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Determination of the Most Suitable Location for Retail Shopping Store by Using Geographic Information Systems Technology: A Case Study of Konya/TURKEY

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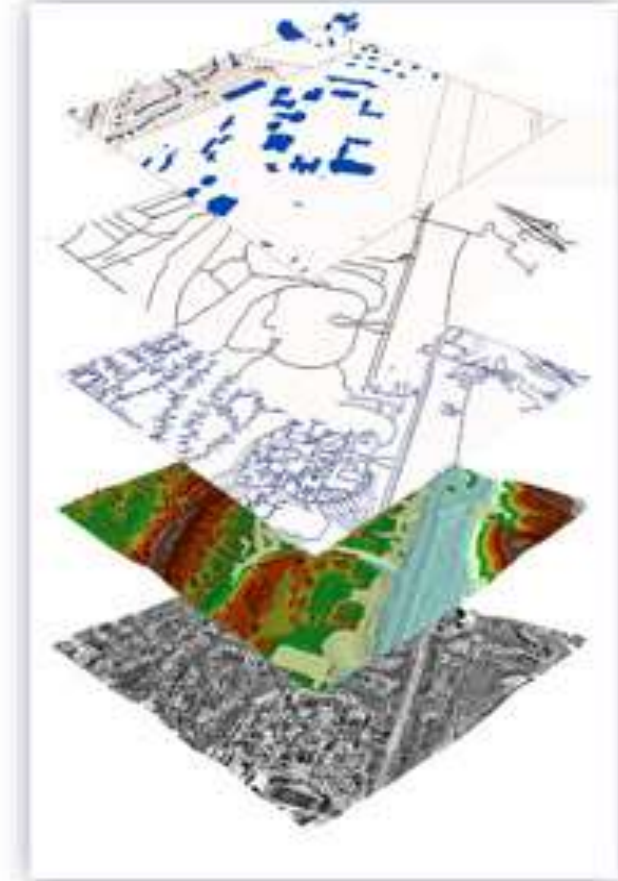


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1.INTRODUCTION

Geographic Information Systems (GIS); is an information system that performs the functions of collecting, storing, processing and presenting graphical and non-graphical data obtained by location-based observations in integrity.



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1.INTRODUCTION

The most suitable location selection projects developed with conventional methods (mathematical/statistics) require huge investments and cause high costs. As to location analyses with GIS, they cause less cost and result faster. Depending on the developing technology, the evaluation of data by the computer software of GIS enables to obtain clear results in a short period of time while speeding up the studies.

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1.INTRODUCTION

Today, some of the examples of application areas of retail organizations with GIS are as follows;

- Location Analysis
- Marketing and Scheduling Planning
- Urban Structure Planning
- Cost Analysis
- Cadastral Analysis Collection and Attachment
- Resource Allocation Facility Analysis

Location selection is the process of finding the desired location(s) by matching the existing criteria and the identified specific factors. The Multiple Criteria Decision Analysis (MCDA) problem is a solution that is applied in situations where more than one criterion must be evaluated together. The basic method of solving the problem is to divide the problem into small, simple and understandable parts so that a meaningful result can be obtained from these parts .

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1.INTRODUCTION

In this study, analysis is made for Sütgross Food Animal Husbandry Industry and Trade Limited Company for branch location selection problem which is one of the issues of strategic importance for the retail grocery sector that is one of the rapidly developing sectors in Turkey. In the scope of implementation, non-spatial population, number of buildings and settlements are already transferred to the GIS system as an input layer of Konya data and a database is created. The most suitable market areas have been determined with the help of important criteria such as distance to rival markets, population density and proximity to roads.

