

DETERMINATION OF THE MOST SUITABLE SITES FOR SHOPPING CENTERS IN GEOGRAPHICAL REGIONS WITH GIS

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Abstract Being a part of social life, Shopping Centers become more popular and they represent the environments where consumption comes into prominence. However, in the recent years, Shopping Centers are seen as places combining consumption activities and time killing activities. Since number of Shopping Centers is at peak in big cities, attempts are made to open Shopping Centers in places other than big cities in accordance with population density, economic and social data. However, it is observed that geographical location and neighborhood relations are not taken into consideration in location surveys in cities other than major cities. Yet, such variables have major role at decision making stage. In this study a model based on geographical information system (GIS) was created and decision making process was analysed with the purpose of location survey of Shopping Centers to be opened across the geographical regions by taking population density, economic and social data, quality of life, geographical and spatial data. In analysis, ESRI software, ArcGIS software pack, ArcCatalog, ArcMap, ArcToolbox tool boxes and software required for topology development, data conversion and geographical (spatial) analysis.

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1. INTRODUCTION

Evaluations planned for shopping malls across the country by considering the location selection data and parameters can also be executed by considering all of the settlement areas, in other words, geographical regions of the country. However, interaction of settlement areas with others in their own geographical regions can be stronger than that of the interaction across the country. Under the light of this assumption, it has been planned to make an evaluation on geographical region basis. The data collected in our research titled "GIS BASED SITE SELECTION FOR SHOPPING CENTERS IN TURKEY" were also used in this study and the same method was implemented for evaluation of the data. Initially, settlement areas (cities) in 7 different geographical regions of the country gathered together and evaluation charts were created. The approaches and the modeling formula implemented for site selection across the country were used in the same manner and the cities were evaluated on regional basis.

2. RESULTS

2.1. Evaluation and Presentation of Results

Evaluation of the data indicated to be used at the country level shall increase chance of the rational decision makings of decision makers on geographical region basis. For this reason, considering the total number of shopping centers in a region, their distribution by the cities in the region and other parameters on regional basis, it was evaluated separately for 7 different geographical regions of the country. Furthermore, the areal size, total population, population density, economic development, contribution to national income, population growth rate and similar data were taken into consideration.

Presentation of the evaluation results is in below order:

- a. Geographical (spatial) and socio economic (semantic) data used in evaluation
- b. The location of the geographical region in Turkey and graphic (two dimensional) presentation of site selection results for the region
- c. Graphic presentation (two dimensional) of site selection results of the geographical region.

2.2. Marmara Region

Covers 8.5% of the country with an area of 67.308 km². Population is about 20 million and population density is 320 people/km². Economy of the region is

a developed economy and 20% of the country national income is provided from this region. 79% of the populations live in cities. Population growth rate is 0.27%.

Marmara Region is the most developed region of the country on socio economic terms; there are 11 cities in the region and 124 shopping centers, in different numbers in every city, apart from one of them. Istanbul is the leading city in the region, in which the highest number of shopping centers of the region and Turkey are located. The cities with proper sites for shopping centers in the region with an area of 73.100 km² where about 22 million people (1/4 of Turkey population) live are respectively Istanbul, Bursa, Kocaeli, Balıkesir and Sakarya (Table 1, Figure 1-2).

Table 1 Geographical (spatial) and socio economic (semantic) data of Marmara Region

