

**MARKET SHARE ANALYSIS FOR SHOPPING CENTERS
IN ANKARA**

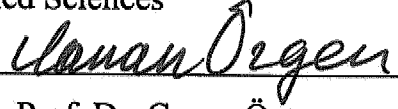
**A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
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IPEK YAVUZER**

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THE DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF
GEODETIC AND GEOGRAPHIC INFORMATION TECHNOLOGIES**

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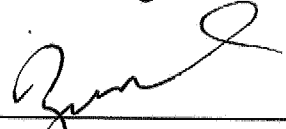
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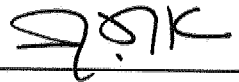
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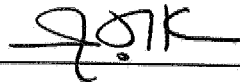
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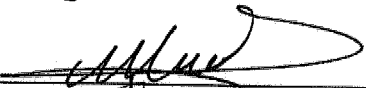
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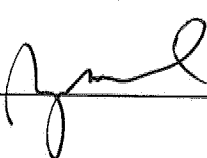
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ABSTRACT

MARKET SHARE ANALYSIS FOR SHOPPING CENTERS IN ANKARA

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In the last decade, the changes in living styles of people and shopping activities brought a new concept, "shopping center". By the time the numbers of shopping centers increased and this big consumption market created a great competition among the investors. The investors had the necessity of examining their market share within the market and other social and spatial factors for the feasibility of their shopping centers.

In this thesis considering the need of such a study, a market share analysis is carried out to determine the market share of shopping centers within the competition, analyze the important facts of the market share, estimate the market capacity and potential market regions. Ankara is chosen as the study area since it has an increasing trend for the development of shopping centers. The study is carried out for Armada, Bilkent and 5M Migros shopping centers since they serve for the whole city and have different functions such as recreation, restaurants, cultural activities together with shopping activities.

For the analysis a gravity model developed by Lakshmanan and Hansen is used. The model estimates the market share of the centers among regions considering the factors, as accessibility in terms of cost and time, economic conditions of regions, attractiveness of shopping centers and competitors of the market.

For the application process Geographic Information Systems ESRI Arc GIS 8.1 and ESRI ArcView 3.2 are used as software to store and manipulate data, build regulations on road network structure, calculate distances and costs, and present maps and results.

Key Words: Market Share Analysis, Geographic Information Systems, Gravity Model, Ankara

ÖZ

ANKARA ALIŞVERİŞ MERKEZLERİ İÇİN MARKET PAYLAŞIM ANALİZİ

Yavuzer, İpek

Yüksek Lisans, Jeodezi ve Coğrafi Bilgi Teknolojileri Bölümü

Tez Yöneticisi: Doç. Dr. Oğuz Işık

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Son on yılda, hayat tarzındaki değişimler alışveriş merkezi” olgusunun doğmasına sebep olmuştur. Son yıllarda alışveriş merkezlerinin sayısı artmış bu da yatırımcılar arasında büyük bir rekabet başlatmıştır. Yatırımcılar bu rekabette merkezlerinin uygulanabilirliğini saptamak için market paylaşımlarını mekansal ve sosyal faktörlerle birlikte incelemeye başlamışlardır.

Bu tezde böyle bir çalışmaya olan mevcut ihtiyaç da göz önüne alınarak alışveriş merkezleri arasında bir market paylaşım analizi yapılmış, market paylaşımlarında önemli faktörler, marketin büyüklüğü ve yüksek market potansiyeli olan bölgeler saptanmıştır. Ankara mevcut alışveriş merkezi gelişimleri nedeni ile çalışma alanı olarak seçilmiştir. Ankarada bulunan üç büyük alışveriş merkezinden Armada, Bilkent ve 5M Migros alışveriş merkezleri tüm kente hizmet etmeleri ve bünyelerinde alışveriş aktiviteleri dışında sosyal ve kültürel aktiviteler de bulundurmaları nedeni ile analizlerde kullanılmak üzere seçilmişlerdir.

Analizler için Lakshmanan ve Hansen tarafından geliştirilen çekim modeli kullanılmıştır. Model market paylaşımlarını maliyet ve zaman birimlerinde ulaşılabilirlik, alanların ekonomik durumları ve alışveriş merkezlerinin çekiciliklerini göz önüne alarak hesaplamaktadır.

Analizler sırasında Coğrafi Bilgi Sistemleri, ESRI Arc GIS 8.1 ve ESRI ArcView 3.2, yazılımları bilgi depolama ve işleme, yol ulaşım ağının düzenlenmesi, zaman ve maliyet hesaplamaları, haritalama ve sunum aşamalarında kullanılmıştır.

Anahtar Kelimeler: Market Paylaşım Analizi, Coğrafi Bilgi Sistemleri, Çekim Modeli, Ankara

TO MY FAMILY, UNIVERSITY, COUNTRY
AND THE WORLD...

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CHAPTER 1

INTRODUCTION

1.1. Aim of the Study

In the last decade, the economic dynamics of the societies turned from production based to consumption based activities. Increasing of women participation in business life changed the daily shopping activities to weekly shopping activities and time limitations brought the need of buying all products from same place rather than from several places and wasting time. Transportation technology developed, car ownership increased, and people had the opportunity to travel to long distances for shopping in a short period.

Within the industrial development, specialization and diversification among the products raised and people got the knowledge to buy special products for their special needs. This change in the living style of people brought a new concept, "shopping center". People prefer to buy their needs in places which they can find all different products and entertain at the same time.

By the time, the numbers of shopping centers increased and this big consumption market created a great competition among the investors. The investors had the necessity of examining their market share within the market and other social and spatial factors for the feasibility of the shopping centers. At that point, most of the companies used questionnaires, social economical and spatial studies for the site and market analysis. Some models are developed to find the market share of centers among competitors, to

determine the feasibility of the center and to estimate the free potential sites for future investments.

In this thesis considering the need of such a study, from a view of shopping investor, a market share analysis is done to determine the market share of shopping centers within the competition. Ankara is chosen as the study area since it has an increasing trend for the development of shopping centers. The three biggest shopping centers are used in the analysis. The study is carried out for Armada, Bilkent and 5M Migros shopping centers since they serve for the whole city and have different functions such as recreation, restaurants, cultural activities together with shopping activities.

The aim of the study is from an investor point of view, to determine the market share among Bilkent, Migros 5M and Armada shopping centers, analyze the important facts of the market share, estimate the market capacity of the city and estimate the market potential of regions in Ankara.

1.2. Methodology

Various models are developed to determine the market share of shopping centers within the market. There are three common methods used for the market share analysis; analog approach, regression analysis and gravity models. Since the study focus on market share concerning spatial and human interactions, the gravity model is used as method of the study. The gravity model is based on the simplest version of Newton's Gravity Model. The gravity model is commonly used for such analysis because the human interaction can be assimilated by Newton's Gravity concept. The earliest version of gravity model was developed by Reilly in 1931. His model assumes that the number of customers will increase as the size of the store or center grows and the distance from the customer to the store shrinks (Reilly, 1931). The major criticism with the traditional gravity model is that, it uses only size and distance affects to estimate sales of retail centers and it was applicable in only two locations. But this model became a guide to other scientists and the model developed for multiple competing shopping centers and

later with multiple variables in the following studies. The multiple competitor factors of gravity model was used by Huff in 1964. Later model developed by Hansen and Lakshmanan and the model which they developed in 1965 is used as reference model in this study. Lakshmanan –Hansen model is applicable to this study since it concerns accessibility, socio-economic profile of inhabitants and properties of shopping centers, as given below (Lakshmanan, Hansen, 1965).

$$S_{ij} = (e_i \cdot P_i) \frac{W_j^\alpha \cdot c^{-\beta_{ij}}}{\sum_{j=1}^N W_j^\alpha \cdot c^{-\beta_{ij}}} \quad (1.1)$$

S_{ij} = Consumption spent from i region to j shopping center

e_i = The consumption spent per person in region i

P_i = population of i

W_j = The area m^2 of the shopping center in region j

c_{ij} = Cost of transportation from i region to j shopping center

α, β = constant

Lakshmanan – Hansen used 3 primary factors which affect the market share among shopping centers, market area, accessibility and attractiveness. The modelling is done in four parts which are market capacity, accessibility, attractiveness and attraction power and market share. The regions are taken as quarters of Ankara since data can be found only in quarters and city scale.

Market capacity is the market potential of the regions for the shopping centers and it is determined by multiplying the consumption expenditure per person by population of the quarters. Within the consumption expenditures, consumptions which shows shopping center profile is taken such as food beverage, tobacco, clothing and shoe wear, house furniture, entertainment, culture, hotel, restaurant, pastry shops and other goods and services. The consumption expenditures data represent the whole city but do not give any information about the regions of the city.

It is assumed that the consumption expenditures of quarters are related with the wealth level of the inhabitants. Therefore the quarters are first classified into five groups by creating wealth index considering dwelling ownership information taken from DIE 1990. According to these classes, consumption expenditures are differentiated and market capacities are determined.

Accessibility is related with transportation time and cost. For the accessibility analysis a road network system is created showing turn limitations and directions of main roads. A network analysis is done and shortest travel distances are found from quarters to shopping centers. The transportation costs are studied in two terms such as financial cost of transportation and time spent during the transportation.

To calculate time and money each path distance is multiplied by cost of petroleum spent per km and for the time cost, average speed is given for the main and secondary roads and transportation time is calculated by dividing distance to speed information.

Attractiveness of shopping center changes with various factors, such as, sizes of shopping centers, numbers of products, entertainment activities, parking capacity and etc. Assuming that as long as the size of shopping center increases the numbers and specialty of products will increase, the attractiveness of shopping center is measured by the size of itself.

The attraction power is directly related with attractiveness of shopping center and inversely related with transportation cost. The power of the center is calculated by its power ratio on all shopping center powers on this region together and population shares will be found. In order to calibrate model the estimated results are compared by original results and α , β constants are determined.

In the last part of the chapter the model is calibrated and the market share of the shopping center are determined by the following simple calculation.

$$\text{Market Share of Shopping Center} = \text{Market Capacity} \times \text{Attraction Power} \quad (1.2)$$

In the application process, Geographic information systems are used as a tool. Geographic information systems can combine map images with other kinds of information for analyzing spatial and social relationships in the cities. For that purpose, ESRI Arc GIS 8.1 and ESRI ArcView 3.2 are used as software for the preparation of data, accessibility analysis, mapping and in evaluation process.

1.3 Content of the Study

The thesis starts with a literature survey about market share analysis and application methods. In this chapter, a market share definition is given and methods of market analysis analog approach, regression analysis and gravity models are described. The literature study focus more on gravity models since it focus on spatial and human interaction factors. Different versions of gravity models are described starting from the very early version and Chapter 2 ends with the GIS aspect and use of GIS in market share analysis.

The third chapter is the description of study area, reference model and data used in the study. It starts with a summary of recent retail changes in Turkey, and later describes the study area, Ankara, shopping centers and customer behaviors in Ankara. In the following part of the study, the reference model is described and a summary of application procedure as flow chart is given together with a summary of data used in the study.

In the fourth chapter, the factors of model described in Chapter 3 are divided, calculated separately and brought together at the end of the study. The chapter starts with the determination of market capacities and consumption expenditures. In next part for accessibility analysis, a network database is created and shortest travel distances are calculated for the next step, cost calculations. The chapter continues with determination

of attractiveness of shopping centers, determination of attraction powers and model calibration. In the end of the chapter the market share between shopping centers are calculated and the results are evaluated.

Finally, the last chapter, chapter 5, concludes the summary of the study, evaluates the results and make critics and suggestions.

CHAPTER 2

MARKET SHARE ANALYSIS

In this chapter, the definition of market share and the methods used for market share applications will be discussed. A short summary of analog approach and regression analysis will be given but since in this thesis the spatial factors and human factors are more important than economic side of market share analysis, the part will focus on the mostly common spatial interaction models, gravity models. In this chapter, it is aimed to find the most appropriate use of gravity model for the analysis. For this aim, the gravity models considering different factors will be evaluated. Moreover, at the end of the chapter, the use of GIS in market analysis will be discussed and the GIS methods will be evaluated in order to use in the study.

2.1 Market Share Definition

Market share is defined as “the share of the market commanded by a firm’s product (or brand)” But for consumer products and services, market is a group of consumers and therefore market share means share of potential consumers (Cooper, Masao, 1988). In many cases the market share may also mean actual sales in a given period of time. See below formula by (Cooper, Masao, 1988).

$$s_i = \frac{Q_i}{Q} \quad (2.1)$$

s_i = the market share of brand i

Q_i = sales of firm i

$$Q = \text{total sales of the market} \sum_{j=1}^m Q_j$$

m = the number of competing firms

The need of market share analysis come from the attention of businessman on changes in market and competitive relations among competitors. Most of the companies therefore use different methods in order to gather information about sales and customers. In recent years a new method POS (Point Of Sale) systems are used at check out counters. This systems are optical scanning systems which read bar codes and count information within the center. These systems help for the information about customers of the center but do not give information about competitive interrelations.

Market Share Analysis is a complex subject since it takes various competitive factors into account. It is the shares of attraction within the market. The most common method for market share analysis is "Multiplicative Competitive Interaction (MCI) Model" which is also called "Attraction Model". The MCI model has a formula in principle similar to the Gravity Models which can be seen below, (Cooper, Masao, 1988).

$$s_i = \frac{A_i}{\sum_{j=1}^m A_j} \quad (2.2)$$

$$A_i = \prod_{k=1}^K f_k (X_{ki})^{\beta_k}$$

s_i = the market share of brand i

A_i = The attraction of brand i

m = the number of brands

X_{ki} = the value of kth explanatory variable for brand i

K = the number of explanatory variables

f_k = a monotone transformation on X_k , ($f_k(\cdot) > 0$)

β_k = a parameter to be estimated

Market share analysis is competitive and therefore the effect of a marketing variable function is a function of competitors actions and their market shares. It is aimed to evaluate the effectiveness of marketing actions in a competitive environment. The critical problem of market share analysis is the need of information about competitor companies. By different systems such as questionnaires, POS systems, consumer surveys, the companies can get information about their properties, but to get this information about other competitor companies is not easy. To gather information about competitors require careful monitoring of competitors and a comprehensive file for each competitor (Cooper, Masao, 1988).

The factors which affect the market share changes according to each product. The competition structure is different from a product which is new in market or existing products which increase in quality level or price. Similarly market share can be between brands or between stores. In this study the market share of shopping centers will be evaluated. There are different factors which determine the market share of the shopping centers. In such a case, price, quality, number of products, entertainment facilities provided by center, payment opportunities, parking capacity, atmosphere and accessibility, consumer profile and same factors for competitive centers affects the market share among the centers.

2.2 Methods of Market Analysis

In order to make market analysis such as to estimate the market potential of a region, or estimate location of potential new sites, there are three common methods used for the market analysis.

- Analog Approach
- Regression Analysis
- Gravity Models

2.2.1 Analog Approach

It can be called “similar store approach” since it evaluates the existing best current center. It identifies best current center and makes customer spotting for it. Trade areas are determined by results of customers spotting and characteristics of trade areas are determined. The new shopping should be opened in the similar places and should be similar to the current one.

This approach relies on judgement rather than statistical analysis. It has a handicap that it assumes to have a current similar shopping center, but here may not be one. (www.csun.edu, 2004) Moreover same centers may have different impacts on different locations.

2.2.2 Regression Analysis

The regression analysis starts similar to analog approach. First, it evaluates the best fitting example of shopping centers. Customer spotting, defining trade areas and evaluating the characteristics of trade areas are same as analog approach but they are done for all shopping centers. After the variables which effect the difference in performance of centers are selected and regression equation is fit in order to understand the best fitting model, which gives the most difference. (www.csun.edu, 2004)

$$\text{Sales (demand potential)} = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots b_nx_n \quad (2.3)$$

The model can be applied to potential new locations for site selections and sales estimations. The model examines many variables therefore should have several centers for the analysis. Different form analog approach this model uses statistics rather than judgement to determine variables which influence sale. (www.csun.edu, 2004)

A market analysis is done for hospitals by Wolarsky in order to determine the patients' share of the hospitals. He used a multiple linear regression model for the analysis. He used zip codes for each discharges, he used a medical dataset and created maps for market area of Hunterdon Medical center which is a community hospital in Central New Jersey. His study was followed by the below mentioned steps:

- Thematic maps of admissions are created by zip codes.
- Multiple linear regression method is done to predict patients by evaluating independent variables such as demographic census variables, geographic variables like distance and number of physicians.
- Three variables are distance to Hunterdon hospital and distance to the nearest hospital , for each zip codes population over 65, median income, median house value and number of physicians.
- Variables were entered in SPSS software and produce R-square of .67 which shows % 67 of admissions can be explained with these three variables.
- The population and out migration maps are created an overlaid.
- Finally best potential location for further marketing efforts are found.