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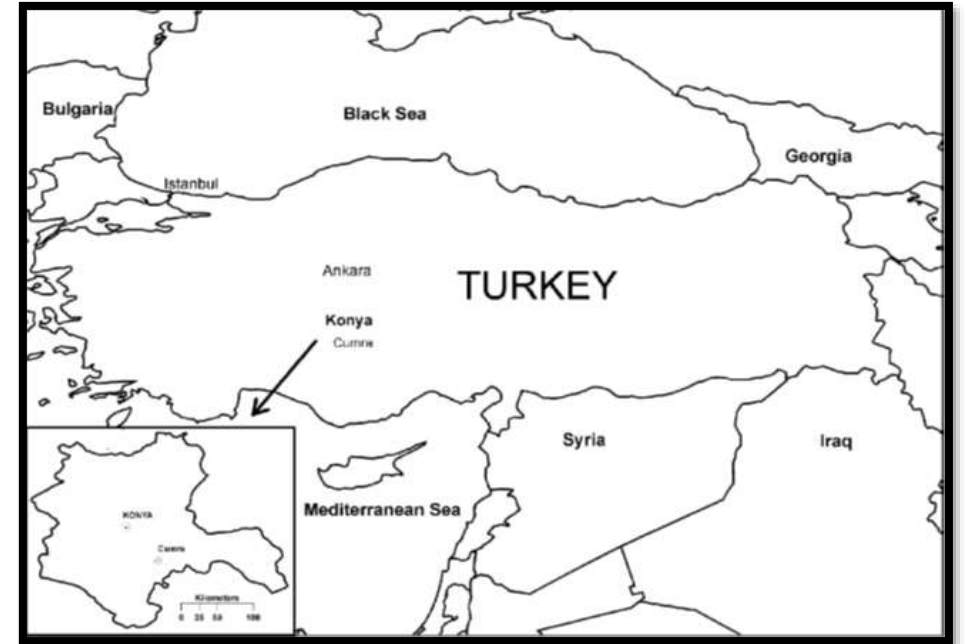
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2. MATERIAL AND METHOD

Konya, with a surface area of 39,000 km², is the largest and the seventh most crowded city in Turkey.



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2. MATERIAL AND METHOD

Sütgross Food Animal Husbandry Industry and Trade Limited Company is a local company that sells milk and dairy products. Most of its activities are carried out in Konya. It also markets its products to other cities. There is only one retail point of sale in the center of Konya. It is planning to open different sales points. It aims that the sales points planned to be opened is in different places of Karatay, Meram, Selçuklu districts of Konya.

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2. MATERIAL AND METHOD

ArcGIS 10 program which allows processing and analyzing geographical data has been used. Data such as numerical maps of Konya, population information, neighborhood borders, building numbers, public transportation stops have been taken from Konya Metropolitan Municipality and internet sources. There are a total of 276 local and national markets in Konya. The locations of these markets are determined from the Google Earth program and the internet sites of the related markets and processed into digital maps. The numbers of these markets in the central districts of Konya are shown in Table 1.

Table 1. Classification of retail markets and distribution by districts

<u>Districts of Konya Province</u>	RETAIL MARKETS								
	<u>National Markets</u>				<u>Local Markets</u>				
	<u>Bim</u>	A101	<u>Nargross</u>	Emekli	Ova	Makro	Sincap	Adese	Çelikkayalar
Meram	52	7	1	3	2	7	18	45	8
Selçuklu	22	4	1	4	2	4	7	24	4
Karatay	23	3	-	2	2	2	6	10	3
TOTAL	97	14	2	9	6	13	31	89	15





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Numerical data has been associated with non-graphical data converted to the coordinate system of UTM 6º, WGS84, 36N. In this study, the following criteria were used in order to select the most suitable place by using MCDA.

They are defined as;

- The proximity to rival markets,
- Proximity to the markets that it wants to be close
- Proximity to social facilities
- Proximity to religious facilities
- Proximity to hospitals, health centers
- Proximity to educational institutions
- Proximity to trade areas
- Proximity to tourism areas
- Proximity to parking areas
- Proximity to public transport stops
- Proximity to public transport routes
- Proximity to the industry areas

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3. RESULTS and DISCUSSION

Choice of retail market places is a very important subject for high profit margin, so that the investments that are made do not go to waste, and to be able to provide quality service to the customer. For these, many criteria need to be evaluated together. For example; while determining the most suitable place, not being too far away from the rival markets, being close to public transportation stops and easy to reach are the criteria that should be paid attention. 12 criteria were used in this study. Layers were created for each criterion. A map has been created for each layer and the result map has been merged with the combination of these maps.

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In Table 2, the buffer ranges and weight scores used for each layer are given.