Plaka kodu	Ad	Alan (km²)	il nüfusu (kişi)	Nüfus yoğunluğu (/km²)	Merkez nüfusu (kişi)	En Yakın İl	×Ν	Zenginlik(mevdu at/kişi)	AVM Sayısı	Kira. A.m²	Ekonomi	Eğitim	Sağlık	Güvenlik	Kent Hayatı	Kültür-Sanat	Yaşam Kaltitesi	Merkez nüfus %	×	^	Yüzde Değerler
10	Balıkesir	14442	1152323	81	215436	Manisa	137	4841	4	40	87	85	75	31	78	48	68	18,70	27,88	39,65	3,61
11	Bilecik	4181	225381	52	34105	Eskişehir	80	2380	0	0	76	79	26	43	79	57	49	15,13	29,98	40,14	0,68
16	Bursa	11087	2605495	250	2287981	Bilecik	95	5325	10	200	74	55	70	36	63	92	60	87,81	29,07	40,18	20,56
17	Çanakkale	10201	508769	54	110000	Tekirdağ	188	3987	2	20	89	95	68	25	93	54	80	21,62	26,42	40,15	1,74
22	Edirne	6241	390428	64	119298	Kırklareli	62	5174	2	20	77	92	89	30	65	50	88	30,56	26,55	41,68	1,61
34	İstanbul	5170	13255685	2551	11008790	Tekirdağ	132	19252	97	2910	98	80	50	85	98	95	94	83,05	28,99	41,04	100,00
39	Kırklareli	6056	332791	53	53221	Edirne	62	5342	0	0	81	75	56	90	74	81	79	15,99	27,23	41,73	1,05
41	Kocaeli	3635	1560138	432	294875	Sakarya	37	5238	8	80	97	65	60	40	71	82	77	18,90	29,90	40,76	4,87
54	Sakarya	4895	872872	180	283752	Kocaeli	37	2441	5	50	47	43	36	81	75	90	51	32,51	30,40	40,77	3,55
59	Tekirdağ	6345	798109	126	107191	Kırklareli	121	4459	5	50	86	49	22	68	43	41	42	13,43	27,51	40,98	2,22
77	Yalova	847	203741	241	70118	Kozaeli	65	4494	2	20	80	91	30	34	96	91	62	34,42	29,24	40,65	0,92
	Toplam	73100	21905732																		

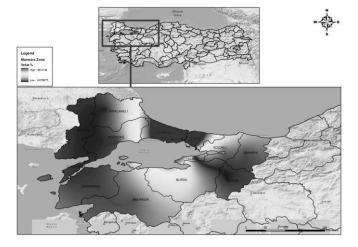


Fig. 1 The location of the Marmara Region in Turkey (above) and graphic representation of the area (two-dimensional) (bottom)

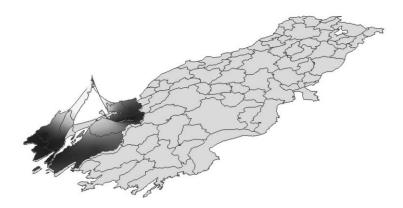


Fig. 2 Marmara Region graphical representation (three-dimensional)

2.3. Aegean Region

Covers 10.1% of the country with an area of 93.139 km². It is the 5th largest region. Population is about 10 million and population density is 105 people/km². It is in the 2nd place in industry after Marmara Region. 61% of the populations live in cities. Population growth rate is 0.16%.

Aegean Region is one of the developed regions of the country on socio economic terms. There are 8 cities in the region with different sizes and a total of 35 shopping centers in different numbers in every city (at least one). The area of the region by geographical borders is 89.110 km² and total population is about 10 million. There are 14 shopping centers in the largest city of the region, Izmir. The cities which are the most proper sites for shopping center are respectively Izmir, Denizli, Manisa and Aydın (Table 2, Figure 3-4).

Table 2 Geographical (spatial) and socio economic (semantic) data of Aegean Region