(Wolarsky E)

2.2.3 Gravity Models

Shopping gravity is defined as the area which is needed for keeping centers existence. Its minimum extend is defined by its size such as the number of people needed by the store for its existence. And the maximum extend of the gravity field is defined as distance between the store and the place that the customer is still willing to travel. (Szczyrba, 2002)

According to (Szczyrba, 2002) the shopping gravity is affected by the following factors:

- Attractiveness of retail network of the locality
- Socio-professional structure of population in the municipality
- Motorisation level of population
- Quality of communication network and transportation
- Function and importance of municipality within the structure.

In order to determine shopping gravity various models are used. The most common one is customer surveys. Generally all shopping centers do questionnaires in order to determine its shopping gravity and customer profile. These questionnaires are generally based on the questions to determine the customers willing to travel, the time they spent for transportation, the distance they are willing to travel, socio-economic structure of the customers and consumption expenditures. Another method is using mathematical models based on the basic principles of Newton's Gravity Models.

Gravity models have been used in planning and transport studies more than any other form of mathematical model. They have been used to analyze interaction among several areas. Gravity models are used for such analysis because the human interaction can be assimilated by Newton's Gravity concept. The name of Gravity Model comes from the simplest version of Newton's Gravity Model. (Ruiz, 2004)

According to Newton the attraction power of two objects is directly related with their Mass (m) and inversely related with the distance (d) between them.

$$F_{ij} = \frac{K \cdot M_1 \cdot M_2}{d_{12}^2} \quad (2.4)$$

F_{ij} = Attraction Pwoer

K = Constant

M_1, M_2 = Mass of objects

d_{12} = distance between two objects

The basic formulation is later developed for different applications by different scientists. Erlander (1980) in his study mentions that one of the first statements giving the idea of gravity model use in human interaction model was from Carey in 1858 with the following statement . “Man tends of necessity to gravitate towards his fellow-man. Of all animals he is the most gregarious, and the greater the number collected in a given space the greater is the attractive force there exerted, as is seen to have been the case with the great cities of the ancient world, Nineveh and Babylon, Athens and Rome, and as is now seen in regard to Paris and London, Vienna and Naples, Philadelphia, New York and Boston. Gravitation is here, as everywhere else in the material world, in the direct ratio of the mass, and in the inverse one of the distance”

The Newton's gravity model is first developed by Reilly in 1931 for determining the trade areas of the cities. The major criticism with the traditional gravity model is that it uses only size and distance affects to estimate sales of retail centers. Later scientists developed traditional gravity model and adopted to their problems and applications.

In 1959 Hansen tried to explain the relation between employment and residence by new form of gravity model. He used attractiveness, accessibility and holding capacity concepts in his study. Huff in 1963 tried to estimate the shopping trips by determining the probability of a customer to shop in a specific shopping center. Later Lakshmanan and Hansen together in 1965, used also shopping trips in order to estimate the sales of shopping centers with calibrated model. The latest researches incorporate properties of retail centers and shoppers with the model. In 1993, Okoruwa, Nourse, Terza used Poisson Distribution in order to estimate shopping trips and sales of shopping centers. In their study they used socio-economic and demographic characteristics of shoppers and properties of shopping centers as variables.

2.2.3.1 Reilly's Law of Retail Gravitation

In 1931 William J. Reilly create an application of gravity model to measure trade interaction between two cities. He was inspired by Newton's gravity model and he

became a guide for the future applications of gravity model. Reilly says that, the trade area of a city is related with the size of the city. As larger as the city, the larger its trade area. The two equal sized cities will have a boundray in their midway and this midpoint is called breaking point of thier trade areas. When cities are not in equal size the break point of the trade area boundary will be closer to the smaller city. (Reilly, 1931)

$$I_{ij} = k \frac{P_i P_j}{D_{ij}^b} \quad (2.5)$$

I_{ij} = Interaction between two cities
 $P_i P_j$ = Population of two cities
 D_{ij} = Distance between two cities
 K = Constant

The Law of Retail Gravitation allows us to draw the hinterland of trade areas of the cities using their population and distance by the following calculations:

$$\text{Break Point} = \text{Distance} / (1 + (\text{SQRT}(\text{SizeB} / \text{SizeA}))) \quad (2.6)$$

Table 2.1
 Reilly's Law of Gravitation

Reilly's Break Point Theory				
Size of Location A	Size of Location B	Distance Between	Breakpoint	
60,500	90,000	12	5,4	Miles
60,500	150,000	12	4,7	Miles
160,000	90,000	12	6,9	Miles

Reilly's model was the very early use of gravity model and it was applicable only two locations. But this model became a guide to other scientists and the model developed

for multiple competing shopping centers and later with multiple variables in the following studies.

2.2.3.2 Huff's Gravity Model

Huff's gravity model estimates the probability that a customer will shop in a market. According to Huff as long as the market grows or the distance to the market decreases, the probability that the customer will shop in this market increases. The model is formulated as a ratio of one cities attractiveness versus sum of all other cities attractiveness. It is formulated by Huff, 1963 as follows:

$$PROB_{ax} = \frac{\frac{POP_x}{D_{ax}}}{\sum \frac{POP_x}{D_{ax}}} \quad (2.7)$$

$PROB_{ax}$ = the probability that a customer located at a, which is D_{ax} miles from w will choose x,

POP_x = Population of city a

D_{ax} = Distance from a to x

Here is an application table of Huff's Probability Model done in order to estimate the traffic flow of people among three cities by University of Alabama in Huntsville, (<http://coeweb.eb.uah.edu> 08.01.2005)

In this example the model calculates the likelihood that a person living in one city shops in another city as well as the ability of one city that attracts people from other cities. In columns 4-8 a distance matrix is created and distances from each point to another is written. The distance of a city to itself should be 0 miles but for calculations 1 is taken as minimum distance.

Table 2.2
Huff's Probability Model Application

	A	B	C	D	E	F	G	H
	Center	North	South	East	West			
1	Waverly	Charles City	Waterloo/ Cedar Falls	Oelwein	Hampton			
2	City							
3	Population	8,539	7,378	100,765	6,493	4,133		
4	Distance from Waverly	1	28	14	31	38		
5	Distance from Charles City	28	1	42	58	64		
6	Distance from Waterloo/Cedar Falls	14	42	1	45	52		
7	Distance from Oelwein	31	58	45	1	69		
8	Distance from Hampton	38	64	52	69	1		
9								
10	POP/D _{ai}	8539.00	281.36	7197.90	209.45	108.76		16336.07
11	POP/D _{bi}	304.86	7878.00	2399.17	110.05	64.58		10756.76
12	POP/D _{ci}	609.93	187.57	100765.00	144.29	79.48		101786.3
13	POP/D _{di}	275.45	133.53	2239.22	6493.00	59.90		9201.089
14	POP/D _{ei}	224.71	123.09	1937.79	94.10	4133.00		6512.694
15								
16	Sum (POP _i)	9954.05	8603.55	114538.68	7050.89	4445.72		
17	Sum (POP _j)	16336.07	10756.76	101786.27	9201.10	6512.69		
18								
19	PROB _{ai}	85.78	3.27	6.28	2.97	2.45		
20	PROB _{bi}	3.06	91.57	2.09	1.58	1.45		
21	PROB _{ci}	6.13	2.18	87.97	2.05	1.79		
22	PROB _{di}	2.77	1.55	1.95	92.09	1.35		
23	PROB _{ei}	2.26	1.43	1.69	1.33	82.97		
24		100.00	100.00	100.00	100.00	100.00		
25								
26	PROB _{aj}	52.27	1.72	44.06	1.28	0.67		100.00
27	PROB _{bj}	2.84	73.24	22.30	1.02	0.60		100.00
28	PROB _{cj}	0.60	0.18	98.00	0.14	0.08		100.00
29	PROB _{dj}	2.99	1.45	24.34	70.57	0.65		100.00
30	PROB _{ej}	3.45	1.69	29.75	1.44	83.48		100.00
31								
32								
33	External-Internal trips percents	"."	10.89	57.07	10.01	8.82		
34	External-External trips percents	"."	8.69	82.14	7.55	5.92		
35								
36	E-E percent from each approach		44%	59%	43%	40%		

The information column 10-14 shows the attractiveness of city j on cities a,b,c,d,e. The columns 16,17 shows the sum of populations of i and j. The information column 19-23 shows that the likelihood that residents from that city shop in all the available cities. The columns 26-30 represent the ability of a city to attract shops from surrounding cities. The likelihood external, external trips for each city is sum of all trips coming from and going to all other communities and in this example external external trip for City Oelwein can be calculated by sum of E20, E21,E23, E27, E28, E30. On the other hand the external-internal trips of Oelwin is sum of E19, B22, E26 and B 29. (<http://coeweb.eb.uah.edu> 08.01.2005)

The Huff's probability model is one of the earliest example of gravity model with multiple factors. As an addition to Reilly's model, more than two competitors can be applied to model. The criticism of this model is that only two variables are used for the study which is size and distance. The socio-economic conditions of the people are not taken into consideration.

2.2.3.3 Hansen's Gravity Potential Model

Hansen developed the early version of gravity model for planning applications to predict the settlement of population. He used the model to show that accessibility to employment is a major factor for the settlement of population. His model had 3 primary factors such as holding capacity, accessibility and attractiveness. Hansen used zones as model unit. He considers that the relationship between increase in population and employment in zone can be expressed by accessibility index which is developed by the following formula, (Hansen, 1959).

$$A_{ij} = \frac{E_j}{d_{ij}^b} \quad (2.8)$$

A_{ij} = Accessibility index of zone j
 E_j = total employment of zone j
 d_{ij} = distance between zones i to j
 b = power of d_{ij}

According to Hansen how many people will be attracted by the region is related with accessibility of the region and the population number who is attracted by an area. He calls this "development potential" of the zone. It is the attractiveness of the zone, (Hansen, 1959).

$$D_i = A_i H_i \quad (2.9)$$

D_i = Development Potential
 A_i = Accessibility
 H_i = Holding Capacity-Population

In addition to the development potential of the region, the population is shared related to the other regions development potential, therefore the share of population growth is related with how attractive that zone among other competitor zones, (Hansen, 1959).

$$G_i = G_T \cdot \frac{A_i H_i}{\sum_i A_i H_i} \quad (2.10)$$

G_i = Total Population Growth in region i
 G_T = Total Population Growth

Hansen Model can be summarized with the following steps:

- Calculate accessibility index for each zone
- Multiply accessibility index with holding capacity
- Development potentials for each zone
- Find total development potentials
- Find rates of development potentials among total
- Multiply the rates with total population growth
- Population Share

Hansen's gravity model brought the concept of holding capacity to the application. This concept later developed by Hansen and Lakshmanan together and market area concept rised which will be described in detail in the following parts of the study. Holding capacity is important because for the first time the regions are differentiated according to their potentials. In addition to Huff's model hansen used accessibility, development potentials and attractiveness as factors. The criticism of this version of model is it still consideres all people same and do not differentiate according to their socio-economic conditions.

2.2.3.4 Lakshmanan – Hansen Model

Lakshmanan model is a different use of Newton's gravity model when it is compared with the previous studies. The first model which was developed by Reilly in 1931 was applicable for two shopping centers. The assumption of the first model was as greater as the size of shopping center (mass) the greater its gravitational pull. Moreover, as

long as the distance to the shopping center decreases, the gravitational pull of the center increases. The multiple competitor factors of gravity model was used by Huff in 1964. Hansen and Lakshmanan using this method created a model for retail shares of shopping centers. The model is similar to the model Hansen is developed in 1959 but the new version of model is important that it uses economic and demographic properties of customers such as population variables, consumption expenditures.

The other factors of the model is attractiveness of shopping centers, size and the distance effect of accessibility. (Lakshmanan, Hansen, 1965)

The Lakshmanan and Hansen model is selected as the appropriate model since it considers the factors we want to evaluate such as accessibility, potential of regions, customer properties and properties of shopping centers. The criticism of this model is that Lakshmanan Hansen model calculates accessibility in distance units but in today's conditions accessibility time is as important as distance effect. In our study the accessibility part of this model is developed with reference to the Poisson Gravity Model developed by Okuruwa, Nourse and Terza. The accessibility is calculated in distance and time units. The detail explanation of Lakshmanan – Hansen model is given in Chapter 3.

2.2.3.5 Poisson Gravity Model

Okuruwa, Nourse, Terza (1993) demonstrated how sales for retail centers can be estimated without using traditional gravity model. They developed a technique to estimate sales in Atlanta Metropolitan Region. They specify shopping behaviour as Poisson process. Poisson process has two assumptions. It assumes that the events are independent and the probability of one event's occurrence is proportional to the size of the unit. The shopping trips satisfy the first assumption as the shopping trip done by each individual is an independent event.

The individual responds are denoted by t , and alternative shopping centers are denoted by j . Y_{jt} is the poisson random variable representing number of shopping trips made from center j to the individual t . M is the poisson parameter which wants to be estimated (Okoruwa, Nourse, Terza, 1993).

$$Pr Y_{jt} = e^{-m_{jt}} (m_{jt})^{y_{jt}} / y_{jt}!$$

$$M_{jt} = \exp (X_t B_j) \quad (2.11)$$

X_t = row vector of socioeconomic and demographic characteristics of t individual

$X_t = [X_{1t}/X_{2j}]$

$X_{1t} = [1, x_{djt}/x_t]$

X_{jj} = rowvector of center specific characteristics of center j

X_{djt} = driving time, in minutes from t individual to the j shopping center

B_j = coefficient how individual characteristics affect trip to center j /coefficients of the center-specific variables

As can be seen from the formulation, socio-economic and demographic characteristics of individuals, shopping center specific variables and friction factor is used in the study. Variables for shoppers include information such as, marriage, age, sex, education, employment, residence ownership, households numbers, income, driving time to the shopping center. The variables for centers include information as, age of mall, size, number of stores and constant term.

A statistics of data is made with the variables and a summary for shopping trips and their frequency is done. After, the model results are compared with the observed trip distribution. In the study made for Atlanta % 97 R-square is achieved. And by using this calibrated form of model predicted sales for Atlanta Metropolitan Statistical Area is estimated (Okoruwa, Nourse, Terza, 1993).

The poisson model is one of the latest version of gravity models. In addition to Lakshmanan – Hansen model time affect of accessibility is considered. The analysis uses demographic and socio-economic characteristics of the people in detail such as

marriage, sex, age, education. The criticism of the model is since it is a mathematical model it can not modelize exceptions. The human behaviours can not be predicted and therefore the people are considered with similar behaviours. Since Turkey is a developing country the information needed to apply poisson gravity model was not achievable. Therefore is not selected as reference model, but in case there is enough information about study area the model can be used for analysis.

2.2.3.6 Discrete Choice Analysis

Dipasquale and Wheaton (1996), mentions a similar model to Lakshmanan Hansen model in their study. In this study consumers are assumed to select only one shopping center. The model starts with dividing market areas. Zones are used as unit and zones are categorized according to households income. Each shopping center has attributes that households find desirable such as size, parking capacity, mix of stores. And transportation costs are also taken as factor of choice analysis. For the importance of willing to travel and desirability of centers two coefficients are taken and these coefficients are also distinguished according to household levels.

2.3 The Limitations of Gravity Models

In the previous part of the study different methods of gravity models are evaluated. Gravity models have been the best of mathematical models for enlivening human interactions and relationships. Since it is not possible to modelize real world with mathematical model as original one, all model forms have some limitation. In this chapter these limitations of gravity models are explained in following items:

- The models deals with large group of people and assumes that the group is homogenous. It predicts the human behaviour by probability but human groups have exceptions and this exceptions are not represented in these models.

- The distance is one of the major factor which affects the interactions. And it is not accurate to measure distance only by length. The arrival time to the place is more accurate way of measure than distance itself.
- The units of the method should be determined by areas or zones. As long as the size of the regions decrease it will give more accurate results since the homogeneity of regions will be represented in more classifications. But as long as the number of region increase it will be difficult and time consuming to make complicated calculations.
- Calibration of models provides the best adjustment of model to the real world system. Generally different parameters are tried and the best adjustment parameters are selected for the future analysis. In this subject first of all in developing countries such as Turkey, it is very difficult to achieve real information. On the other hand, the parameters which can fit the real world today may not fit the same world tomorrow (Ruiz, 2004).

The visualization of the market share gives an important tool for the developers. The market properties can be visualized by charts, pies, spotting, mapping trade areas and so on. In the next chapter, GIS which is a very important tool for market share analysis for gathering data, application and mapping part will be discussed.