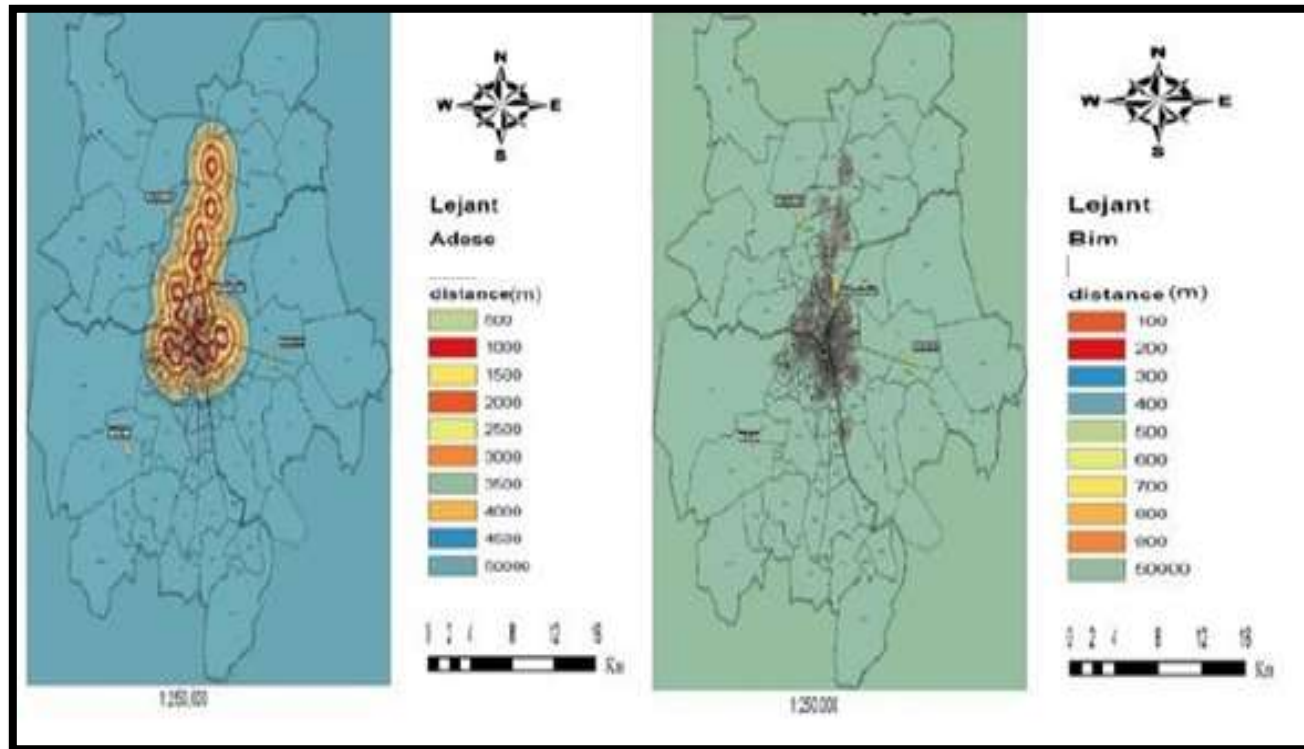
Table 2. Attribute ranking for the maps

<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>
Educational Institutions		Trade Areas		Tourism Areas		Parking Areas		Public Transport Stops		Industry Areas	
0-0.2 km	1	0-1 km	1	0-1 km	1	0-1 km	1	0-0.05 km	1	0-3 km	1
0.2-0.4 km	2	1-2 km	2	1-2 km	2	1-2 km	2	0.05-0.1 km	2	3-6 km	2
0.4-0.6 km	3	2-3 km	3	2-3 km	3	2-3 km	3	0.1-0.15 km	3	6-9 km	3
0.6-0.8 km	4	3-4 km	4	3-4 km	4	3-4 km	4	0.15-0.20 km	4	9-12 km	4
0.8-1 km	5	4-5 km	5	4-5 km	5	4-5 km	5	0.20-0.25 km	5	12-15 km	5
1-1.2 km	6	5-6 km	6	5-6 km	6	5-6 km	6	0.25-0.30 km	6	15-18 km	6
1.2-1.4 km	7	6-7 km	7	6-7 km	7	6-7 km	7	0.30-0.35 km	7	18-21 km	7
1.4-1.6 km	8	7-8 km	8	7-8 km	8	7-8 km	8	0.35-0.40 km	8	21-24 km	8
1.6-1.8 km	9	8-9 km	9	8-9 km	9	8-9 km	9	0.40-0.45 km	9	24-27 km	9
1.8- 50 km	10	9-50 km	10	9-50 km	10	9-50 km	10	0.45-50 km	10	27- 50 km	10
<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>	<i>Layer</i>	<i>Point</i>
National Markets		Local Markets		Public Transport Routes		Social Facilities		Religious Facilities		Hospital	