Plaka kodu	Ad	Alan (km²)	li näfusu (kişi)	Nüfus yoğunluğu (/km²)	Merkez nüfusu (kişi)	En Yakın İl	ΥĀ	Zenginlik(mevdu at/kişi)	AVM Sayısı	Kira. A.m²	Ekonomi	Eğitim	Sağlık	Gävenlik	Kent Hayatı	Kültür-Sanat	Yaşam Kaltitesi	Merkez nüfus %	×	^	Yüzde Değerler
3	Afyonkarahisar	14532	697559	49	128516	Kütahya	100	2713	12	120	52	52	66	41	77	53	53	18,42	30,55	38,76	2,18
9	Aydın	7922	989862	126	192267	Muğla	99	4957	6	60	59	77	77	23	88	59	64	19,42	27,84	37,84	3,16
20	Denizli	11716	931823	80	350000	Aydın	126	5480	4	80	69	73	81	26	82	88	71	37,56	29,09	37,78	4,17
35	İzmir	11811	3948848	329	2232265	Manisa	36	8387	14	480	96	86	92	27	70	69	92	56,53	27,17	38,45	22,57
43	Kütahya	12119	590496	49	166665	Eskişehir	78	2203	1	10	78	61	67	69	94	46	74	28,22	30,00	39,42	2,25
45	Manisa	13120	1379484	105	214345	İzmir	36	2960	8	80	62	45	74	38	84	47	55	15,54	27,39	38,61	3,97
48	Muğla	12716	817503	64	43845	Aydın	99	7897	6	60	93	94	52	33	97	49	84	5,36	28,37	37,18	1,89
64	Uşak	5174	338019	63	137001	Afyon	117	5758	2	20	85	69	55	63	83	89	73	40,53	29,41	38,67	1,65
	Toplam	89110	9693594														· · ·				

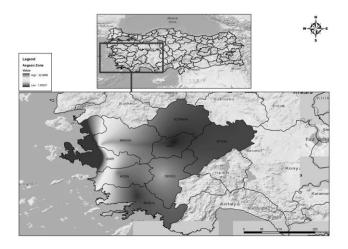


Fig. 3 The location of the Aegean Region in Turkey (above) and graphic representation of the area (two-dimensional) (bottom)



Fig. 4 Aegean Region graphical representation (three-dimensional)

2.4. Black Sea Region

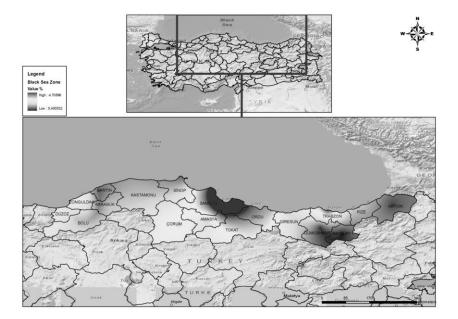
Covers 18% of the country with an area of 143.537 km² and it is the 3rd largest geographical region of the country. Population is about 8.4 million and population density is 59 people/km². (Turkey average is 83 people/km²). It is the second region with the lowest population density. Population growth rate is 0.4% (Turkey population growth is 0.1834%). 51% of the population lives in the rural area (Turkey average is 35%).

There are no shopping centers in 10 cities in the region and 13 shopping centers in the other 5 cities.

The priority order of the cities in the region according to the site selection results for new shopping centers in the region is Samsun, Trabzon, Ordu and Çorum (Table 3, Figure 5-6).

Table 3 Geographical (spatial) and socio economic (semantic) data of Black Sea Region