2.4 GIS & Market Share Analysis

Geographic Information systems are developed as tools for the storage, retrieval and display of geographic information. The analysis of patterns and relationships in geographical data is a central function of Geographical Information Systems.

GIS is an important tool in order to see spatial relationships since the tabular information may mean different when they are located on a map with different colors and representations. It helps to understand the trade area and what is needed for business development (Koloszyc, 2004).

GIS is an important tool for market analysis since it allows following items:

- Define trade areas.
- Analyze market penetration.
- Measure the effectiveness of marketing campaigns.
- Locate untapped market areas and emerging markets.
- Visualize consumer expenditure data.
- Perform drive-time analyses. (ESRI, 2004)

In most studies trade area analysis, proximity analysis and drive-time analysis are used for market analysis. In the next part, these methods of GIS will be described.

2.4.1 Trade Area Analysis

The trade area analysis is a methodology or technique that provides a basis for understanding, quantifying the extent and characteristics of known or approximated trade areas (Segal, Donald B, 1997). The size and shape of the trade areas of market units can be determined by GIS. It will help to examine the customer base and determine the customer profile. This analysis will help to understand where customers come from, which type of customers come and how far they are willing to travel for the service provided by the center.

There are several methods to determine the trade area of center in softwares. Arc GIS Business Analyst provides following methods:

- **Simple ring**—created around your stores using a radius you specify. This analysis assumes that the trade area is circular and centered on the stores location. This technique does not account for barriers that cross the circular area. See Figure 2.1 (Segal, 1997)

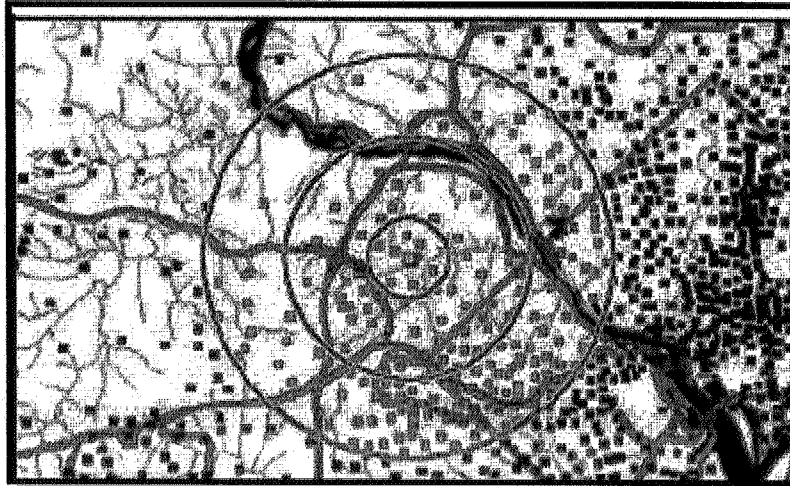


Figure 2.1
Radial Method, Location of Stores in 1, 3, 5 miles radius

- **Data driven ring:** created around your stores using a radius proportional to a store characteristic such as total sales, square footage, and gross leasable area
- **Equal competition:** creates trade area boundaries halfway between each store and its neighboring stores (Thiessen polygons)
- **Drive time:** defines areas accessible along the street network based on your specified maximum travel time or distance.
- **Gravity model:** predicts the sales potential of an area based on distance, competition, attractiveness factors, and consumer spending.
- **Threshold ring:** - creates rings containing a specified population or household count (ESRI, 2005).
- **Trend Map Analysis** Customer point of sale data is collected and this address base data can be geocoded to provide a reference for each customer. Geographic distribution and characteristics of the trade area is evaluated. The trend map analysis provides very precise measure of spatial distribution and characteristics of store trade areas (Segal, 1997), see Figure 2.2.

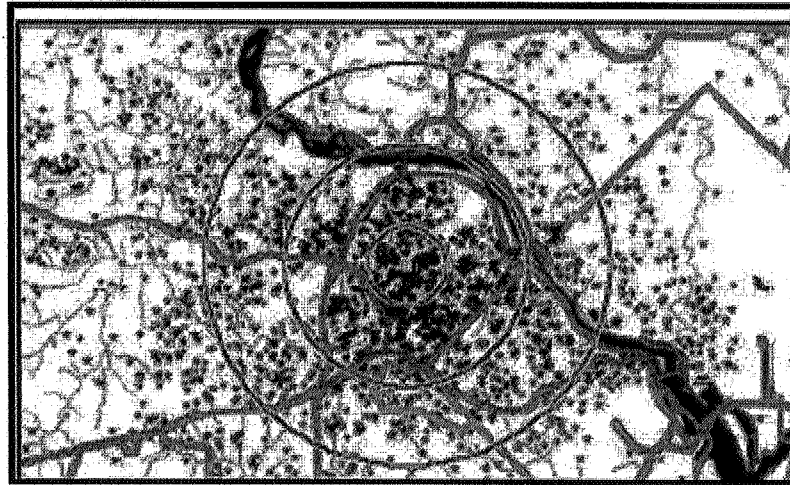


Figure 2.2
Trend Map Showing Locations of Customers

Figure 2.3 shows a map of trade area analysis done by Alta Vision Geographics, (2004). The map shows the sales of the product within the region. In the figure the dark regions represents the higher sales where as the light colors represents the lower sales.

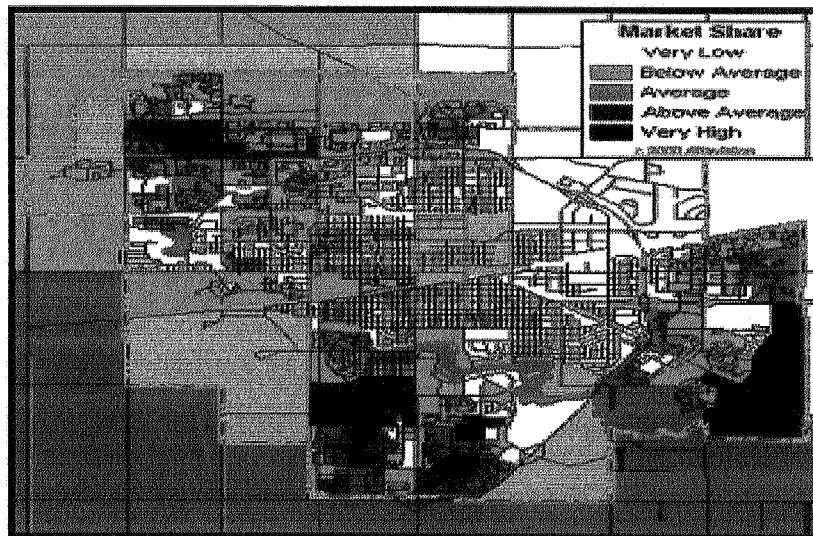


Figure 2.3
Trade Area Analysis

2.4.2 Proximity Analysis

Proximity Analysis helps to understand your existence of competitors or other physical factors such as motorway, river, mountain, sea. In the figure 2.4 the 5 mile radius is determined as the market area of the centers. By proximity analysis it is possible to see if there is any competitors in your trade area, what kind of competitors and how many. In region Mobile there are 13 competitive stores in the trade area. In Daphne there are 3 competitors but half of the trade area is without customers because of sea, in Gulf Shores there are 4 competitive stores and seems to be the most efficient site location for the center. (Info Grow, 2004)

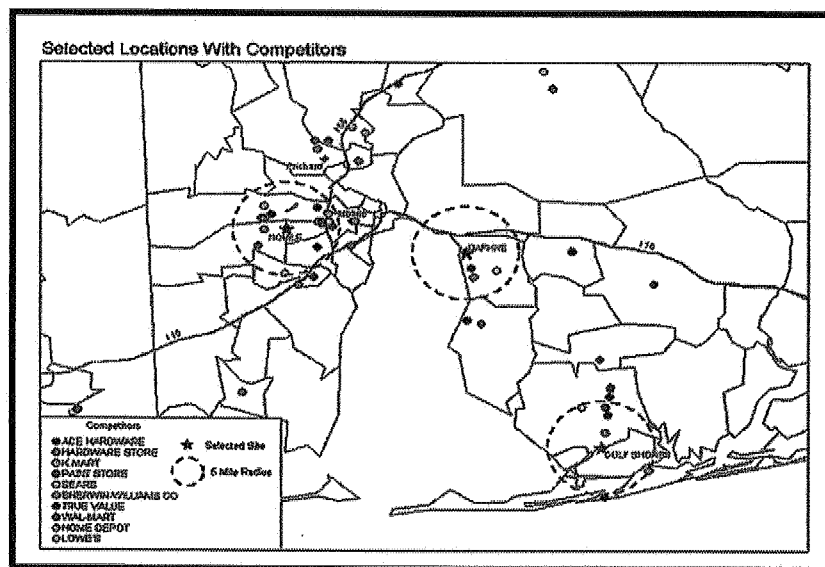


Figure 2.4
Proximity Analysis

The proximity analysis give an idea about potential sites for further developments but in order to analyze market in terms of various factors, trade area analysis or market analysis will not be enough since they can not deal with multiple factors. In this point gravity model of GIS use seems to be more appropriate for this study.

2.5 Summary

In this chapter, market share definition is given as the share of potential customers. (Cooper, 1988) The factors which affect the market share change according to each product. In this study the market share of shopping centers will be evaluated. There are different factors which determine the market share of the shopping centers. In such a case, price, quality, number of products, entertainment facilities provided by center, payment opportunities, parking capacity, atmosphere and accessibility, consumer profile and same factors for competitive centers affects the market share among the centers. There are three common methods used for market share analysis such as analog approach, regression analysis and gravity models. Since in this thesis it is important to consider spatial and human factors, the chapter evaluation focus on the gravity models.

First gravity model was developed by Reilly in 1931 on the principle of Newton's gravity model. The support that the attraction between two centers is directly related with their size and inversely related with the distance between them. The major criticism with the traditional gravity model is that it uses only size and distance affects to estimate sales of retail centers. Later scientists developed traditional gravity model and adopted to their problems and applications. Lakshmanan - Hansen model is selected as reference model that it uses economic and demographic properties of customers such as population variables, consumption expenditures together with accessibility and attraction power. In Chapter 3 the selected model Lakshmanan and Hansen model will be described in detail.

CHAPTER 3

MODEL AND DATA USED IN STUDY

3.1 Introduction

Gravity Models have probably been used in planning and transport studies more than any other form of mathematical model. They are used to analyze the interaction between several urban areas and they are named this way because the concept of human interaction can be assimilated to Newton's Gravity Concept (Ruiz, 2004).

In the previous chapter, after a literature survey, we discussed the limitations of gravity models and how different scientists tried to expand these limitations by developing new forms of Gravity Models. Most of gravity models explain human behaviours homogeneously and without exceptions. The distance effect of the model is calculated by the length factor but for human beings time of distance factor is as important as the length factor. The units of models such as regions, zones, districts are assumed to be pure and homogeneous which is not possible in real world. And finally the model variables may change according to different city structures and different populations, and therefore should be calibrated according to each city conditions.

The gravity model developed by Lakshmanan and Hansen is selected as the most appropriate model since it expands these limitations better than other versions of Gravity Model. Lakshmanan-Hansen Model assumes that different segments of population will have different consumption capabilities. The model is adoptable to calculate distance factor not only in length units but also in time units for the travel distances. And finally it calibrates model by evaluating real world information.

The chapter will start by giving information about the study area. In the first part a description of the retail sector in Turkey will be discussed and information given about the study area and reference shopping centers. In following parts we will discuss the customers behaviours of shopping centers in Ankara and Lakshmanan-Hansen Model with its advantages and limitations. In the last part a summary chart of the application procedure will be given together with a list of spatial and non-spatial data used in the application.

3.2 Recent Changes in Turkish Retail Sector

Starting from the 1980s, export products expanded in retail Turkish market and so on the customer demand for these products increased. Retail shops provided by government were not enough to meet this demand and private sector started to grow at that period. Government from 1985, supported private investors for big shopping centers. In the beginning of the 1990s European regulations and restrictions enabled European investors to come to Turkey. In 1988 Metro, in 1992 Continent and in 1991 Carrefour's attendance brought action to the retail market. In the 90s the number of big retail centers increased rapidly by the help of bigger capital, higher quality service and advantages of wholesale. This brought hard competition among investors and therefore most of the small retail units were closed or could survive by making joint ventures with other companies (Erdoğan, 2003).

Today fifty retail chains operate in Turkey and some of them have partnership with international companies. Sırtoğlu (2004) in his study mentions that in 2001 the number of food retail outlets has declined by 5000 down from 230.000 and the market share of hypermarkets and supermarkets are expected to increase from 40 percent to more than 50 percent by the end of 2005. In order to protect small retailers Turkish government tries to slow down the closure of small retails such as Bakkal, butcher ...ect by limiting hypermarkets locations in downtown areas (Sırtoğlu, 2004).

In the development of big retail centers such as shopping centers, outlets and hypermarkets, socio-economic profile of inhabitants play the major role. In the recent years the economy development speed up and consumption expenditures and car ownership increased, finance sector developed and expand the use of credit cards. The factors such as increase of woman participation in business, industrialisation and increase in education level also support this development. Erdoğan (2003) in his study mentions that, according to a survey done by Nielsen ZET the reasons of customers to choose a shopping center can be summarized as follows:

Price	68 %
Number of Products	59 %
Clean atmosphere	15.7 %
Accessibility	5.2 %
Use of Credit Card	4.5 %
Quality of Products	5.1 %

These factors together with social activities provided in shopping areas such as movies, theaters increase the trend of shopping centers which provides various products and services in clean atmosphere together with appropriate buying opportunities to the customers.

3.3 Description of Study Area

Ankara, is chosen as the study area since it has an increasing trend for shopping centers. Ankara has 8 main metropolitan districts such as Yenimahalle, Keçiören, Altındağ, Gölbaşı, Mamak, Sincan, Etimesgut and Çankaya. It has 428 quarters (mahalle) in metropolitan area and it is governed by Ankara Greater Metropolitan Municipality (Ankara Government web site, 2004).

According to the 2000 population census, there are 1.018.371 households in the city. 56 % of population lives in their own house and 34 % of the population lives in rent in

metropolitan areas. It is guessed that 30-35 % of the population lives in squatter houses (Ankara Government web site, 2004).

3.4 Shopping Centers in Ankara

“Turkey’s retail sector has been developing rapidly since the 1980s, concurrent with changes in its economic and social structures. Liberalization of the economy, stimulated by its Customs Union with the EU (European Union) in 1996, has opened the door for further development.” (Sırtıoğlu, 2004) Since then a retail transformation started in big cities. Ankara has an increasing trend for shopping centers. The first hypermarket¹ of the city, Kocatepe Beğendik, was opened in 1993 under a mosque. It has 25.000 m² closed area and serves with various goods such as textile, furniture, food and other service units (Çıngı, 2001).

The shopping center concept of the city arised with Bilkent Center built in suburban area of Ankara, near Bilkent University. When Bilkent Center was opened in 1998, it was bigger than all other retail centers as its size. Following years other shopping centers were develeoped such as Carrefour, Armada and 5 M Migros. There are also smaller centers serving for the city such as Yimpaş, Atakule, Galleria. These centers mostly serve local areas and finally can not compete with bigger shopping centers such as Armada, 5M Migros and Bilkent. The locations of Armada, 5M Migros and Bilkent shopping centers can be seen in Figure 3.1.

The three biggest shopping centers are used in the analysis. Armada, Bilkent and 5M Migros shopping centers are taken for the study since they serve for the whole city and have different functions such as recreation, restaurants, cultural activities together with shopping activities. It was also an important factor during decision that it was possible to achieve reliable data from these shopping centers. In the next part of the study a short information is given for Armada, Bilkent and 5 M Migros Shopping Centers.