0-0.5 km	1	0-0.1 km	1	0-0.05 km	1	0-0.2 km	1	0-0.2 km	1	0-0.2 km	1
0.5-1 km	2	0.1-0.2 km	2	0.05-0.1 km	2	0.2-0.4 km	2	0.2-0.4 km	2	0.2-0.4 km	2
1-1.5 km	3	0.2-0.3 km	3	0.1-0.15 km	3	0.4-0.6 km	3	0.4-0.6 km	3	0.4-0.6 km	3
1.5-2 km	4	0.3-0.4 km	4	0.15-0.20 km	4	0.6-0.8 km	4	0.6-0.8 km	4	0.6-0.8 km	4
2-2.5 km	5	0.4-0.5 km	5	0.20-0.25 km	5	0.8-1 km	5	0.8-1 km	5	0.8-1 km	5
2.5-3 km	6	0.5-0.6 km	6	0.25-0.30 km	6	1-1.2 km	6	1-1.2 km	6	1-1.2 km	6
3-3.5 km	7	0.6-0.7 km	7	0.30-0.35 km	7	1.2-1.4 km	7	1.2-1.4 km	7	1.2-1.4 km	7
3.5-4 km	8	0.7-0.8 km	8	0.35-0.40 km	8	1.4-1.6 km	8	1.4-1.6 km	8	1.4-1.6 km	8
4-4.5 km	9	0.8-0.9 km	9	0.40-0.45 km	9	1.6-1.8 km	9	1.6-1.8 km	9	1.6-1.8 km	9
4.5-50 km	10	0.9-50 km	10	0.45-50 km	10	1.8- 50 km	10	1.8- 50 km	10	1.8- 50 km	10





Figure 2 shows the maps produced for national and local markets, education and public transport routes in the study area.



- According to Figure 2, the market named Adese (local) and BIM are intensified around Alaaddin Hill and its surroundings.