Plaka kodu	РΥ	Alan (km²)	il näfusu (kişi)	Nüfus yoğunluğu (/km²)	Merkez nüfusu (kişi)	En Yakın il	KM	Zenginlik(mevdu at/kişi)	AVM Sayısı	Kira. A.m²	Ekonomi	Eğitim	Sağlık	Güvenlik	Kent Hayatı	Kültür-Sanat	Yaşam Kaltitesi	Merkez nüfus %	×	^	Yüzde Değerler
5	Amasya	5731	334786	59	74393	Çorum	92	2578	0	0	71	70	41	39	64	43	48	22,22	35,85	40,67	1,16
8	Artvin	7493	164759	22	23157	Rize	159	3130	1	10	95	82	63	91	89	86	91	14,06	41,82	41,19	0,52
14	Bolu	10716	271208	33	84565	Düzce	45	3337	1	10	57	90	96	49	86	94	93	31,18	31,60	40,74	1,14
19	Çorum	12833	535405	42	161321	Amasya	92	2775	1	10	88	48	61	99	58	77	89	30,13	34,93	40,55	2,13
28	Giresun	7151	419256	61	83636		44	3357	2	20	92	64		42	60	67	72	19,95	38,41	40,91	1,38
29	Gümüşhane	6125	129618	20	30270	Bayburt	78	1832	0	0	49	83	80	59	55	44	61	23,35	39,48	40,46	0,48
37	Kastamonu	13473	361222	27	64606	Karabūk	122	2893	2	20	84	57	62	37	95	74	67	17,89	33,78	41,39	1,15
52	Ordu	5894	719183	121	141000	Giresun	44	2109	1	10	60	41	64	46	51	64	46	19,61	37,89	40,98	2,28
53	Rize	3792	319637	81	78144	Trabzon	74	2773	0	0	75	71	78	92	67	73	85	24,45	40,51	41,03	1,16
55	Samsun	9474	1252693	138	363180	Amasya	131	3262	3	30	64	60	86	57	62	83	83	28,99	36,34	41,31	4,78
57	Sinop	5858	202740	35	30502	Samsun	165	3523	0	0	73	76	69	83	90	98	90	15,04	35,14	42,03	0,64
60	Tokat	9912	617802	62	113100	Sivas	108	1733	1	10	55	56	57	54	61	45	50	18,31	36,56	40,33	1,91
61	Trabzon	4495	763714	164	214949	Rize	75	4049	3	30	79	84	94	96	68	87	96	28,15	39,74	41,00	2,90
67	Zonguldak	3470	619703	188	104276	Bartın	89	6068	2	20	82	59	87	51	81	72	87	16,83	31,79	41,45	1,92
69	Bayburt	4043	74412	20	32285	Gümüşhane	78	2124	0	0	65	74	51	89	53	61	63	43,39	40,22	40,26	0,40
74	Bartin	1960	187758	90	35992	Karabük	88	4608	0	0	53	58	49	24	80	71	47	19,17	32,33	41,63	0,66
78	Karabük	2420	227610	55	100749	Bartin	88	3444	2	20	68	87	71	44	92	58	69	44,26	32,63	41,20	1,16
81	Düzce	3641	338188	132	129118	Bolu	45	2257	1	10	45	66	79	28	57	39	44	38,18	31,16	40,84	1,53
	Toplam	118481	7539694																		



 $\textbf{Fig. 5} \ \ \text{The location of the Black Sea Region in Turkey (above) and graphic representation} \\ \ \ \text{of the area (two-dimensional) (bottom)}$

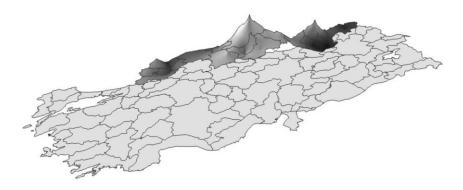


Fig. 6 Black Sea Region graphical representation (three-dimensional)

2.5. Central Anatolia Region

Central Anatolia Region is a geographical region with a population of about 12 million covering 13 cities. The area of the region is 163.057 km². There are no shopping centers in 4 of 13 cities in the region. There are 40 shopping centers in total in other 9 cities. Considering the distribution of shopping centers by cities, Ankara (capital city) ranks first in the region, which is the second in country listing with 25 shopping malls.

The priority order of the cities in the region according to the site selection results for shopping centers in the region is Ankara, Konya, Kayseri, Eskişehir and Sivas (Table 4, Figure 7-8).

Table 4 Geographical (spatial) and socio economic (semantic) data of Central Anatolia Region