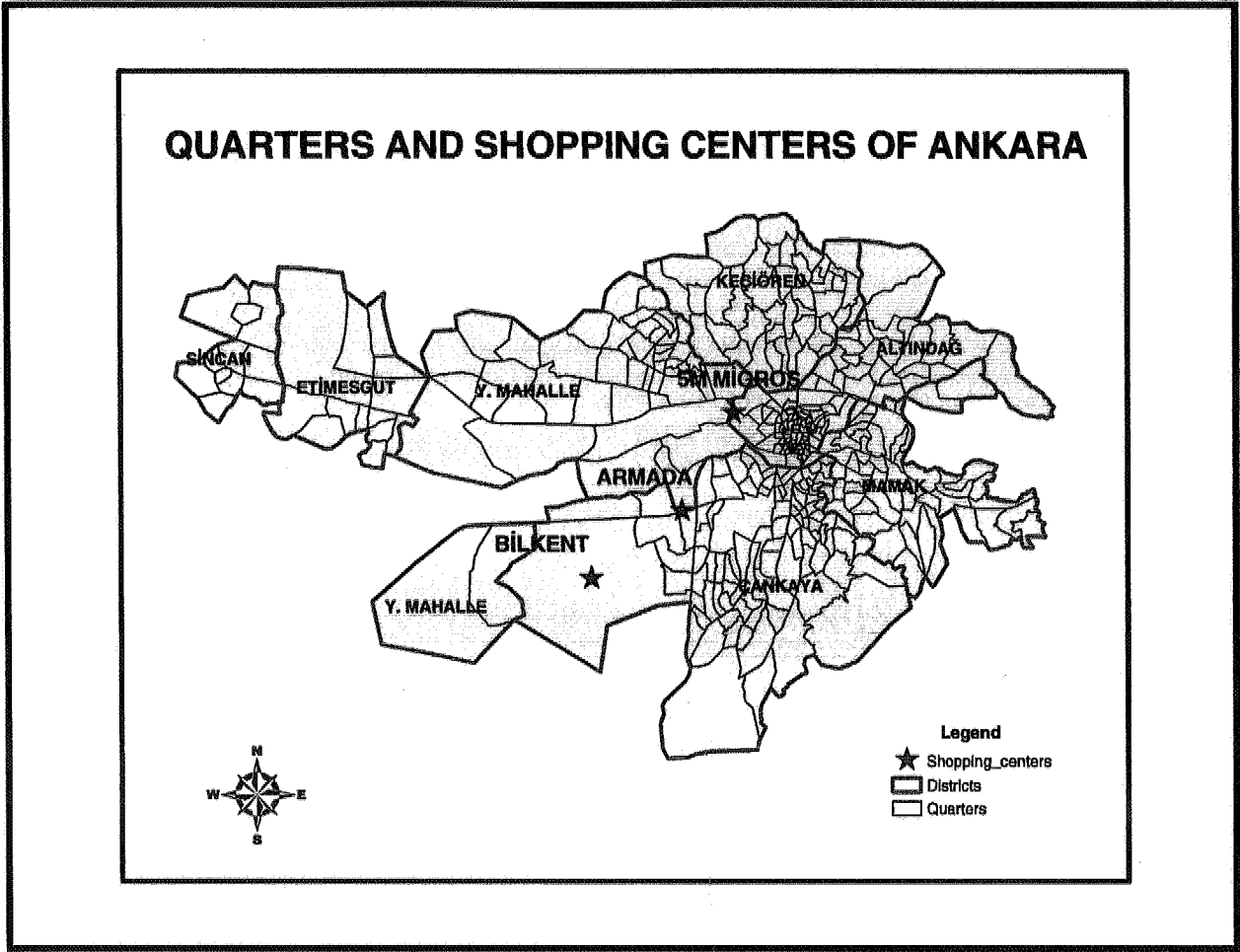


Figure 3.1
Ankara City Map

3.4.1 Armada Shopping Center

Armada Shopping Center was opened in 2002 by Söğütözü İnşaat ve İşletme A.Ş. on Eskişehir road, Söğütözü area. The shopping center consists of upscale clothing companies, high technology entertainment units, cafes and restaurants, cultural activities, housing furniture and other functions on an area of 50.000 m². It has a movie theater with 1500 seat capacity and 11 saloons, and a 4 dimensional movie saloon. (www.armadasite.com, 2004)



Figure 3.2
Armada Shopping Center – Ankara

The construction area is 125.000 m² together with office block and the rentable area for shopping units is 31.400 m² with 151 shopping units. The shopping center has otopark for 50.000 m² for 2000 cars capacity for the shopping center (www.armadasite.com, 2004).

In 2004, Armada is visited by 18-20.000 customers in week days whereas in weekends this number increases 35-40.000 customers per day. Totally the shopping center is visited by 640-720.000 customers in a month (Armada Management Office, 2004).

The customer surveys done by Armada Management Office for 2004 shows that 68 % of the customers use private transportation and generally come from Eskişehir Yolu, Bahçelievler, Emek, Ümitköy, Konutkent, Balgat, Söğütözü and Çankaya. 78 % of the customers are high educated such as university or high school graduated. They are from mid-high or high income groups. Armada is also visited by students since it is accessible to universities such as ODTU, Bilkent, Hacettepe, Gazi Universities (Armada Management Office, 2004) .



Figure 3.3
Armada Shopping Center – Ankara

3.4.2 Bilkent Shopping Center

Bilkent Shopping Center is built on 99.600 m² construction area and 54.000 m² closed area in 1998 by Tepe İnşaat A.Ş. Bilkent Shopping Center has Real, Praktiker, Marks and Spencer, Toys'r Us, Restaurants, Tepe Cinemax and a bowling saloon with 6000 m² area. It has parking capacity of 1700 cars (www.tepeemlak.com.tr, 2004).

In week days almost 75.000 customers per day visit Bilkent Shopping Center and in weekend the number of customers increases to 150.000 customers per day. Totally 8.5 million customers are counted by management in a year and 710.000 customers are counted per month. This customer information is taken dailly by the market in 2004 and after summarized for the whole year (Tepe Emlak A.Ş., 2004) .

52,5 % of the customers come with private car to the shopping center where as 19,2 % comes with mass transportation and public transportation. Generally customers come from Bilkent, Çayyolu, Bahçelievler and Ayrancı regions. Comparing with other shopping centers the visit frequency is lower where as the consumption spent is higher than smaller shopping centers. 32,4 % of the customers have private car and 59,2 % has second housing ownership. 14,9 % of the customers are graduated from university.

Young age, between 16-29, covers 37 ,5% of the customers, and 28 % of the customers are from 30-44 years age group (Çingir, 2001).



Figure 3.4
Bilkent Shopping Center – Ankara

3.4.3 5M Migros Shopping Center

5M Migros is the biggest shopping center of Turkey. It was built in August 1999 by Garanti-Koza İnşaat A.Ş. It is built with 126.500 m² indoor area in 4 floors. It involves upscale clothing companies and other goods totally 156 shops, high technology entertainment units, cafes and restaurants, cultural activities, housing furniture, cinema, theater and other functions. It has 4th biggest movie theater complex of Europe with 6315 m² and 2353 seats capacity, three dimensional movie theater and a special theater saloon with 1.100 m² and 474 seats capacity (ECE, 2004).

The shopping center is easy to reach by private and public transport since it is on main arteries. It offers 3000 parking spaces, 50.000 m² 2000 car capacity indoor and 18.000 m² 1000 car capacity outdoor (ECE, 2004).

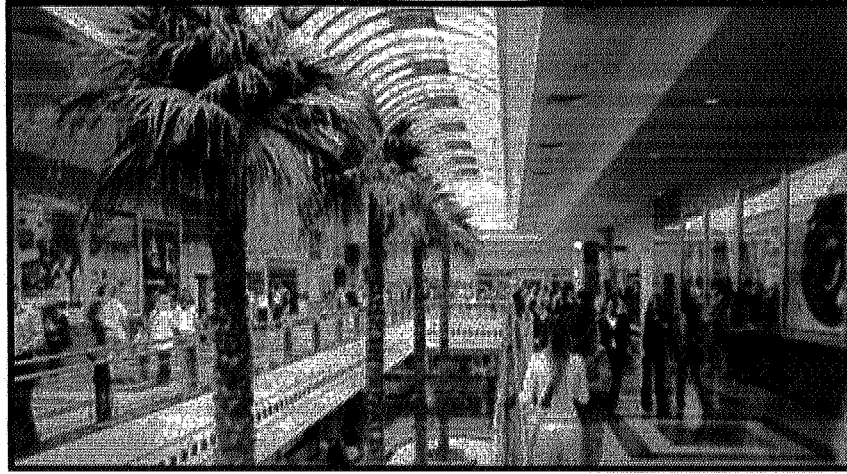


Figure 3.5
5M Migros Shopping Center – Ankara

Migros is generally visited by young generation since it gives consumer goods and services that attract young people. 59,3 % of the Migros customers are between 16-29 years old. 48 % of the Migros customers have second housing unit. The customers are generally university and high school graduated since it is accessible by public transportation and from high or middle income groups (Çingi, 2001).

Survey done by Migros Management Office in 2004 shows that, it is visited by 13.500.000 customers in a year which is monthly 1.125.000 customers.

53 % percent of customers use private car and 47 % of the customers use public transportation. Since Migros is on main public transportation axes such as metro, bus, dolmuş the most of the customers come from Çankaya, Y. Mahalle, Keçiören and Etimesgut (ECE, 2004).

3.5 Customer Profile of Shopping Centers in Ankara

In daily life, it is observed that the visiting frequency and the scale of retail are inversely related. People prefer to buy their daily products from small markets and

groceries whereas they prefer to make their weekly or monthly shopping from supermarkets and hypermarkets. When the need of other goods arises, such as books, furniture, clothing, technological products, etc., people prefer to go to shopping centers.

In order to determine customer profile of shopping centers, centers make studies such as questionnaires, and surveys. But since this information is kept in the privacy of the companies, it is not possible to achieve them. In this study, therefore a thesis study done by Çingı in 2001 is used as reference information for the customer profile of shopping centers in Ankara. Çingı in her study evaluates the relation between shopping centers and the urban quality transformation of retail space organization in relation to changing consumption patterns. In her study, she made questionnaires to gather information about the customers of shopping centers. In her study, the questionnaire is done for four shopping centers of Ankara such as Yimpaş, 5 M Migros, Kocatepe Beğendik and Bilkent Center. Totally 450 questionnaires are done and these questionnaires were distributed among shopping centers with ratio to their sizes. According to that, 120 questionnaires were done for Bilkent Center, 141 questionnaires for Migros, 105 questionnaires for Kocatepe Beğendik and 84 questionnaires for Yimpaş shopping center. The questionnaires were done between 25.09.2000 and 09.10.2000 seven days, in 3 time intervals as 18.00 - 22.00, 14.00 - 18.00 and 10.00-14.00 time intervals. The results are evaluated by cross tabulation of data and in this study used as reference information about customers. The necessary customer information for this study taken from Çingı's survey is summarized in following paragraphs.

Nowadays shopping is not only a need, it is also seen as social activity and entertainment. People prefer to buy their needs where they can entertain at the same time. In big shopping centers such as Migros, Bilkent people spend average 1-2 hours for their shopping and they generally come with their relatives or friends. The young population, between 16 - 29 ages prefers shopping centers for its atmosphere, accessibility and large variety of products it provide. They prefer entertainment units such as cinema in shopping centers rather than ones in city centers. Similarly, older age

group such as 30-44 also prefers to go to movies in shopping centers since it provides large area of parking space. Within the city, the questionnaires show that 38 % of the population comes with private car and 31.8 % uses public transportation and the rest uses services, taxi or come on foot (Çıngı, 2001).

The similar income education groups have similar consumption behaviors. People who go to shopping centers can be summarized as high education and high or mid-high income group people. Types of employment do not show distinction. % 60 is from public, private sector and students (Çıngı 2001).

Information taken from management offices of shopping centers of Armada, Bilkent Center and 5M Migros together with Çıngı's survey show that Çankaya, Yıldız, Esat, Bahçelievler, Emek, Bilkent, Odtü, Ümitköy, Batıkent prefer to go to shopping centers. These regions have similar income-status properties as can be seen in Figure 3.6 Ankara status – income map 1990 in Appendix A which is done by Guvenç (1998). In his study Oran, Ayrancı, Yıldızevler, Gaziosmanpaşa, K.dere, Bahçelievler, Emek, Esat, Konutkent, Ümitköy quarters seem to be from “Wealthy” (“Varlıklı”) groups of Ankara.

3.6 Modeling

Lakshmanan – Hansen model is based on the Newton's Gravity model which is later developed as Interaction Model by Reilly. The Interaction model assumes that the numbers of customers will increase as the size of the store or center grows and the distance from the customer to the store shrinks (Reilly, 1931).

The aim of the model is to determine the market share of shopping center among its competitor shopping centers. For this aim Lakshmanan – Hansen used 3 primary factors which affect the market share among shopping centers. These three factors are calculated one by one during the modeling and used as an input for determination of market share in the competition (Lakshmanan, Hansen, 1965)

$$S_{ij} = (e_i \cdot P_i) \frac{W_j^\alpha \cdot c^{-\beta_{ij}}}{\sum_{j=1}^N W_j^\alpha \cdot c^{-\beta_{ij}}} \quad (3.1)$$

S_{ij} = Consumption spent from region i to shopping center j

e_i = The consumption spent per person in region i

P_i = population of i

W_j = The area (m^2) of the shopping center in region j

c_{ij} = Cost of transportation from i region to j shopping center

α, β = constant (Gives importance weights to c_{ij} and W_j which differs for each city and population, the calculations of α and β will be explained in detail in Chapter 4)

The three primary factors which affect the market share of a shopping center are as follows:

- Market Capacity
- Accessibility
- Attractiveness

Market capacity is the market potential of the quarters for the shopping centers. For this information, the consumption expenditure spent for markets per person and population of the quarters are used. The market capacity shows, how much the quarter pays for shopping consumptions (Lakshmanan, Hansen, 1965).

$$M_i = c \cdot \text{consumption / person in quarter } i \cdot \text{population } i \quad (3.2)$$

Accessibility is calculated only in distance units in Lakshmanan – Hansen model but in this study it is related with transportation time and cost. The transportation costs are studied in two terms such as financial cost of transportation and time spent during the transportation. Therefore the total transportation cost is the sum of time costs and financial costs of transportation (Lakshmanan, Hansen, 1965).

$$c_{ij} = a.t_{ij} + m_{ij} \quad (3.3)$$

c_{ij} = Total cost of transportation from i to j

t_{ij} = time of transportation from i to j

m_{ij} = Cost of transportation from i to j

a = constant (constant assuming that the time of transportation is not same for each customer. For example according to Lakshmanan-Hansen time importance is not the same to a housewoman and a business woman. But in this study it is assumed to have same importance for each customer, therefore it is taken as 1)

The attractiveness of a shopping center is related with the number and quality of products, entertainment services it provides, number of parking areas, numbers of check outs and so on. In this study, size is taken as factor of attractiveness. Assuming that as long as the size of shopping center increases the number and specialty of its products increases, in this study, sizes of the shopping centers and number and specialty of products are taken as the factors which affect the attractiveness of shopping centers.

The competition among shopping centers can be found by the Attraction Power. Attraction Power is the ratio showing the power of shopping center among competitor shopping centers. Therefore, as can be seen from the formulation of Lakshmanan, Hansen (1965), attraction power is directly related with the attractiveness of a shopping center and inversely related with its accessibility.

$$\text{Attraction Power: } \frac{W_j^\alpha \cdot c^{-\beta}_{ij}}{\sum_{j=1}^N W_j^\alpha \cdot c^{-\beta}_{ij}} \quad (3.4)$$

W_j = The area (m^2) of the shopping center in region j

c_{ij} = Cost of transportation from i region to j shopping center

α, β = constant

As it is mentioned in the beginning of this part, α and β values will differ for each city and population. Therefore it should be calibrated for each study area. Before calculation of market share the model should be calibrated in reference to real world information.

Until that part of the modelling, it is seen that the model is divided into pieces and calculated separately. In the end of modelling, these pieces will be brought up together and market share of the shopping center will be calculated.

$$\text{The Market Share of } j = \text{Market Capacity} \times \text{Attraction Power Sh. Cent. } j \quad (3.5)$$

This model is important in that it allows estimating the interactions among quarters and shopping centers. In common gravity model applications, the behavior of people in the quarters are predictable but they do not consider exceptional behaviors. The exceptional behaviors are not represented in the sample quarters. In this study, it is important that not all quarters are considered to have the same behavior; they are differentiated according to their consumption expenditures.

In another point, generally in gravity models distance is used as the measure of the effects. Occasionally, people consider time effect together with distance effect. In this model, application time is also taken as the variable, together with transportation cost.