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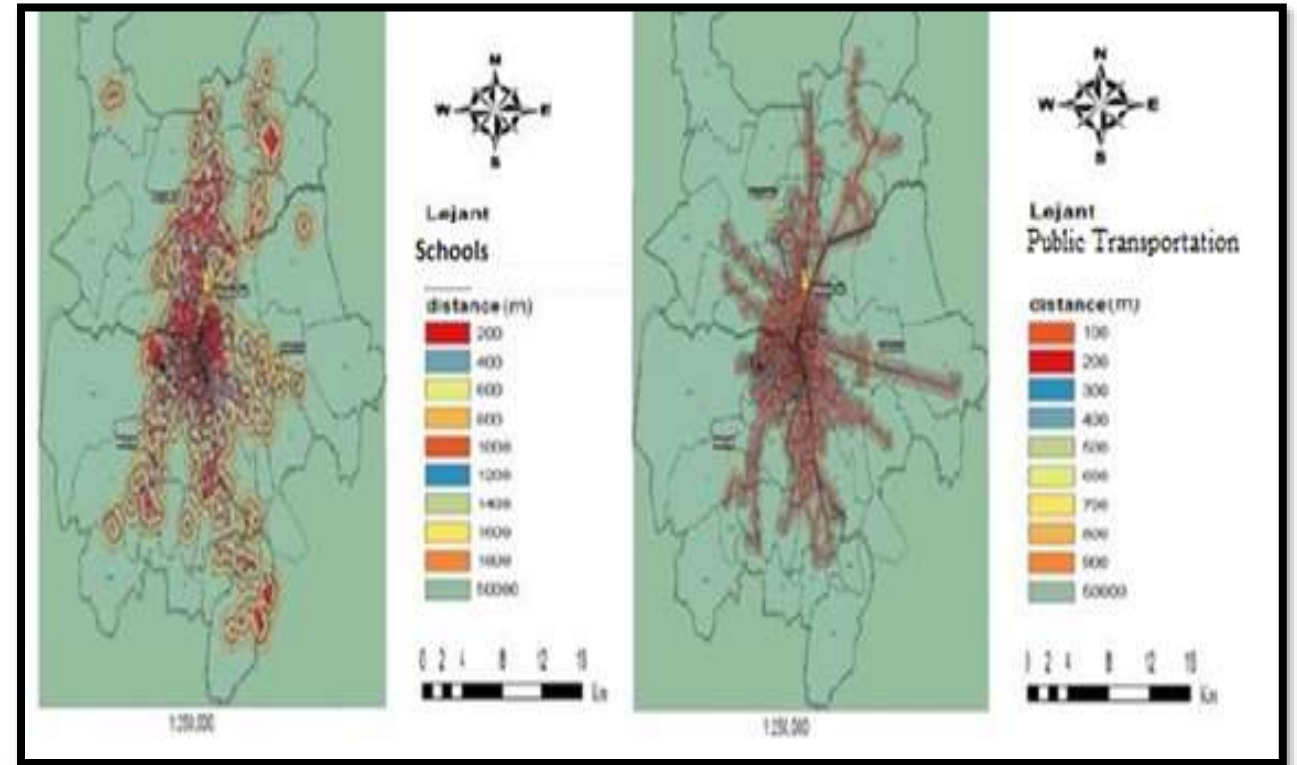
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Figure 2 shows the maps produced for national and local markets, education and public transport routes in the study area.

- It is seen that Educational Education Facility area and have public transportation lines is intensified in Alaaddin Hill and its surroundings.



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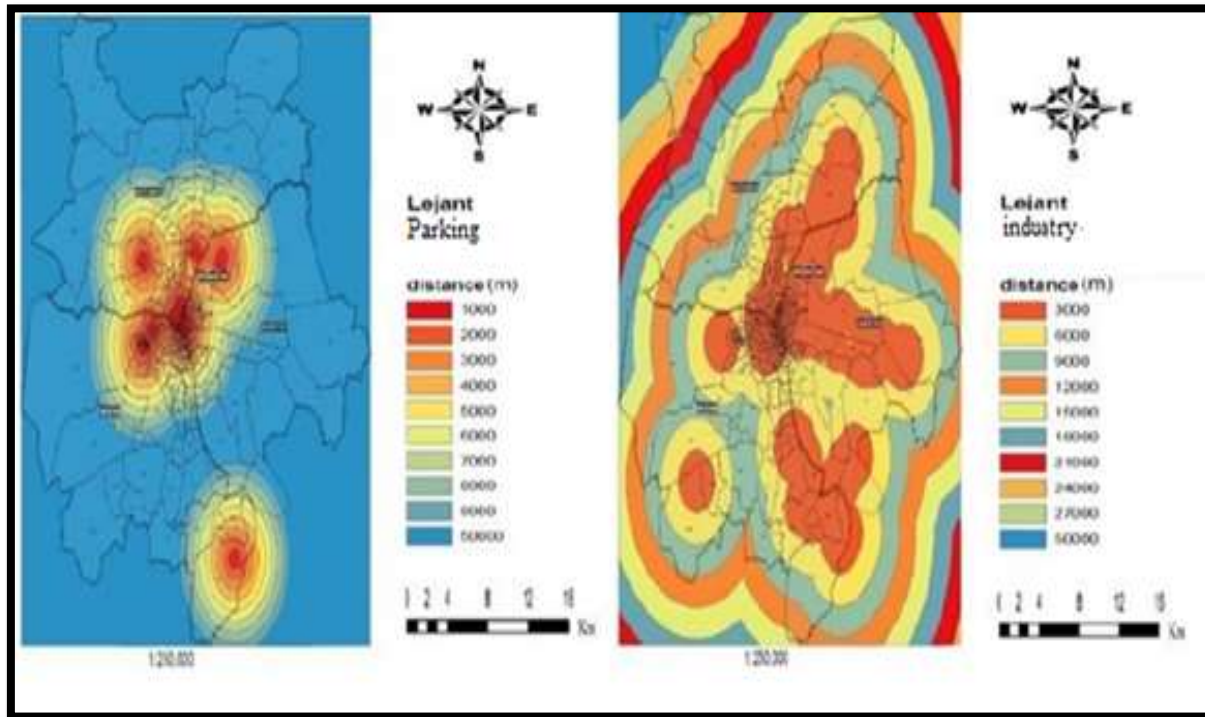