Plaka kodu	Ad	Alan (km²)	il nüfusu (kişi)	Nüfus yoğunluğu (/km²)	Merkez nüfusu (kişi)	En Yakın İl	Ϋ́	Zenginlik(mevdu at/kişi)	AVM Sayısı	Kira. A.m²	Ekonomi	Eğitim	Sağlık	Güvenlik	Kent Hayatı	Kültür-Sanat	Yaşam Kaltitesi	Merkez nüfus %	×	^	Yüzde Değerler
6	Ankara	25615	4771716	195	3203362	Çankırı	131	20334	31	930	99	99	98	65	39	96	99	67,13	32,85	39,92	30,99
18	Çankırı	8411	179067	24	62508	Kırıkkale	105	2305	2	20	58	78	54	48	72	56	56	34,91	33,62	40,59	0,80
26	Eskişehir	13904	764584	55	482793	Kütahya	78	6382	5	100	90	96	91	72	69	99	97	63,14	30,52	39,79	4,83
38	Kayseri	17116	1234651	72	1064164	Nevşehir	81	4352	5	50	67	68	85	84	37	63	78	86,19	35,46	38,72	9,66
40	Kırşehir	6434	221876	35	88105	Nevşehir	91	4085	1	10	56	88	44	56	48	62	52	39,71	34,16	39,15	1,08
42	Konya	40824	2013845	52	1112768	Karaman	119	2944	6	60	66	47	83	79	38	80	70	55,26	32,50	37,87	11,37
50	Nevşehir	5438	282337	52	67864	Aksaray	75	4162	1	10	70	72	35	82	56	97	65	24,04	34,72	38,63	1,05
51	Niğde	7318	337931	46	78088	Nevşehir	82	2223	1	10	43	63	45	75	44	51	43	23,11	34,68	37,97	1,18
58	Sivas	28129	642224	22	251776	Tokat	108	2965	1	10	41	53	93	29	28	68	58	39,20	37,03	39,74	2,97
66	Yozgat	14083	476096	34	73930	Kırşehir	112	2233	1	10	35	39	38	86	47	55	41	15,53	34,83	39,83	1,41
68	Aksaray	8051	377505	50	129949	Nevşehir	75	3491	1	10	50	40	39	21	23	60	31	34,42	34,01	38,37	1,64
70	Karaman	8816	232633	26	105384	Konya	119	3340	1	10	83	54	65	95	87	42	82	45,30	33,20	37,18	1,21
71	Kırıkkale	4589	276647	61	205078	Ankara	77	2087	1	10	63	67	95	32	45	79	86	74,13	33,50	39,84	1,95
	Toplam	188728	11811112																		

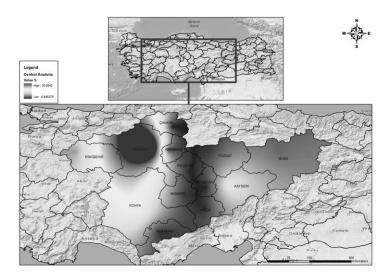


Fig. 7 The location of the Central Anatolia Region in Turkey (above) and graphic representation of the area (two-dimensional) (bottom)

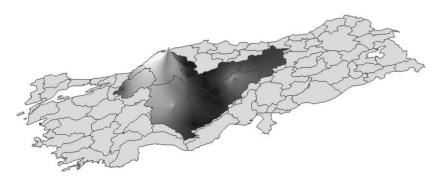


Fig. 8 Central Anatolia Region graphical representation (three-dimensional)

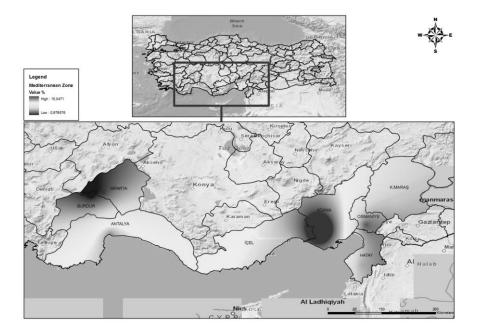
2.6. Mediterranean Region

Covers 15% of the country with an area of 122.927 km². Ranks 4 by size. Population is about 9 million and population density is 71 people/km². 60% of populations live in cities. Population growth rate is 0.22%.

There are 8 cities in the region and a total of 25 shopping centers apart from two cities. Antalya ranks first with 13 shopping centers. As a result of the research and evaluation, the most suitable cities for shopping centers are respectively Adana, Antalya, Mersin and Kahramanmaraş (Table 5, Figure 9-10).