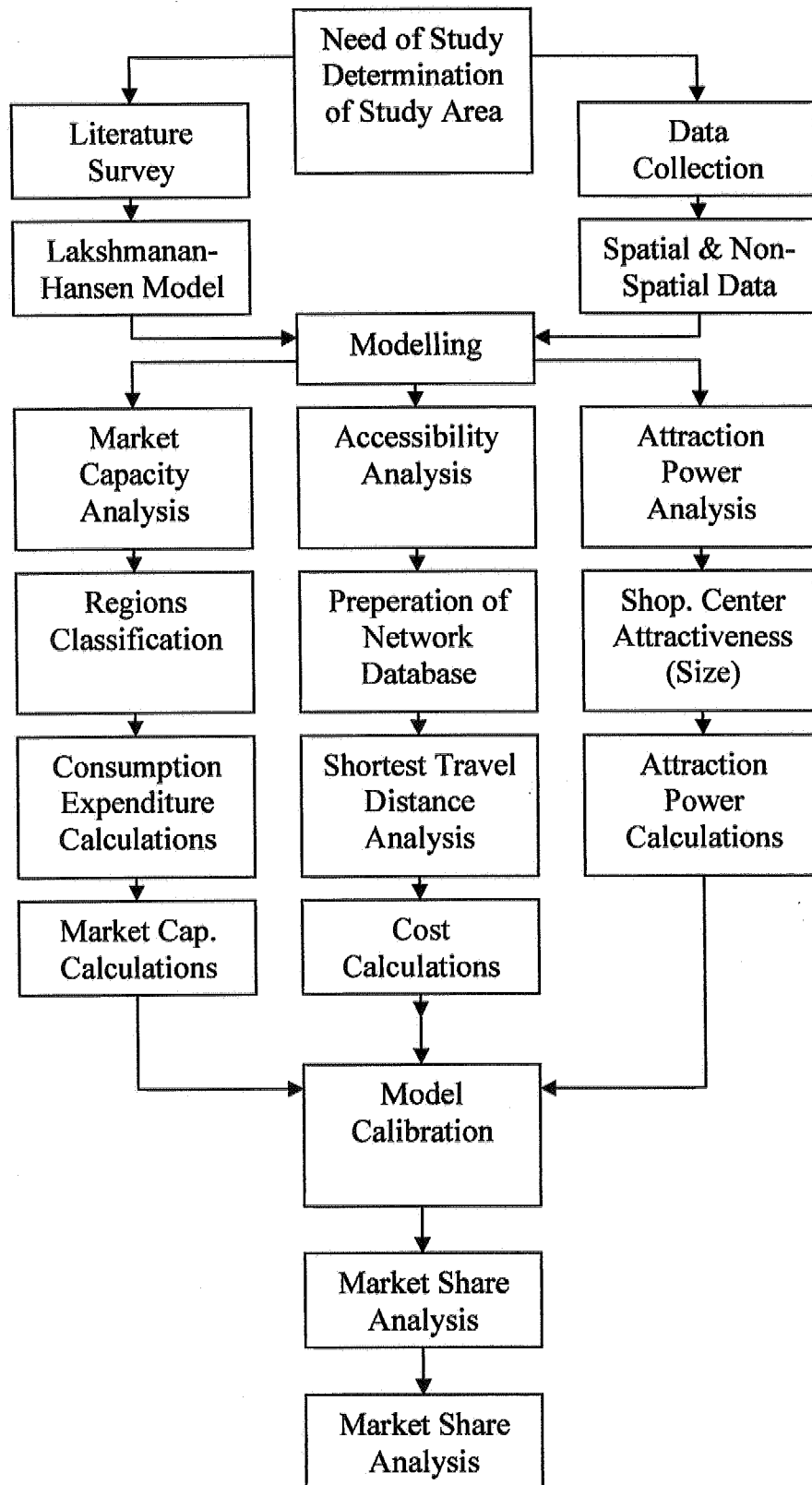
As the next step of modeling, the calibration of model is the most important part of the study since it brings the results closer to the real world. After the determination of attraction powers of each shopping center, the population shares of the shopping centers are calculated. Since the number of monthly customers is known for all shopping centers, the results are compared with the real results. By changing α and β values, a matrix is created for each α and β combinations. The α and β values combination giving the minimum total error for the shopping centers is taken for the analysis. After calibration of model Attraction Power and Market Share values are created one more time.

During the application, for Market Capacity Analysis, 1994 consumption expenditure data, dwelling ownership information of 1990 population census and 2000 population census from DIE are used for market area determination.

For accessibility analysis, city map is taken from Ankara Government website and edited with observed traffic restrictions and traffic flow. A network database created with the edited data. For attractiveness of shopping centers and calibration of model, data is taken from management offices of three shopping centers and their websites.

3.7 Application Flowchart

The flowchart below shows the steps of the study:



3.8 Data Collection

Table 3.1
Graphic Data for the Study

Name	Content	Year	Format	Feature	Source
Roadfinal1.shp	All Roads	2000	Digital map info	Polyline	Ankara Metropolitan Municipality Office of Information Systems
Mahalle1.shp	Borders of Districts	2000	Digital map info	Polygon	Ankara Metropolitan Municipality Office of Information Systems
Shopping center.shp	Armada, Bilkent, 5M Migros	2004	Digital map info	Point	Manual-Ankara City Map
Ankara City Map	Ankara Road, landuse,	2004	htm	Paper	Metropolitan municipality website

Data collection and preparation is the most difficult part of the study. Since Turkey is a developing country and it is not possible to reach all necessary data. Another problem was that the applicable data was in different agencies, in different format and quality. Therefore, the most time consuming effort in this study was gathering and editing part of data and creating a single database for the analysis.

Table 3.2
Non Graphic Data for the Study

Name	Content	Year	Format	Source
Population	Population of Districts	2000	Table	DIE
Consumption Expenditure	Household Consumption Expenditure Survey for Ankara	1994	Paper	DIE
Housing Ownership	1 st , 2 nd housing Ownership Rates	1990	Table	DIE
Average Speed Information	Speed Information for general and secondary roads	2004	paper	Observation
Main Road Borders	Borders for Main Roads	2004	Paper	Ankara City Map, Metropolitan municipality website
Shopping Center Information	Spatial information, customer information	2004	Paper	Armada Management Office, Tepe Emlak A.Ş., Ece Türkiye Proje Yönetim A.Ş.

CHAPTER 4

MARKET SHARE ANALYSIS AMONG SHOPPING CENTERS IN ANKARA

4.1 Introduction

In this chapter a market analysis will be carried out for the three biggest shopping centers of Ankara with Lakshmanan and Hansen Model, using GIS technology. In Chapter 3 the basic steps of Lakshmanan - Hansen model were discussed. In this chapter first of all, the model will be divided into pieces and all the pieces will be analysed and calculated separately. In the final part of the chapter these pieces will be brought together and the market share of the shopping centers will be determined.

The chapter will start with preparation of database for market capacity determination. Collection of spatial and non-spatial data and bringing them into the same format was the most difficult effort of this part. It is later followed by the most time and effort consuming part of the study, which is preparation of network database for accessibility analysis.

The road network of the application area is edited, updated and a network database is created in order to determine accessibility costs of the analysis. In the last part of this chapter, the attractiveness of shopping centers are determined and the power of the shopping centers vis-a-vis their competitors are found by determining the attraction power of shopping centers. And finally market shares and population shares are calculated among the shopping centers.

4.2 Determination of Market Capacity

According to Lakshmanan - Hansen Model (1965), the market areas of the regions show the buying capacity of the regions and therefore determined by the total consumption expenditure of the regions and their population. The consumption expenditures show the amount of money spent per person for shopping centers' products. So as long as the population of region increases the market consumptions and so on the market capacity of the region increases.

$$M_i = c \times \text{consumption / person in region } i \times \text{population } i \quad (4.1)$$

The consumption expenditures data represent the whole city but do not give any information about the regions of the city. In fact, the quarters are not same within the city. In order to differentiate the quarters in terms of their economic status, the average consumption expenditures of the quarters are tried to be estimated in the next part of the study.

4.2.1 Determination of Consumption Expenditures

Food, beverage and tobacco, clothing and footwear, house furnishing, entertainment and culture, hotel restaurant and pastry shop, various good and services are taken as dispenses for the consumption expenditures, since they show the market dispenses of the shopping centers. In this part of the study, quarters' consumption expenditures will be differentiated. It is assumed that the consumption expenditures of quarters are related with the wealth level of the inhabitants. Therefore, the quarters are first classified into five groups according to their wealth level. In order to determine wealth level of the quarters a "wealth index" is created. In order to create wealth index 1990 population census of DIE, (State Institute of Statistics) 1st and 2nd dwelling ownership information is taken as criteria. According to this index, quarters are classified into five

groups and consumption expenditures are tried to be estimated with reference to these classes.

The determination of consumption expenditure process can be summarized in Figure 4.1 as follows:

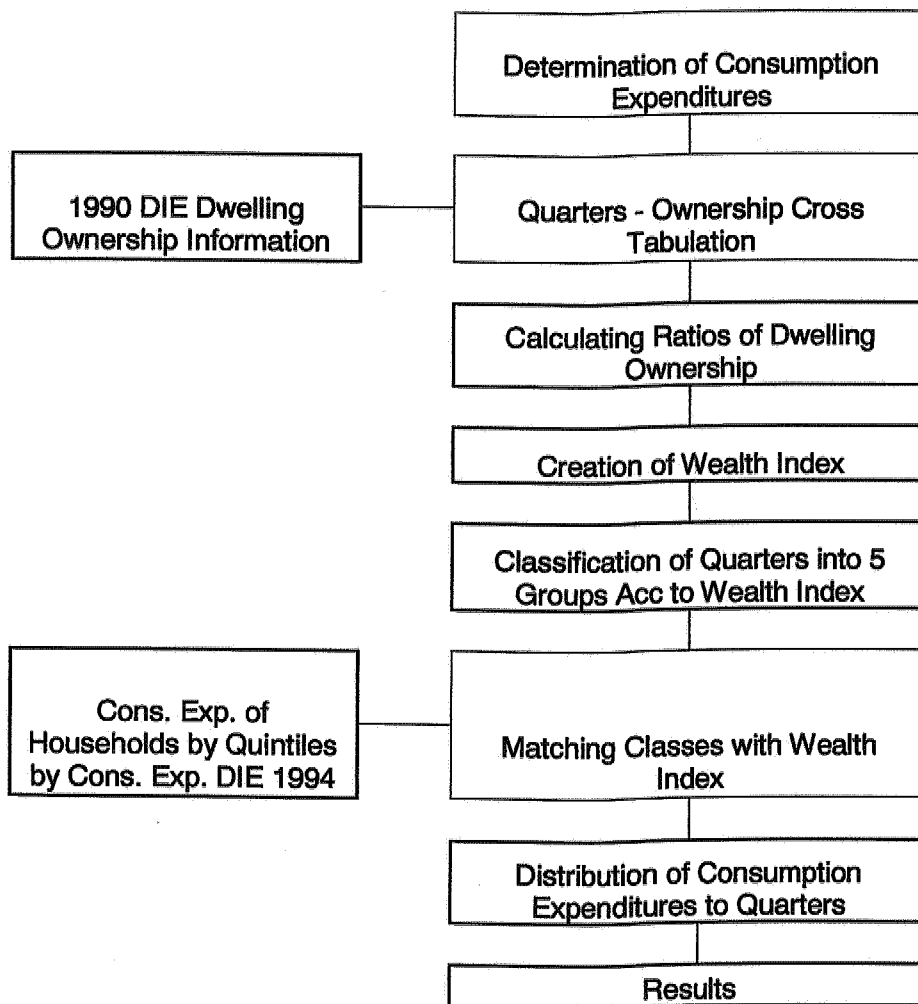


Figure 4.1
Flow Chart of Determination Process of Consumption Expenditures

The 1994 Household Consumption Expenditures Survey by quintiles by consumption expenditures carried out by DIE for 19 selected province centers is used in the study. DIE conducted the “Household Consumption Expenditures Survey” between dates of

01 January – 31 December 1994 at 236 urban and rural settlements of Turkey and to 26256 households. Totally, each month 2188 households were interviewed rotely by interviewers. Interviews were done to selected sample households and sample households were changed periodically in each month. The settlements with population less than 2001 were changed once in three months, the settlements with a population 2001 and over were fixed during the year (DIE, 1994).

Diaries for recording consumption expenditures of households were given before survey and each month the sample households were visited and information on expenditures of household in the survey month such as food, clothing, culture, entertainment, house, furnishing etc. were asked during the interviews (DIE, 1994).

For Ankara, the study is done and after generalized for the whole city which is 654.505 households and 2.670.009 household members. Within the 1994 Household Consumption Expenditure survey, the consumption expenditures were grouped as food, beverage, tobacco expenditures, clothing and shoe expenditures, housing expenditures, house furnishing expenditures, health expenditures, transportation expenditures, entertainment and cultural expenditures, education expenditures, hotels, restaurants and pastry shop expenditures and various goods and service expenditures (DIE, 1994). The expenditures which show the shopping center expenses are taken to be used in the study, such as food, beverage, tobacco expenditures, clothing and shoe expenditures, house furnishing expenditures, entertainment and cultural expenditures, hotels, restaurants and pastry shop expenditures and various goods and services expenditures.

Since the survey is done for households, the results are afterwards calculated per person by dividing the expenditures by population of the survey. The total amount is then converted from Turkish Lira to USD according to TL - USD conversion rates of mid-year 1994.

The Table 4.1 in Appendix A shows the consumption expenditures for Ankara which are assumed as the expenses of shopping centers. In this table, it is seen that the

households are grouped into five according to their consumption expenditures. In order to divide households into groups DIE used the method of GT. In this method, households are listed descending according to their expenditures and divided into 5 groups according to their order of expenditures (DIE, 1994). 1st 20% group shows the group of households which has the lowest consumption expenditures for shopping expenses. In this group household members have monthly 23,97 USD consumption expenditure for shopping activities. The other groups in order spend for shopping 34,5, 54,5 and 64,4 USD monthly whereas the richest group of households spend 115USD in a month. The most of the shopping expenditures are consumed by the highest 20% group. The sum of lowest 3 groups consumption expenditures 61.174.115 USD does not exceed the consumption expenditures of the highest group, 63.215.277 USD in a month.

Since the consumption expenditure survey is done for cities, this table does not give expenditure information about quarters. In this part, quarters will be classified into 5 groups according to their economic status and consumption expenditures for these 5 groups will be matched with the classes of economic groups. The dwelling ownership is taken as the main criterion of the classification.

Dwelling Ownership Information of 1990 Population Census by 5% is taken and results of two questions are evaluated. "Is any member of your household the owner of the dwelling you now live in?" "Is any member of your household the owner of any other dwelling?" (DIE, 1990). The information is gathered in Table 4.2 and for each quarter, the percentage of people who owns the dwelling he lives in and who owns more than 1 dwelling in the region is determined. Please see Table 4.2 in Appendix A for full table.

The standard deviation of results for each region is calculated and by summing two results for two questions, a wealth index is created in Table 4.3. The dwelling ownership survey is applied to regions with different frequencies.

Table 4.2
1990 Housing Ownership Survey - Ankara

OWNER OF DWELLING YOU LIVE IN?					OWNER OF 2.ND DWELLING?			
		YES	NO	Total		YES	NO	Total
QUARTER	10001	65	65	130	10001	26	104	130
	10002	4	14	18	10002	4	14	18
	10003	1	10	11	10003	2	9	11
	10004		2	2	10004		2	2

In some quarters the survey is done with 300 households where as in some quarters it is asked only to 3, 4 households. While calculating the wealth index, quarters which do not have more than 5 sample households are not taken into calculations since it may not give very accurate results. For these quarters all neighbor quarters wealth indexes are evaluated and an average wealth index is given for these quarters.

For this study, to have more than 1 dwelling is more important criterion than to own the dwelling they live in. Therefore different importance weight is given for each question during the calculations of the wealth index. According to that 30 % importance is given to “Is any member of your household the owner of the dwelling you now live in?” where as, 70 % importance is given to question “Is any member of your household the owner of any other dwelling?”

$$\text{Wealth Index} = (\text{Percent of Quest.1} \times 0.30) + (\text{Percent of Quest.2} \times 0.70) \quad (4.2)$$

To give an example lets evaluate Table 4.2, quarter 10018. For quarter 10018, the census is done for 116 households and 52 of the households answer “YES” and 54 of households said “NO” to the first question “Is any member of your household the owner of the dwelling you now live in?” The same quarter said 9 “YES” answers and

97 “NO” answers to the second question “Is any member of your household the owner of any other dwelling?”

When the percentages of the YES answers are calculated in the total number of questions, it is reached that 49 % of the households own the dwelling they live in and 8 % of them have second dwelling. For all regions, the same calculations are done and for minimum values “0” and for maximum values “100” is given. All percentages are subtracted by the minimum value “0” and divided by the maximum value “100”. For region 10018, 0,490 is found for the first question and 0,084 is found for the second question. See Appendix A, Table 4.3. If we assume both questions in same importance, the wealth index of the region would be:

$$\text{Wealth Index} = 0,490 + 0,084 = 0,574$$

But it is assumed that the first question has 30% importance where as the second one will have 70 % importance. Therefore, the wealth index of region 10018 is calculated by the following calculation:

$$\text{Wealth Index} = (0,490 \times 0,30) + (0,084 \times 0,70) = 0,12145$$

The wealth indexes vary from 0 to 1, 1 show the highest richness index where as 0 shows the lowest one. In following part, a classification is done by quintile method and in this classification quarter 10018 seems to be in the first group of classes which has the lowest wealth index.

