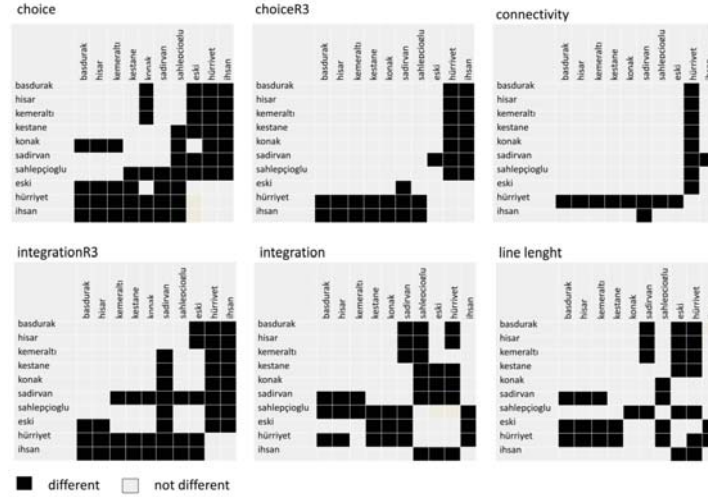


Figure 7. Statistically significant difference in street pattern around each mosque.

Table 3 shows the integration (global), integration R3 (local), choice (global), choice R3 (local), and connectivity and line length scores for each mosque. For each score, the statistically significant differences between each mosque are represented in Figure 7 (The analyses were based on ANOVA and Post Hoc test). Results showed similarities in street pattern for mosques in the same districts (light gray colours between mosques from the same district), and differences for mosques in different districts (dark gray colours between the mosques from different districts). In other words, the Post Hoc Tests of ANOVA revealed that accessibility measures (choice, choice R3, connectivity, integration, integration R3, line length, mean depth and mean depth R3) differ between the mosques located in historical (Basdurak Mosque, Hisar Mosque, Kemeraltı Mosque, Kestane Mosque, Konak Mosque, Sadırvan Mosque, Sahlepçioğlu Mosque) and contemporary districts (Eski Mosque, Hürriyet Mosque, Ihsan Mosque) (Figure 7). On the other hand, the mean accessibility values do not differ across the mosques located in historical district (Basdurak Mosque, Hisar Mosque, Kemeraltı Mosque, Kestane Mosque, Konak Mosque, Sadırvan Mosque, Sahlepçioğlu Mosque). Likewise, the mean accessibility values do not differ across the mosques located in contemporary district (Eski Mosque, Hürriyet Mosque, Ihsan Mosque).

Discussion and Conclusion

Mosques are in the centre of social life. Majority of Muslim men get together in mosques daily or weekly. Thus, location of mosques should be carefully selected. In other words, mosques are not only the places of worshipping, but also the places where people can socialize. The street network and the land use around mosques should encourage people to get together around mosques. Dhingra and Chattopadhyay (2016, p. 563) emphasised the importance of people oriented designs through examples of old cities. In parallel, our study aims to provide further support to that argument and highlight the importance pedestrian oriented design in public areas of historical sites.

This study compared the mosque use density and physical environmental characteristics around mosques in historical and new development (contemporary) areas. A total of ten mosques were analyzed; seven were located in the city centre (Kemeraltı district), three were located in contemporary areas (Mavişehir-Şemikler district). For the use density, results showed that in both areas mosques are used more often on special occasions and at noon time on casual days. While the mosques in the city centre are used beyond their capacity on special events, mosques in the contemporary area are usually used below their capacity even on special events.

In the historical district, the mosques are located more closely to each other (their 400 meter walking buffer overlap) than those in the contemporary districts. The street pattern and the land use around the mosques in historical city centre and contemporary districts differ. In the historical district, it is found that mosques are surrounded by commercial areas as Sharifi and Murayama (2013, p. 128) mentioned in their study, while the mosques in the contemporary areas surrounded by residential areas or vacant lands.