Table 5 Geographical (spatial) and socio economic (semantic) data of Mediterranean Region

Plaka kodu	Ad	Alan (km²)	l nüfusu (kişi)	üfus yoğunluğu (/km²)	Merkez nüfusu (kişi)	En Yakın İl	κĀ	nginlik(mevdu at/kişi)	AVM Sayısı	Kira. A.m²	Ekonomi	Eğitim	Sağlık	Güvenlik	Kent Hayatı	Kültür-Sanat	aşam Kaltitesi	erkez nüfus %	×	>	üzde Değerler
1	Adana	14256	2085225	ž 150	1630710	Morcin	69	4596	4	40	48	42	53	70	50	66	<i>≻</i> 45	Σ 78,20	35,31	37,00	≻ 15,08
1	Audild			130					4	40	_	42	33	70	30	00	-	/0,20	33,31	37,00	
7	Antalya	20815	1978333	95	955596	Burdur	122	6878	17	170	94	89	90	76	99	93	98	48,30	30,70	36,89	10,25
15	Burdur	7238	258868	38	63363	Isparta	51	3750	0	0	91	93	58	45	85	78	76	24,48	30,29	37,71	0,97
31	Hatay	5403	1480571	254	202216	Osmaniye	128	3247	1	10	38	31	23	50	73	31	32	13,66	36,16	36,22	4,05
32	Isparta	8733	448298	54	148496	Burdur	51	4.045	1	10	61	97	97	61	91	84	95	33,12	30,57	37,78	1,83
33	Mersin	15737	1647899	106	875842	Adana	69	4057	6	60	54	50	48	60	76	70	54	53,15	34,62	36,80	9,06
46	K.Maraş	14327	1044816	73	403828	Gaziantep	80	1721	1	10	32	35	42	77	49	25	39	38,65	36,92	37,57	4,68
80	Osmaniye	3767	479221	153	198836	Adana	86	1320	0	0	40	38	43	22	66	27	37	41,49	36,26	37,09	2,25
	Toplam	90276	9423231																		



 $\textbf{Fig. 9} \ \, \textbf{The location of the Mediterranean Region in Turkey (above)} \ \, \textbf{and graphic representation of the area (two-dimensional) (bottom)}$

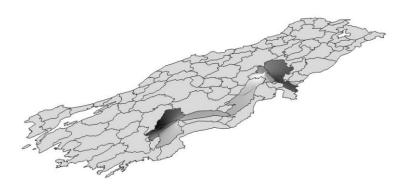


Fig. 10 Mediterranean Region graphical representation (three-dimensional)

2.7. Eastern Anatolia Region

Covers 21% of the country with an area of 165.436 km² and it is the largest geographical region covering 21% of the country. Population is over 6 million and population density is 38 people/km². It is the region with the lowest population density. 48% of the populations live in rural areas. It is the geographical region with the lowest population growth rate of 0.14% after Black Sea Region.

There are 14 cities in the region, no shopping centers in 9 cities and a total of 6 shopping centers in other 5. Distribution of the shopping centers by cities is one shopping center, apart from only one city. According to the research and evaluation results, the most suitable cities for shopping centers are respectively Erzurum, Malatya, Van and Elaziğ. (Table 6, Figure 11-12).

Table 6 Geographical (spatial) and socio economic (semantic) data of Eastern Anatolia Region