Concerning the wealth index, all the regions are classified into five groups. While choosing the method of classification, different classification methods of ArcGIS 8.1 such as Quantile Method, Natural Breaks, Equal Interval and Manual methods are tried and observed.

Table 4.3
Table of Wealth Index – Ankara

		1. HOUSE	2. HOUSE	PERCENTAGES		WEALTH INDEX
QUARTERS	10016	63,15	13,158	0,631	0,131	0,188
	10017	84,02	8,333	0,840	0,083	0,119
	10018	49,05	8,491	0,490	0,084	0,121
	10019	65,94	9,189	0,659	0,091	0,131

Finally, since consumption expenditure data is for 20 percent groups of population, Quantile Method is used for classification. The results of the classification is compared by observations and found appropriate for this study.

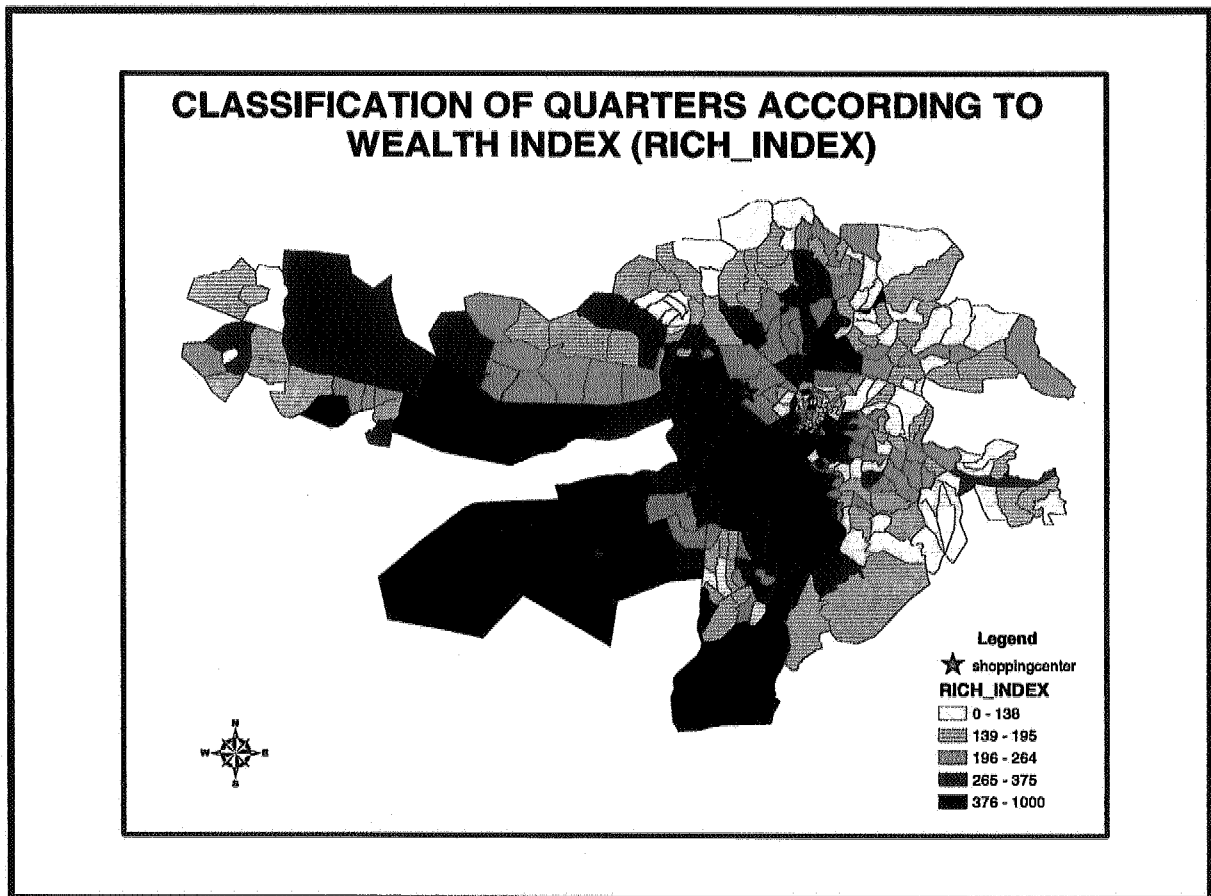


Figure 4.2
Classification of Quarters According To Wealth Index

The quarters with the darkest color shows the quarters which has highest wealth index, it is to say the richest class of the city. As can be seen from figure 4.2 the south part of the city seems to have better economic status then other parts. The Çankaya district has the quarters with the highest wealth indexes. Quarters such as Ümitköy, Çayyolu, Ortadoğu, Oran, Çankaya, Ayrancı, GOP, Kavaklıdere, Bahçelievler, Emek, Altınpark, Kavacık Subayevleri, AOC, Erler, Bahcekapı have the highest wealth index in the city.

In the next step of the study consumption expenditures information for the five groups of the city is assigned to these five wealth index groups of the regions. The highest consumption value is given to the first group who has highest wealth index, but since the regions are not homogenous and each region may include each group of consumption expenditure, some assumptions are made in order to have more accurate results.

The richest 20 % group is called as group A (Ümitköy, Gaziosmanpaşa, Oran, Bahçelievler quarters...etc.) and the other groups are given as B (Beştepe, Birlik, Emniyet...etc.), C (Elvan, Macun, Çamlıca..... etc.), D (Yeşilkent, Ostim... etc.) and E (Baraj, Yükseltepe, Ovacık... etc.) descending.

If 100 % population of each quarter is from same group, A group will have 115\$ monthly consumption expenditure where as Group B has 64\$, Group C has 55\$, Group D has 35\$ and Group E has 24\$ for the shopping centers. Since it is not possible in real world, the quarters are assumed heterogenous with the following assumptions:

The Table 4.4 shows that in A group 60 percent of population is has A group consumption expenditures, 20 percent B group expenditures, 10 percent C group expenditures, 5 percent D and E group consumption expenditures. In Figure 4.3, the calculation is done for A group of quarters.

Table 4.4
Assumptions for consumption expenditures

Groups of quarters	A %	B %	C%	D%	E%
A	60	20	10	5	5
B	5	60	20	10	5
C	5	10	60	20	5
D	5	5	10	60	20
E	5	5	10	20	60

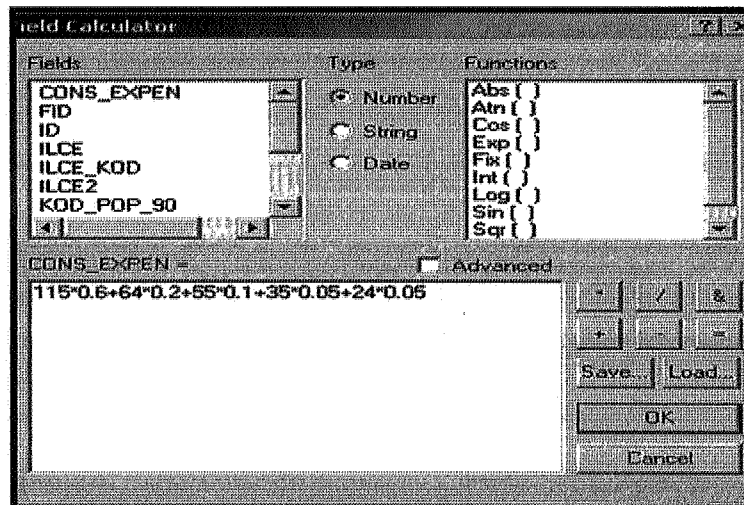


Figure 4.3
Calculations of Consumption Expenditures

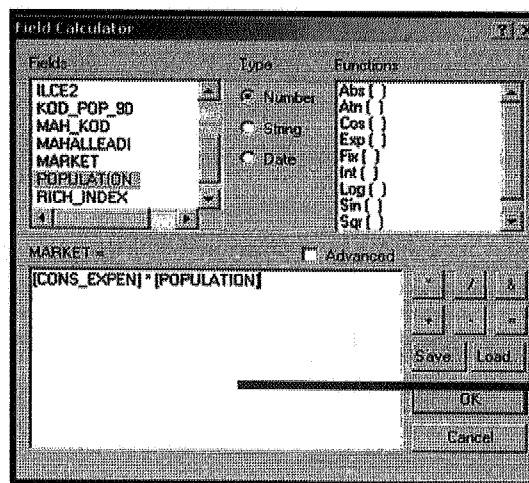
After calculations for each group, following consumption expenditures are determined and used in the following part of the study.

- A Group Quarters have 90\$ monthly consumption expenditure
- B Group Quarters have 60\$ monthly consumption expenditure
- C Group Quarters have 53\$ monthly consumption expenditure
- D Group Quarters have 40\$ monthly consumption expenditure
- E Group Quarters have 36\$ monthly consumption expenditure

4.2.2 Determination of Market Area

Market capacity means the consumption potential of the quarters for shopping products and services. The all consumption expenditure values are given in the attribute data of quarters, in Appendix A Table 4.5 and by multiplying the each consumption expenditure with the population, market capacity of each region is determined.

Table 4.5
Attribute Table of Quarters



ID	MAHALLEADI	ILCE	ILCE	MAH_K	POPULATION	KOD_POP	RICH_INDEX	CONS_EXPE	MARKET
1	Kent Koop	YENIMAHALLE	5	52	29040	0	216	53	1539120
2	Mesulliyet Mah	CANKAYA	1	1	1142	20060	497	90	102790
3	Yucetepe Mah	CANKAYA	1	15	7171	20085	410	90	645390
4	Mebusevleri- Anikaba	CANKAYA	1	14	5639	20059	527	90	507510
5	Namik Kemal Mah	CANKAYA	1	16	1617	20067	649	90	145530
6	Kizilag Mah	CANKAYA	1	9	2535	20051	645	90	228510
7	Y bahcelievler Mah	CANKAYA	1	19	19061	20084	480	90	1715490
8	Kocatepe Mah	CANKAYA	1	21	1210	20093	643	90	108900
9	Cumhuriyet Mah	CANKAYA	1	20	215	20019	714	90	19350
10	Fidanik Mah	CANKAYA	1	24	1855	20034	640	90	167940
11	Saglik Mah	CANKAYA	1	25	824	20074	714	90	74160
12	Kavaklidere Mah	CANKAYA	1	2	9088	20047	479	90	817920
13	Ezaliloglu Mah	CANKAYA	1	39	4553	20031	498	90	409770
14	Tinasatepe Mah	CANKAYA	1	38	7577	20079	403	90	681930
15	Sevran Mah	CANKAYA	1	35	9200	20076	500	90	829000
16	Doguz Mah	CANKAYA	1	37	3614	20026	450	90	325260
17	Zafetatepe Mah	CANKAYA	1	36	3988	20087	269	60	239290
18	Gokluak Mah	CANKAYA	1	105	3310	0	451	90	297900
19	Ozgiatlik - Metin Okta	CANKAYA	1	103	5135	0	212	53	272155
20	Umut Mah	CANKAYA	1	75	9121	20081	270	60	547290
21	Anakpasa Mah	CANKAYA	1	74	4340	20085	154	40	187600
22	Mimaristan Mah	CANKAYA	1	108	3273	0	249	53	173469
23	Arkatopraklik Mah	CANKAYA	1	32	3183	20003	210	53	168639
24	Dizkler Mah	CANKAYA	1	31	2130	20025	89	36	76590
25	Sehit Cengiz Topel M	MAMAK	2	11	5440	50042	130	36	195840
26	Elincil Yil Mah	CANKAYA	1	79	2095	20027	269	60	125700

In Appendix A Table 4.5 the market capacities of all quarters are given. The market capacities show the buying potential of each quarter in terms of USD. In Figure 4.4 the market share of quarters are classified according to quintile method.

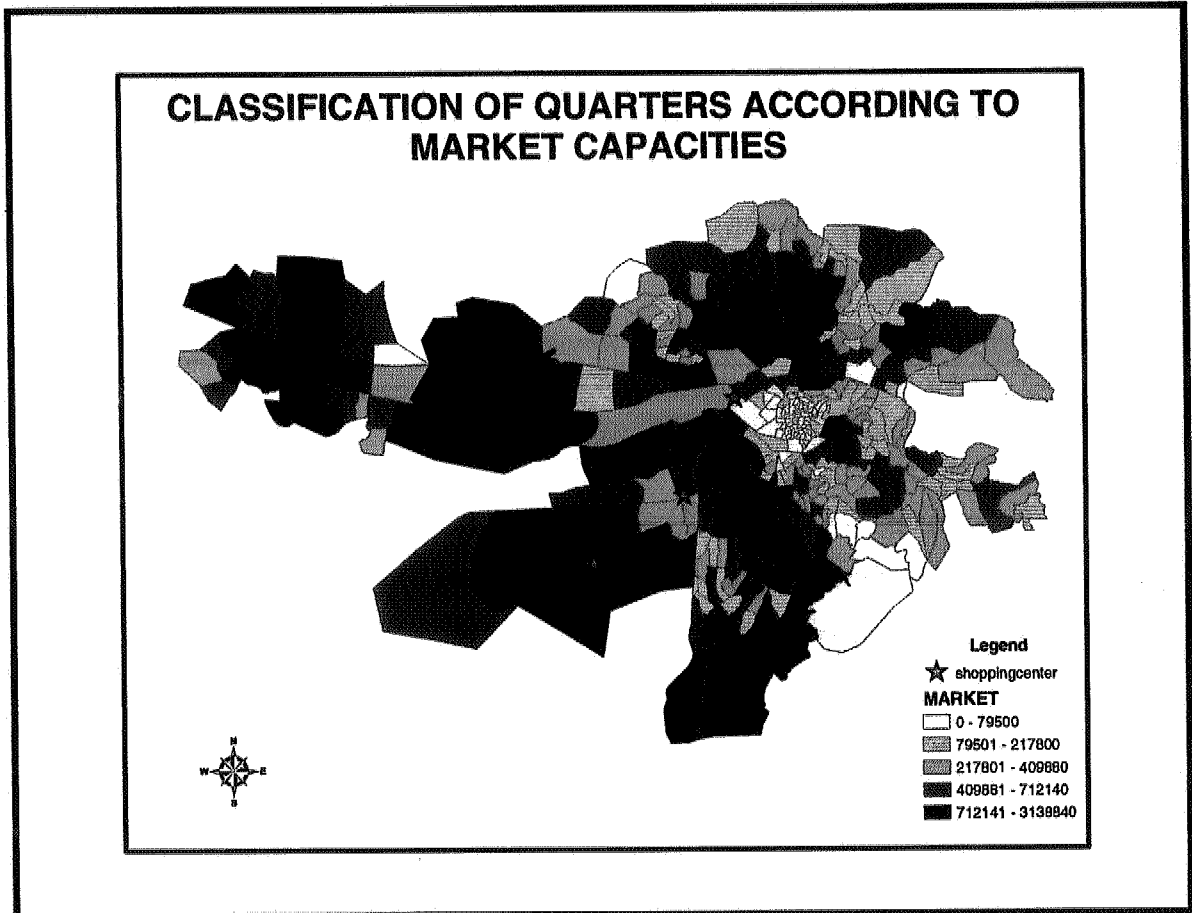


Figure 4.4
Classification of Quarters According to Market Capacities

In this figure, quarters such as Oran, Çankaya, Yıldız, Birlik, Gaziosmanpaşa, Kavaklıdere, Ayrancı, Orta Doğu, Çayyolu have bigger market capacities in south part of the city. It is possible to say in these areas that there is high potential of consumption for shopping centers. In west, part of the city a group of quarters is seen in Yenimahalle District. Kent Koop, Eriş, Batı, Yenibatu, Ergazi, İnönü, Bahçekapı, Kardelen quarters have bigger market consumptions. There is another grouping of quarters in Etimesgut

District which includes Emiryaman, Elvan, Atatürk, Topçu, Plevne Regions and in south part of Keçiören District.

When Figure 4.4 is compared with Figure 4.2, classification of quarters according to wealth index, Çankaya District quarters together with Ortadoğu Çayyolu, Emiryaman, Erler, Bahçekapı quarters show similar results. The rest of the quarters which have larger market capacities do not have the highest groups of wealth index but have higher population which affect the size of market capacities.