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Figure 3 shows the maps generated for parking, industry, social facilities and tourism areas in the study area.



- The parking areas are intensified in Selçuklu district Horozluhan and Sille neighborhoods, in Meram district Selam and Çarıklar Fatih neighborhoods, in Karatay district Fevzi Çakmak neighborhood.
- Industrial areas are located in the neighborhoods of Fatih, Musalla Bağları, Horozluhan, Büyük Kayacık, Tömek and Aşağı Pınarbaşı in the district of Selçuklu, in the district of Meram: Kaşınhanı Station and Kaşınhanı Yeni neighborhoods and in the district of Karatay: Satır, Başak, Tatlıcak, Sakyatan, Hacı Yusuf Mescit, Fevzi Çakmak, Hacı Dede Mescit, Fetih, Akabe and Ulubatlı Hasan neighborhoods

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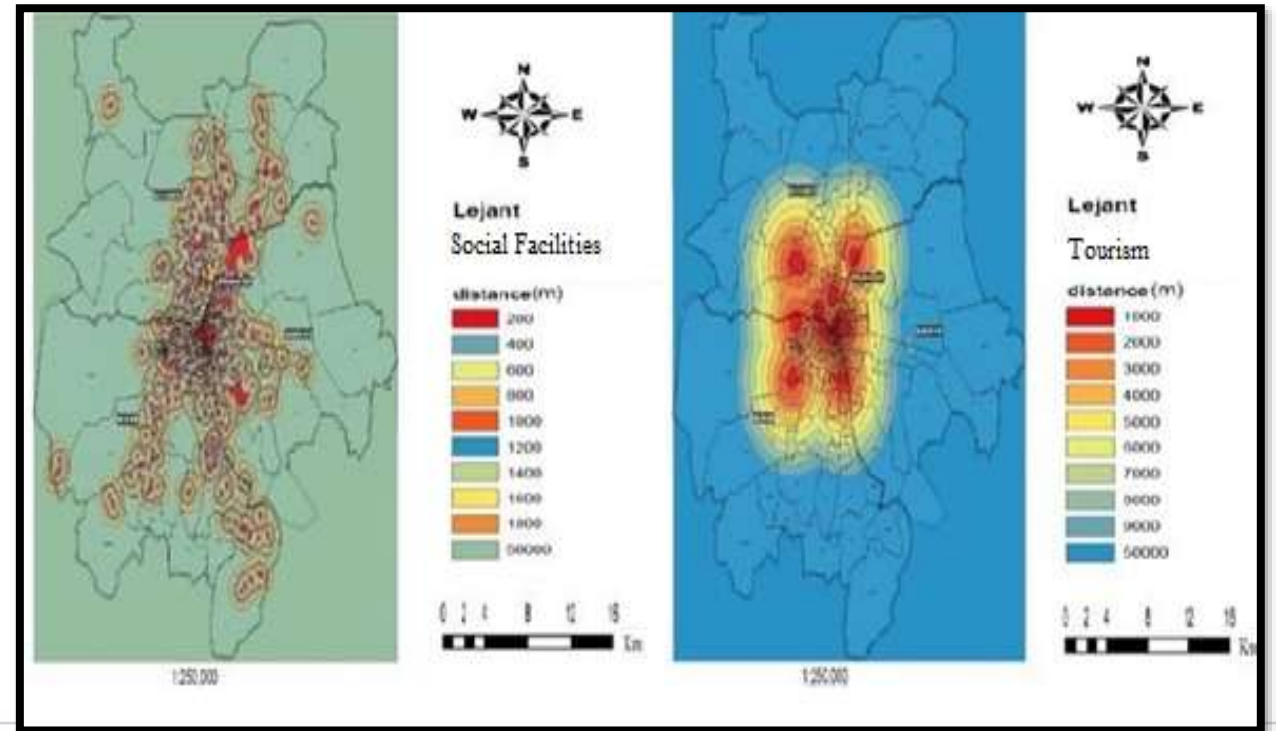
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Figure 3 shows the maps generated for parking, industry, social facilities and tourism areas in the study area.