Plaka kodu	Ad	Alan (km²)	il nüfusu (kişi)	Nüfus yoğunluğu (/km²)	Merkez nüfusu (kişi)	En Yakın il	KM	Zenginlik(mevdu at/kişi)	AVM Sayısı	Kira. A.m²	Ekonomi	Eğitim	Sagiik	Güvenlik	Kent Hayatı	Kültür-Sanat	Yaşam Kaltitesi	Merkez nüfus %	×	٨	Yüzde Değerler
4	Ağrı	11315	542022	47	79764	Iğdır	143	1090	0	0	21	23	31	98	19	19	26	14,72	43,05	39,71	1,54
12	Bingöl	8402	255170	31	68876	Muş	114	1097	0	0	30	30	46	78	35	40	35	26,99	40,49	38,89	0,96
13	Bitlis	8413	328767	47	44923	Muş	83	810	2	20	23	34	34	20	34	30	21	13,66	42,12	38,41	0,91
23	Elazığ	9181	552646	65	266495	Malatya	98	2468	5	50	42	44	99	47	41	38	81	48,22	39,21	38,67	2,88
24	Erzincan	11974	224949	19	107175	Tunceli	130	3161	1	10	72	81	73	35	46	65	57	47,64	39,48	39,75	1,21
25	Erzurum	24741	1125085	30	621235	Bayburt	124	1604	1	10	51	51	84	52	32	76	59	55,22	41,27	39,90	6,35
30	Hakkâri	7729	251302	35	58145	Şırnak	190	1126	0	0	19	28	21	19	27	35	19	23,14	43,77	37,56	0,88
36	Kars	9594	301766	30	78473	Ardahan	91	1560	0	0	33	37	27	74	26	33	30	26,00	43,10	40,58	1,12
44	Malatya	12235	740643	63	381081	Elazığ	98	2392	2	20	46	62	88	53	36	75	66	51,45	38,32	38,35	4,00
49	Muş	8023	406886	50	67927	Bitlis	83	651	1	10	22	21	28	73	22	22	20	16,69	41,50	38,76	1,21
62	Tunceli	7774	76699	10	25041	Erzincan	130	5844	0	0	44	98	82	58	52	85	75	32,65	39,55	39,11	0,42
65	Van	20927	1035418	54	284464	Bitlis	168	848	0	0	20	20	40	87	20	24	23	27,47	43,37	38,50	3,83
75	Ardahan	5495	105454	22	17274	Kars	91	1944	0	0	34	46	33	62	40	26	38	16,38	42,70	41,11	0,35
76	lğdır	3584	184418	51	59880	Kars	139	1758	0	0	29	33	32	66	21	28	25	32,47	44,06	39,91	0,78
	Toplam	149387	6131225			-															

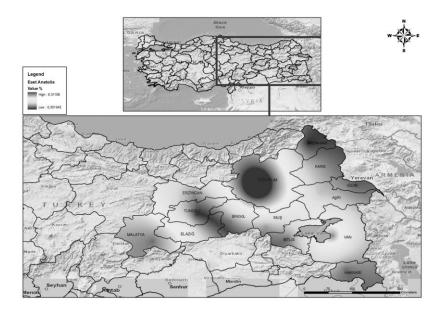


Fig. 11 The location of the Eastern Anatolia Region in Turkey (above) and graphic representation of the area (two-dimensional) (bottom)

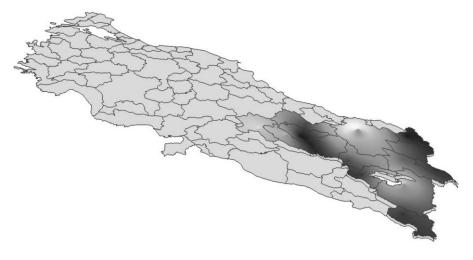


Fig. 12 Eastern Anatolia Region graphical representation (three-dimensional)

2.8. Southeastern Anatolia Region

It is the smallest geographical region of the country with an area of 59.176 km^2 and the population density is 113 people/km^2 . Population growth rate is 0.25%.

62% of the populations live in cities. 1/7 of the country petroleum is collected from this region.

There are 8 cities in the region. There no shopping centers in 5 of the cities. There are 8 shopping centers in total in other 3 cities. The city with this highest number of shopping centers is Gaziantep with 5 shopping centers. According to the research and evaluation results, the most suitable cities for shopping centers are respectively Gaziantep, Diyarbakır, Şanlıurfa, Batman and Adıyaman. (Table 7, Figure 13-14).