Özgen (2012, p. 133) also argued that diversity of land use (such as khan, mosques and office blocks) along a street would increase the vitality. Similarly, Sharifi and Murayama (2013, p. 131) showed that in Iran, the streets around the mosques in the historical area are more integrated and pedestrian oriented and connected to each other than those in the contemporary area, which are more motorized vehicle oriented. Mahboubeh et al. (2011, p. 1, 6) investigated the sociability and physical environment in Malaysia and mentioned the lack of public use and activity in new development areas. Ahmad Basri and Suhanna, (2008, p. 6) discussed that, in order to create a convenient environment to Muslim people who worship five times a day, proximity between religious buildings and their houses and work places should cautiously specified. Our study showed that in historical areas religious buildings are more accessible than those in contemporary sites. In other words, proximity between religious buildings, residential areas and work places are better planned in historical sites than that in contemporary urban settings. In parallel, Farhat Harb (2015, p. 98) also found that in the past, walkability is the main mode of mobility, now the streets are designed for cars in Islamic city of Doha.

Perhaps, such differences in physical environmental characteristics lead to differences in mosque use density. However, mosque use density could be influenced by various other factors, such as cultural values. Thus deriving a casual relation between the mosque use density and physical environmental factors is beyond the scope of this study. A good extension of this study could use surveys to understand such relations. More researches are on call.

References

- Ahmad Basri, S., & Suhanna, S. (2008). Lessons from Traditional Towns and Cities in Malaysia for Sustainable Future Places. Ahmad Basri, S. and Mouktar, MM Urban Design Issues in the Developing World: The Case of Malaysia and Nigeria, 1-21.
- Ayhan, I., & Cubukcu, K. M. (2010). Explaining Historical Urban Development Using

- the Locations of Mosques: A GIS/Spatial Statistics-based Approach. *Applied Geography*, 30(2), 229-238.
- Chiodelli, F. (2015). Religion and the City: A Review on Muslim Spatiality in Italian Cities. *Cities*, 44, 19-28.
- Dhingra, M., & Chattopadhyay, S. (2016). Advancing Smartness of Traditional Settlements-Case Analysis of Indian and Arab Old Cities. *International Journal of Sustainable Built Environment*, 5(2), 549-563.
- Farhat Harb, D. (2015). Walkability Potential in the Built Environment of Doha City. In 12th International Post-Graduate Research Conference, 2015 Proceedings (pp. 94-108).
- Hamid, G. G., Mikhail, S., & Estamboli, M. J. (2012). The Position of Mosque in Islamic Cities and Its Location Design in New Cities. *Damascus University*, 28(1).
- Hillier, B., Penn, A., Hanson, J., Grajewski, T., & Xu, J. (1993). Natural Movement: or, Configuration and Attraction in Urban Pedestrian Movement. *Environment and Planning B: Planning and Design*, 20(1), 29-66.
- Kershen, A., & Vaughan, L. (2013). "There Was a Priest, a Rabbi and an Imam...": An Analysis of Urban Space and Religious Practice in London's East End, 1685–2010. *Material Religion*, 9(1), 10-35.
- Klarqvist, B. (1993). A Space Syntax Glossary. *Nordisk Arkitekturforskning*, 2(1).
- Mahboubbeh, R., Fatemeh, T., & Nasim, T. (2011, April). Criteria of Integration of Sociability and Physical Environment in Sustainable Developments (The Case Study of Malaysia). In *Modeling, Simulation and Applied Optimization (ICMSAO)*, 2011 4th International Conference on (pp. 1-7). IEEE.
- Mazumdar, S., & Mazumdar, S. (2004). Religion and Place Attachment: A Study of Sacred Places. *Journal of Environmental Psychology*, 24(3), 385-397.
- Özgen, C. (2012). Increasing Walkability Capacity of Historic City Centers: The Case of Mersin (Doctoral Dissertation, Middle East Technical University).
- Ratti, C. (2004). Space Syntax: Some Inconsistencies. *Environment and Planning B: Planning and Design*, 31(4), 487-499.
- Saberi, A., Motamedi, S., Shamshirband, S., Kausel, C. L., Petkovi, D., Endut, E., ... & Roy, C. (2016). Evaluating the Legibility of Decorative Arabic Scripts for Sultan Alaaddin Mosque Using an Enhanced Soft-computing Hybrid Algorithm. *Computers in Human Behavior*, 55, 127-144.
- Saoud, R. (2002). *Introduction to the Islamic City*. FSTC Limited.
- Sharifi, A., & Murayama, A. (2013). Changes in the Traditional Urban Form and the Social Sustainability of Contemporary Cities: A Case Study of Iranian Cities. *Habitat International*, 38, 126-134.
- Şahinalp, M. S., & Günal, V. (2012). Osmanlı Şehircilik Kültüründe Çarşı Sisteminin Lokasyon ve Çarşı İçi Kademelenme Yönünden Mekânsal Analizi. *Milli Folklor*, 24(94).