- Social facilities are intensified around Alaaddin Hill.
- The tourism areas are located in Horozluhan, Sille and Hocacihan neighborhoods in Selçuklu district, Durunday neighborhood in Meram district



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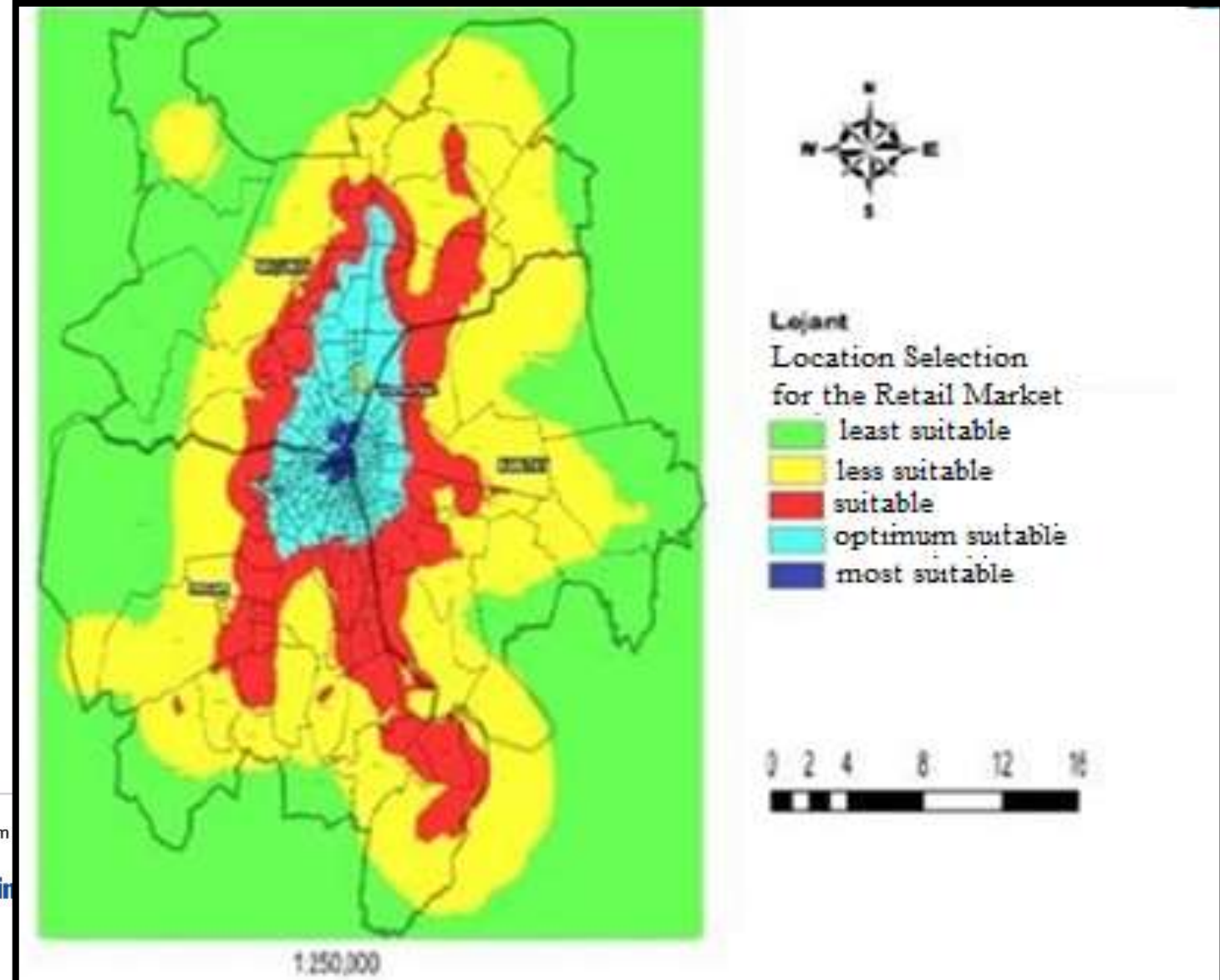


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Taking all these factors into account and using the ArcGIS 10 software, the most suitable locations were determined by performing MCDA and a conformity map was produced (Figure 4).