Table 7 Geographical (spatial) and socio economic (semantic) data of Southeastern Anatolia Region

Plaka kodu	Ad	Alan (km²)	il näfusu (kişi)	Nüfus yoğunluğu (/km²)	Merkez nüfusu (kişi)	En Yakın İl	Ϋ́Α	Zenginlik(mevdu at/kişi)	AVM Sayısı	Kira. A.m²	Ekonomi	Eğitim	Sağlık	Güvenlik	Kent Hayatı	Kültür-Sanat	Yaşam Kaltitesi	Merkez nüfus %	×	٨	Yüzde Değerler
2	Adıyaman	7572	590935	84	178538	K.Maraş	164	1143	0	0	39	32	29	67	42	34	33	30,21	38,28	37,76	2,30
21	Diyarbakır	15162	1528958	102	545983	Mardin	95	1266	5	50	27	25	72	71	30	32	34	35,71	40,21	37,93	6,51
27	Gaziantep	7194	1700763	249	1253513	K.Maraş	80	2314	12	240	36	29	59	64	54	37	40	73,70	37,35	37,09	11,73
47	Mardin	9097	744606	85	65072	Diyarbakır	95	903	0	0	28	24	19	97	24	29	27	8,74	40,74	37,32	1,78
56	Siirt	5465	300695	55	98281	Batman	87	845	0	0	25	26	37	88	33	36	29	32,68	41,94	37,93	1,23
63	Şanlıurfa	19091	1663371	89	385588	Adıyaman	109	759	2	20	26	19	24	93	29	20	22	23,18	38,79	37,17	5,62
72	Batman	4671	510200	110	246678	Siirt	87	999	1	10	31	27	47	55	25	52	28	48,35	41,13	37,90	2,63
73	Şırnak	7296	430109	60	52743	Siirt	97	810	0	0	24	22	20	94	31	23	24	12,26	42,45	37,53	1,14
	Tonlam	75548	7469637		•																

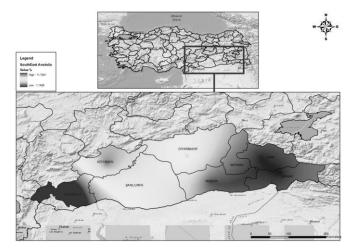


Fig. 13 The location of the Southeastern Anatolia Region in Turkey (above) and graphic representation of the area (two-dimensional) (bottom)

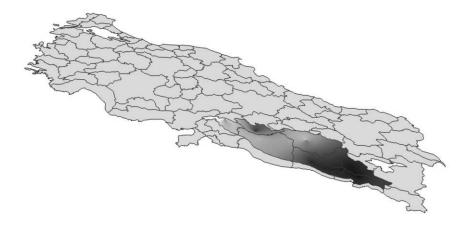


Fig. 14 Southeastern Anatolia Region graphical representation (three-dimensional)

3. CONCLUSION

In this study carried out with the purpose of selecting optimal shopping center locations on regional basis, an analysis was performed in GIS environment upon loading semantic data on geographical (spatial) data. Analysis results indicated the potential areas of shopping centers in an easily understandable format by every decision maker. When results are reviewed numerically or graphically, it is observed that potential areas of shopping centers coincide with life quality in general, however the results are negative and contrary to what is expected in some cities. It is observed that parameters such as urban life, culture-art as well as economic data play an important role in selection of optimal shopping center locations. It is observed that there is a high potential for shopping center sector on regional basis. In conclusion, it is a fundamental condition for decision makers to evaluate geographical (spatial) and semantic data together with reasonable care for rational investments.

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BIOGRAPHICAL NOTES

Ceren Erdin Gundogdu was born in Istanbul-Turkey in 1973. In 1997 she was graduated form Marmara University (Turkey) Faculty of Economic and Administrative Sciences and in 2001 she completed here master thesis about Economic Policy at Istanbul University (Turkey). She wrote her doctoral thesis about "Fuzzy Goal Programming" and gained a Ph.D. degree in 2007 from Istanbul University. Since 2002 she is an academic staff of Department of Business Administration of Yildiz Technical University (Turkey). She has a lot of articles and presentations both in Turkish and in English. She is also reviewer and editor of some international journals. Her academic fields are especially "decision making", "fuzzy goal programming", "geographical information systems (GIS)" and "simulation".