4.3 Accessibility Analysis

4.3.1 Introduction

According to Lakshmanan – Hansen Model, (1965) the accessibility is considered as the cost of transportation from regions to the shopping centers. The cost of transportation is calculated in two groups such as time spent during travel and financial costs of the travel. Considering this the formulation of accessibility cost is given as followed.

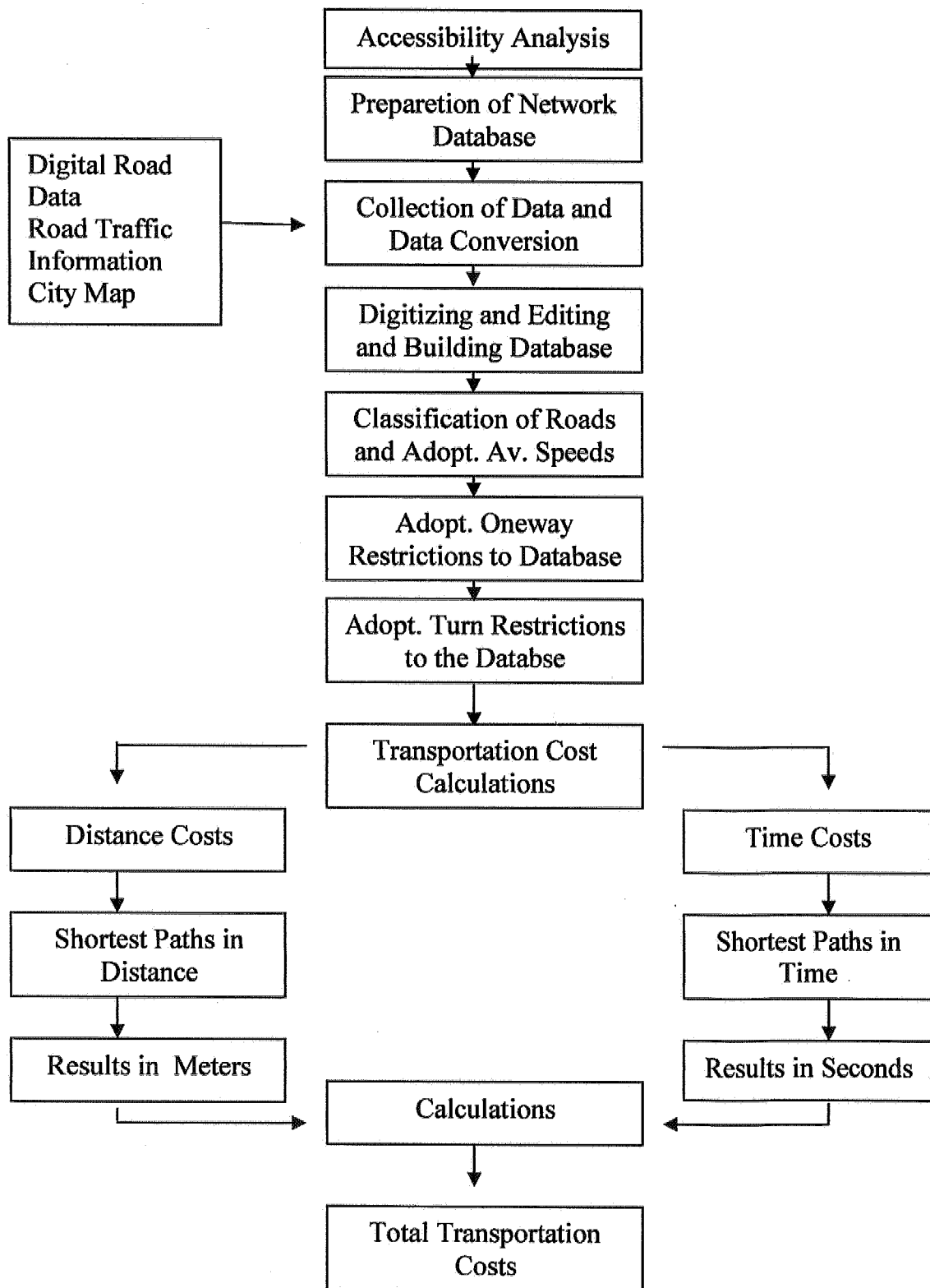
$$c_{ij} = t_{ij} + m_{ij} \quad (4.3)$$

c_{ij} = Total cost of transportation from i to j

t_{ij} = time of transportation from i to j

m_{ij} = Cost of transportation from i to j

The distance is defined as the shortest distance of transportation from the centroids of the regions to the shopping centers. A time cost matrix and transportation cost matrix is created for the shortest paths of all quarters to the shopping centers in order to determine the transportation costs to the shopping centers. For the accessibility analysis, GIS Arcview 3.2 Network Analyst is used as software. The process steps of accessibility analysis are summarized in the following flow chart:



4.3.2 Preparation of Network Database

The preparation of network database is very time and effort consuming work. The road network of a city is very a complicated system, it is not homogenous and it has changing structure in developing cities like Ankara. The traffic flow, junctions, direction of roads, turn restrictions changes very often. Therefore, the database should be edited and updated. The processes done during the preparation of network database can be summarized as follows:

- Collection of data and data conversion
- Digitizing and editing
- Building database
- Classification of Roads
- Giving average speeds according to roads classifications
- Adopting restrictions to the database
- Adopting one-way restrictions to the database
- Adopting turn restrictions to the database

4.3.2.1 Collection of Data and Data Conversion

The road data taken from Ankara Metropolitan Municipality Office of Water and Infrastructure is used in the study for network preparation. This data was in Map-Info file format and since Arc View 3.1 Network Analyst will be used for accessibility analysis, the road data is converted into Arcview shape file format. The data is first exported from Map Info interchange file format, mif converted to shape file format.

4.3.2.2 Digitizing and Editing

Since as a big city, Ankara has thousands of road segments and so on junctions, it is very big team work to create an accurate database. Because of that reason in this thesis,

only main roads are edited and updated for all traffic flow directions and turn restrictions. All editing process is done in Arc GIS 8.1. The main roads which have barriers between the sides are two way roads and therefore represented by double line. Double line representation brings easy way for showing two way directions, turning limitations and barriers towards the middle of the roads.

Ankara_Konya yolu, Ankara - Eskisehir yolu, Eskisehir – Istanbul yolu, Istanbul – Samsun yolu, Turan Gunes Bulvari, Cinnah Caddesi, Dikmen Caddesi, Mesnevi Sokak, Cetinemec Bulvari, Simon Bolivar Caddesi, Ataturk Bulvari, Ziya Gokalp Caddesi, Ismet Inonu Bulvari, Gazi Mustafa Kemal Bulvari, Celal Bayar Bulvari, Kazim Karabekir Caddesi, Hipodrom Caddesi, Tanzimat Caddesi, Talatpasa Bulvari, Turgut Ozal Bulvari, Fahrettin Altay Caddesi, Esref Bitlis Caddesi, Ivedik Caddesi, Bogazkale Sokak, Etlik Caddesi, 1. Cadde Yenimahalle, Dogol Caddesi, Marasal Fevzi Cakmak Caddesi, Gazi Mustafa Kemal Bulvari, Anadolu Bulvari are represented by double line feature and for each line feature, directions of roads and turn limitations are given which will be explained in following part. The rest of the roads are represented by single line feature and considered as one way direction roads.

IN ArcGIS 8.1 Arc Map, the main roads which are two way and have barrier are edited and represented by double line. All editing process is saved as shp.file and after converted to coverage file by arc toolbox. In arc toolbox, clean topology is used to create nodes of edited lines and after edited one more time in Arcmap.

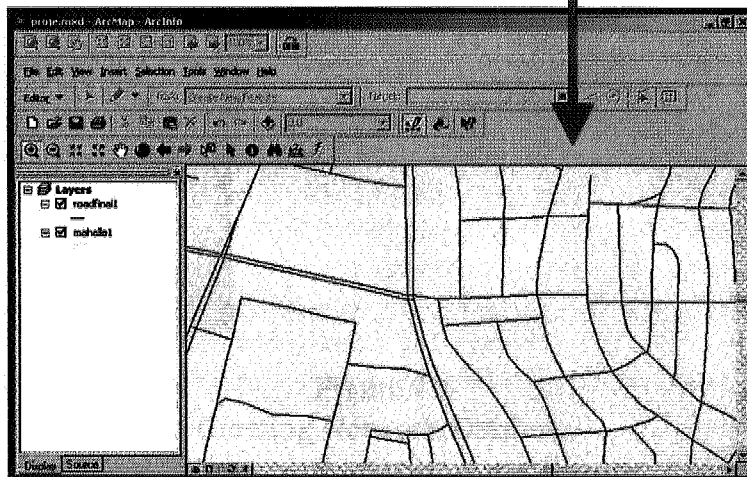
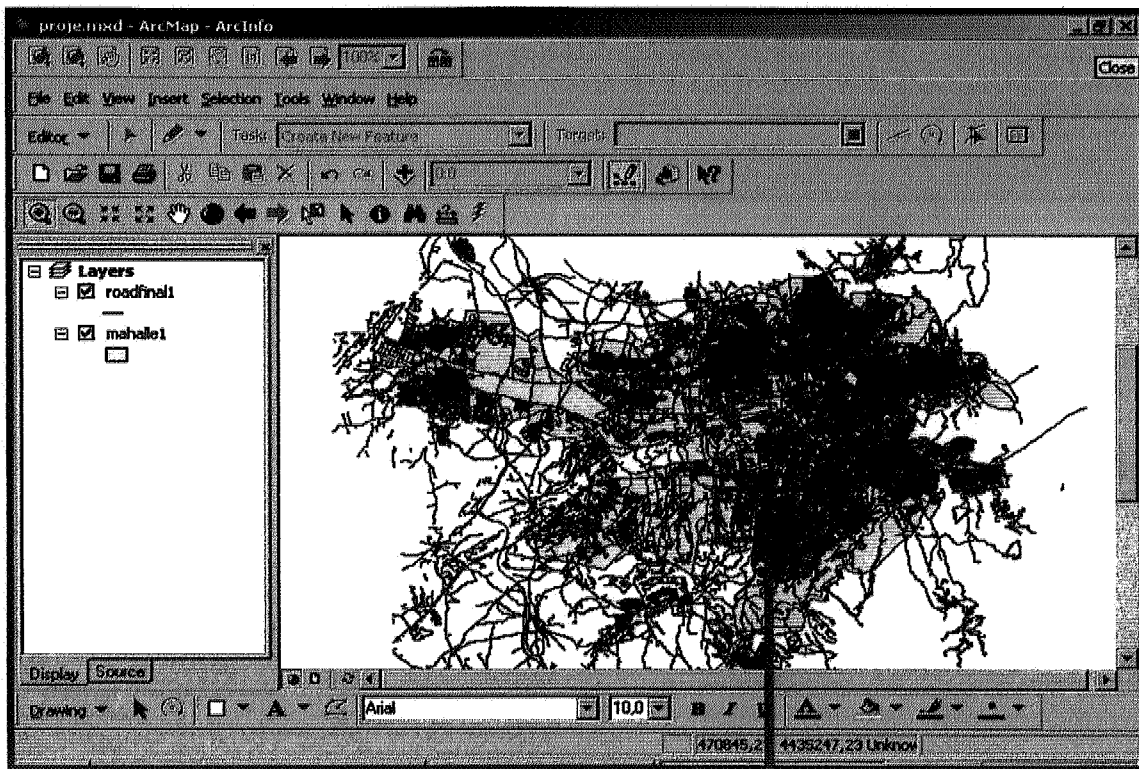


Figure 4.5
Road Data – ANKARA

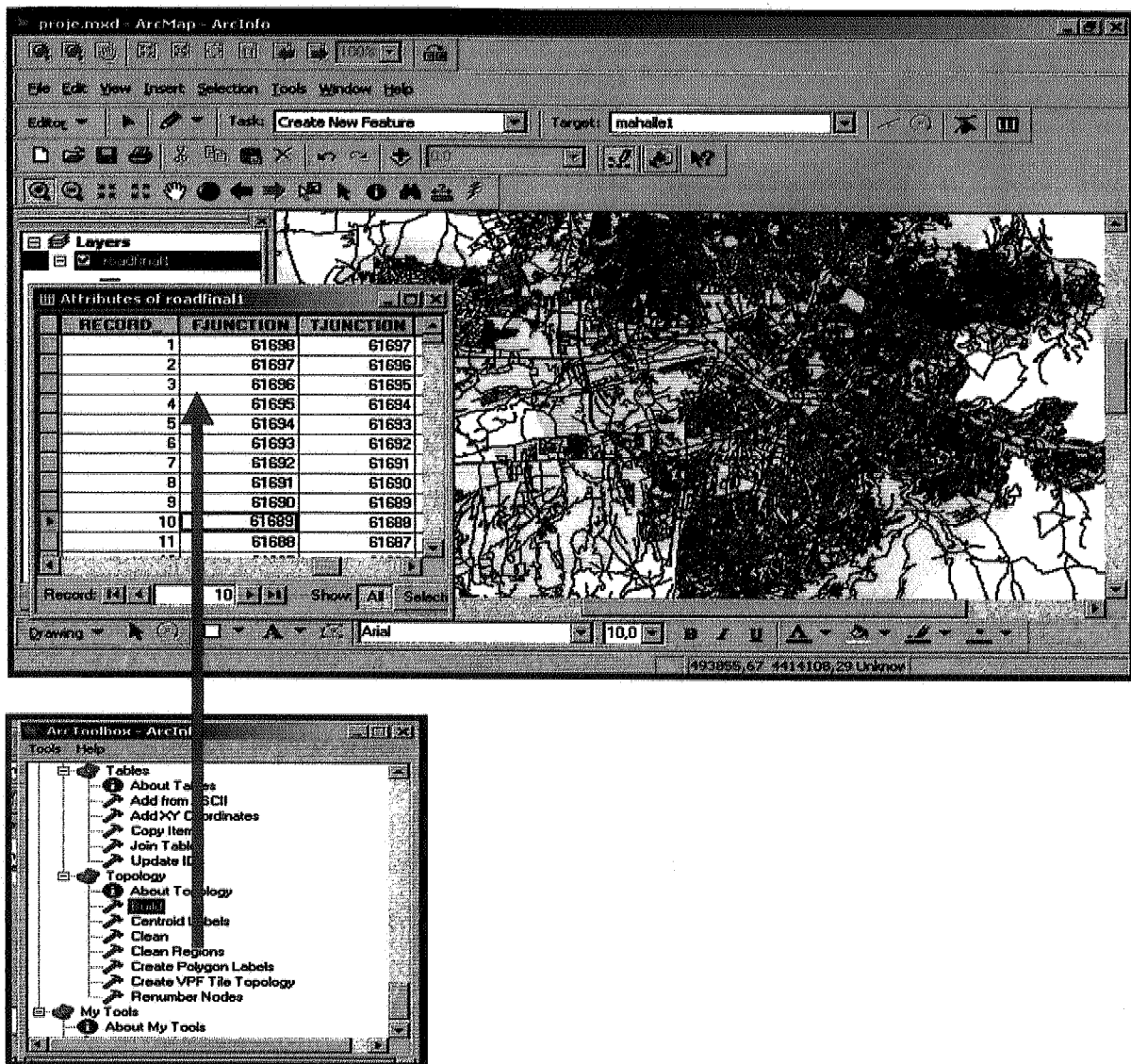


Figure 4.6
Creating Network Database

In order to create database for network analysis the Network Analyst of Arcview 3.2 is used and “Find Best Route” analysis is run in order to create nodes of database. In the following step “Copying Over Node Numbers” script is run. “The script copies over node numbers from nodes.dbf and adds record' numbers to the line theme feature table. It adds fields called RECORD#,' FJUNCTION, and TJUNCTION to the line theme feature table.” (ESRI ArcView 3.2)

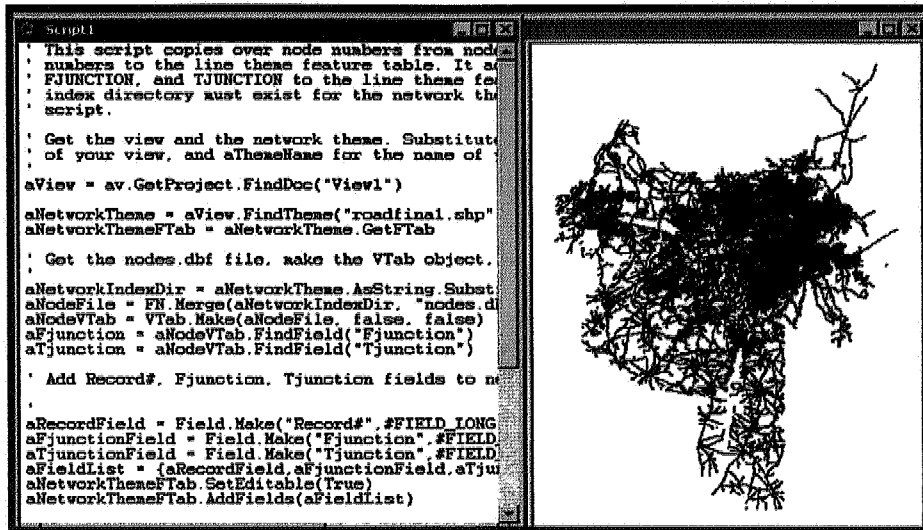


Figure 4.7
Creating Network Database

4.3.2.3 Building Database

Building database part of the study follows three steps such as classification of roads and giving average speed information, giving oneway-two way information to roads, and adopting turn restrictions to the database.