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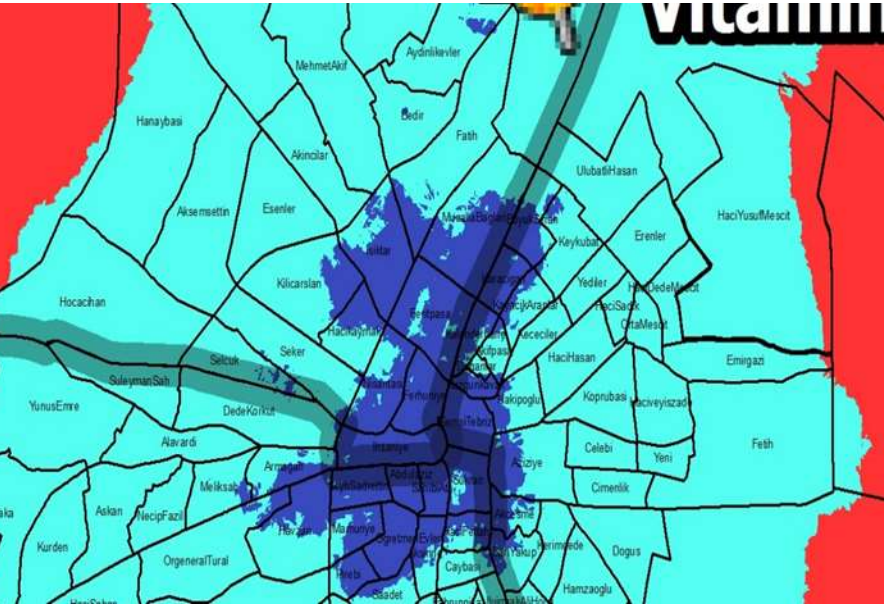


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The most suitable places for the retail market has been found intensified in Alaaddin Hill and its surroundings and also in the district of Selçuklu: **Aydınlıkevler neighborhood** (Kadayıfçı street, Naima street, Zara street), **Bedir** (Hat street), **Selçuk neighborhood** (Harzami street, Güvenilen street, Selamet street) and **Fatih neighborhood** (Karababa street, Mahmuriye street, Dağsaray street) in **Meram district: Meliksah neighborhood** (Hacova street, Meliksah street) and **Orgeneral Tural neighborhood** (Kocadağ street, Bozkaya street) and **Keykubat neighborhood of Karatay district** (Kapalı street, Karakayalı street, Lali street) and in Kerimdede neighborhood (Kerimler street). **The enlarged view of the Alaaddin hill and its surroundings, which is the center of Konya province, is shown in Figure 5.**

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4. CONCLUSION

- GIS is one of the most suitable tools of identifying the most suitable retail market places. The use of GIS for determining the locations of retail market makes it easy to make accurate and quick decisions.
- It is very important to choose the spatial location of stores or sales places for retail markets. Firms in Turkey generally take into account the availability of existing rival firms where they have opened or think to open in the choice of retail market place. They want to use their customer profile as near to rival markets. However, by using GIS technology, it is possible to determine more convenient places where customer majority, marketing simplicity and the least risk.

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4. CONCLUSION

- As a result of the analysis carried out according to 12 criteria, the most suitable retail market places were determined. The current branch of "Sütgross Food Animal Husbandry Industry and Trade Limited Company" is located in the third grade suitable location, so the existing branch did not open in a convenient place. This situation may cause problems in the trade of the company. Changing the location of this branch and opening new branches in more convenient places is very important for the activities of the company.
- This study was carried out with the support of TUBITAK project number 1139B411600263. We thank TUBITAK for its support.

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