4.3.2.3.1 Classification of Roads and Establishing Average Speed Information

In the beginning of the study roads were edited in two groups such as main road which has barrier between directions and the rest of the roads. The classification is done according to the same criteria by opening a road_class information in the attribute table of data. For main roads type 1 is given, where as for the rest of the roads type 2 is given. In Figure 4.8 both road classes can be seen.

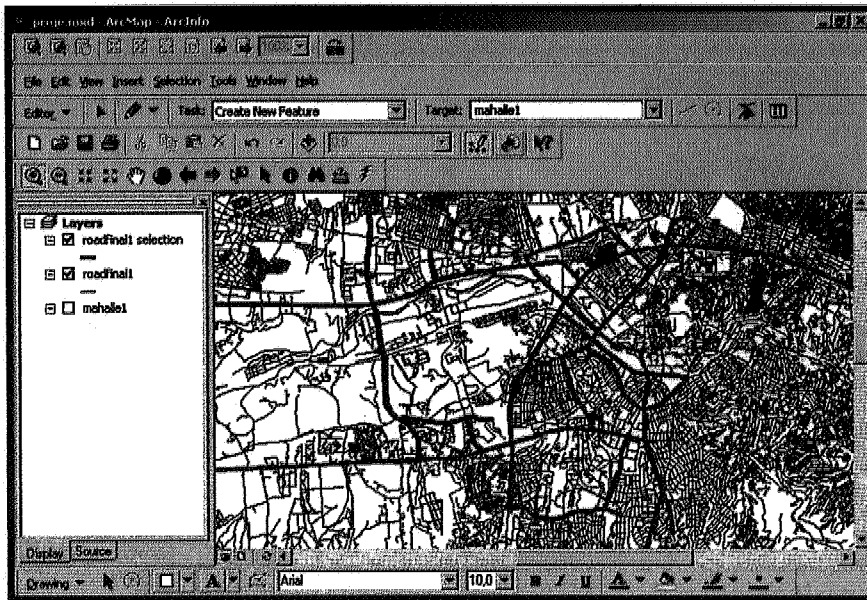


Figure 4.8
Classification of Roads

For establishing the average speed information driver observations are used and 70 km/hour is given for 1st type of roads where as 40km/hour is given for second type of roads. Figure 4.9 and 4.10 shows the adaptation of speed information to database.

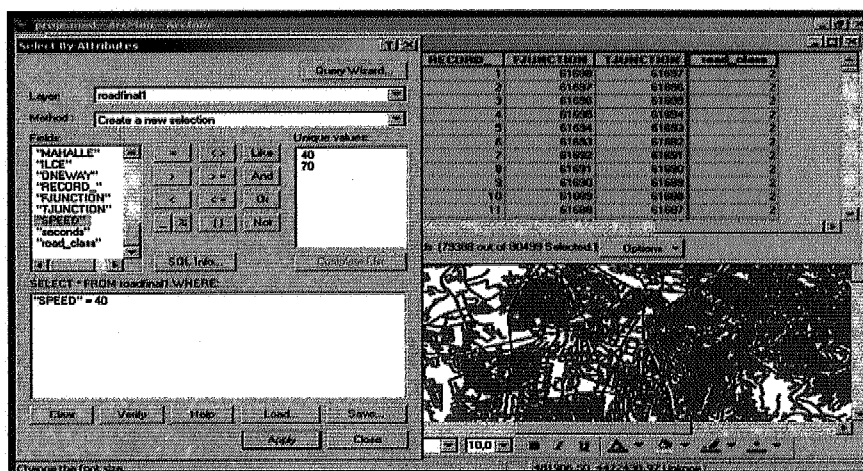


Figure 4.9
Giving Average Speeds According to Roads Classifications

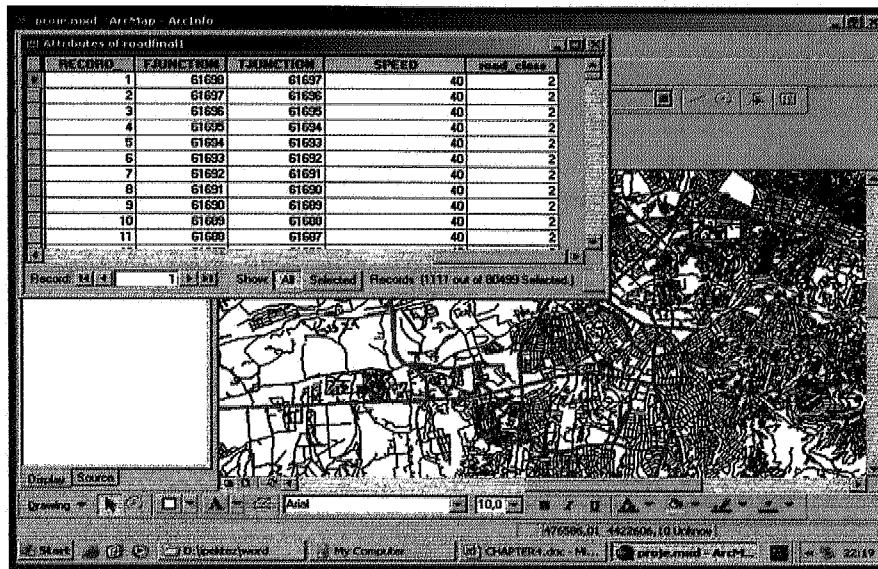


Figure 4.10
Giving Average Speeds According to Roads Classifications

4.3.2.3.2 Adopting One-way Restrictions to the Database

The one way information is given only for the main roads. With reference to Ankara city maps taken from ankara government and municipality websites, if the road flow is the same direction as digitizing direction, in oneway field “ft” is written. This information means the traffic flow is from FJUNCTION to TJUNCTION. If the traffic flow is in opposite direction with digitizing direction; in one way field “tf” is written, which means the traffic flow is from TJUNCTION to FJUNCTION.

The one-way restricted roads can either be because of barriers between roads, or because it has only one direction in traffic flow. Table 4.6 in Appendix A shows one-way restrictions on main roads.

4.3.2.3.3 Adopting Turn Restrictions to the Database

The turn limitations information was given for the main roads which are represented by double line feature and the roads which intersect with the main roads. In order to adopt

the turn restrictions, in last step of preparation of network database, a turntable is created. See Appendix A Table 4.7

Turntable shows the limitations of the turns on the crosses of the roads. All turn limitations are determined manually and written in dbf file and “declare turntable script” is run to declare turntable. See Figure 4.11. This script produces record_f, from_node and to_node numbers to the road table which is necessary information for a turn table.

In turntable a Node_ number represents the cross point of the roads, F_edge and T_edge numbers represents the line segments. The field ‘seconds’ show if the turn is prohibited or not. If the second value is negative, it shows there is turn restriction on that corner, where as if the value is positive it means there is no turn restriction. In this study in order to show turn restrictions -1 is used. As an example, in Figure 4.11 turntable shows that from road 68782 to road 68781 no turns are allowed.

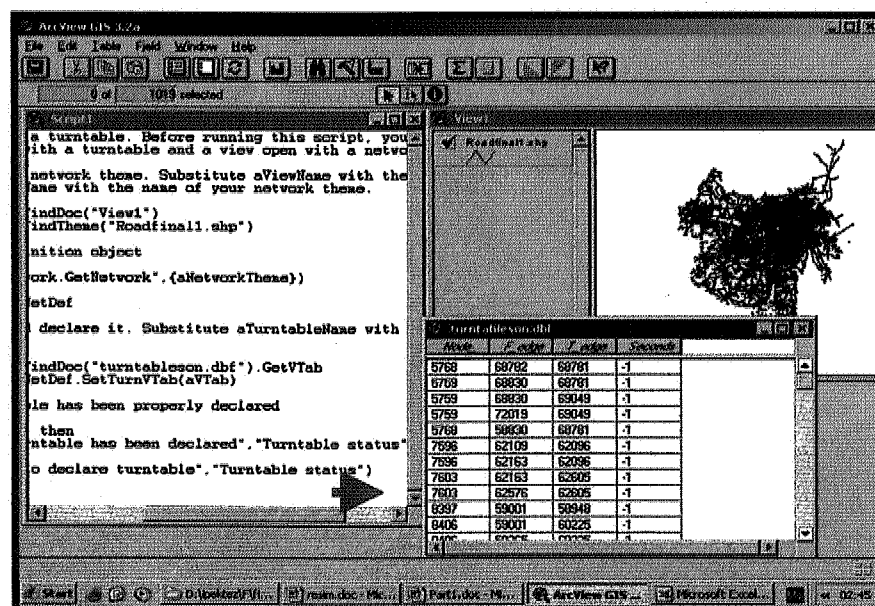


Figure 4.11
Adopting Turn Restrictions into Database

4.4 Determination of Shortest Travel Distances from Quarters to Shopping Centers

Until this part, the network database is ready for accessibility analysis. In this part, accessibility costs are calculated and during the analysis, closest facility of Network Analyst of ArcView 3.2 is used in order to find shortest transportation paths from all quarters to each shopping center. As a reference point, the centroids of all quarters are found. It is assumed that all customers from that quarter will move from centroid of the quarter to the shopping center.

In order to calculate transportation costs, distances should be calculated from each shopping center to each centroid of the quarter. For that reason road data, shopping center data and centroid data files are used for the analysis which is seen in Figure 4.13.

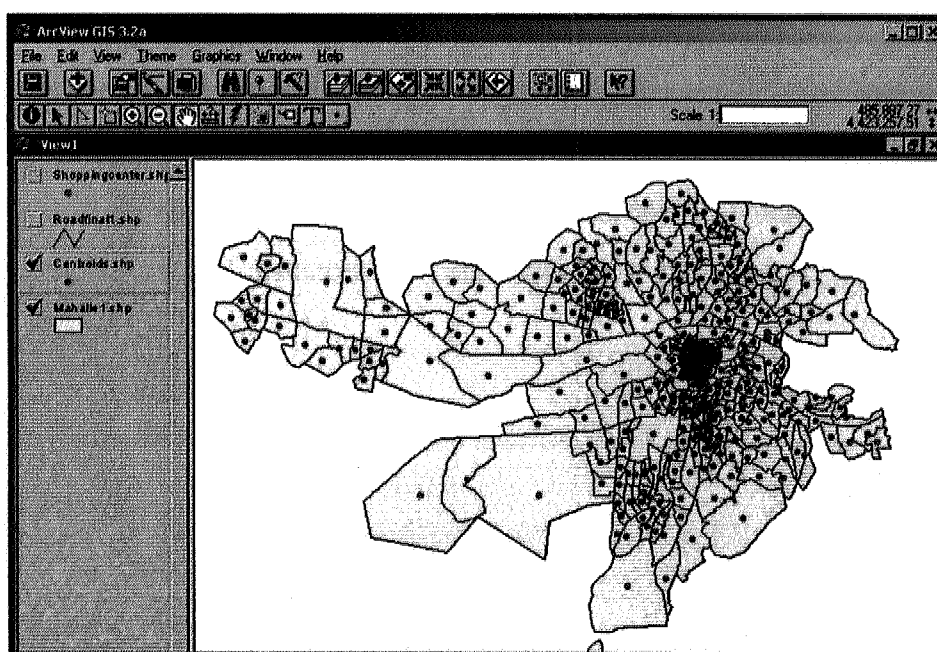


Figure 4.12
Centroids of Quarters

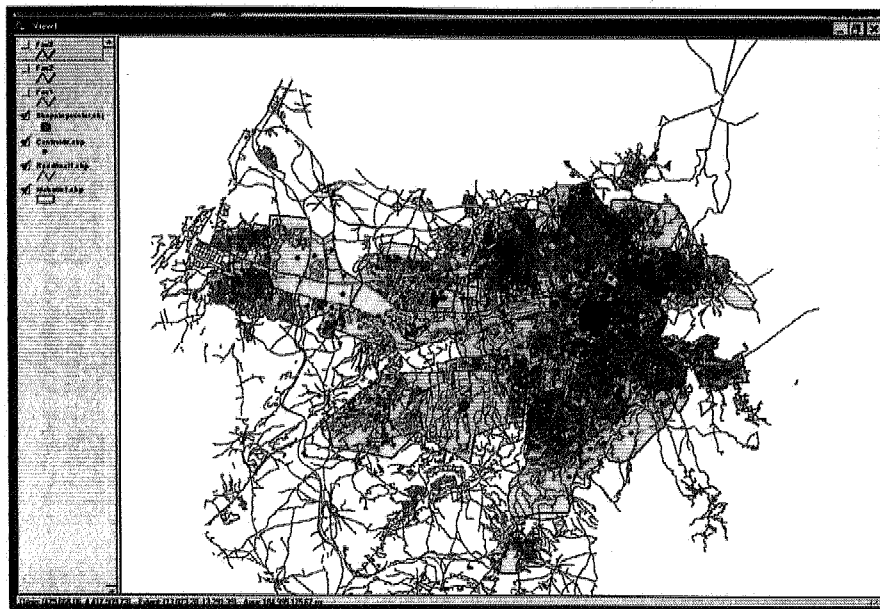


Figure 4.13
Quarters, Centroids of Quarters, Shopping centers and Roads for Network Analysis

The closest facility of Network Analyst of ArcView 3.2 is used for the analysis. The distances are calculated from facilities to events. Events are loaded as shopping centers whereas facilities are determined by centroids. The numbers of centroids which are 394 are written as number of facilities. From properties, the cost unit is written as length and finally shortest travel distances are calculated from each quarter to shopping center in meters. Please see Figure 4.14.

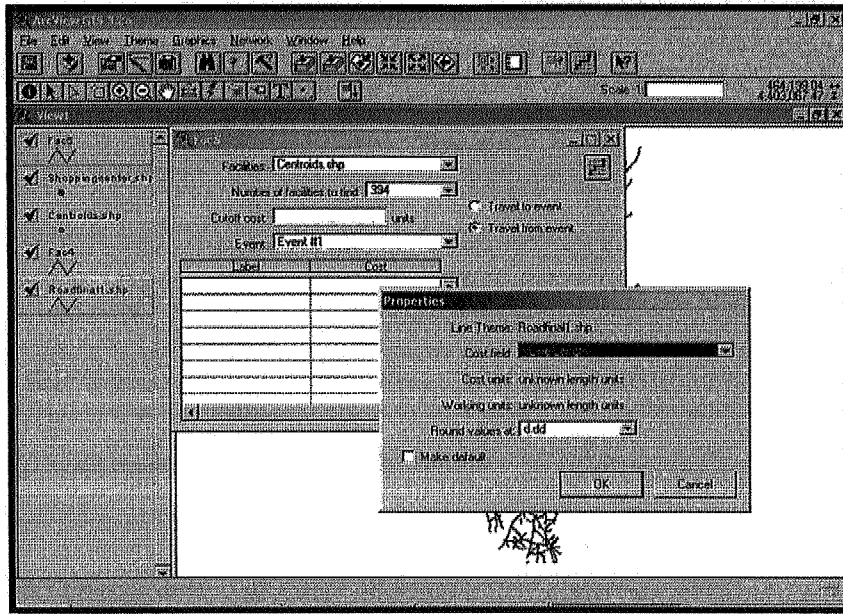


Figure 4.14
Transportation Cost Calculations According to Distance

Label	Cost
Facility #53	1326.61
Facility #55	1570.45
Facility #56	1797.10
Facility #54	2258.14
Facility #270	2306.38
Facility #52	2391.09
Facility #50	2412.42
Facility #51	2465.87

Figure 4.15
Transportation Cost Calculations According to Distance

Since the network database is created concerning directions and turn limitations, the analysis of the shortest travel distance regards the traffic flow of the city. The results of the analysis create a matrix showing distances in meters in Figure 4.15 .

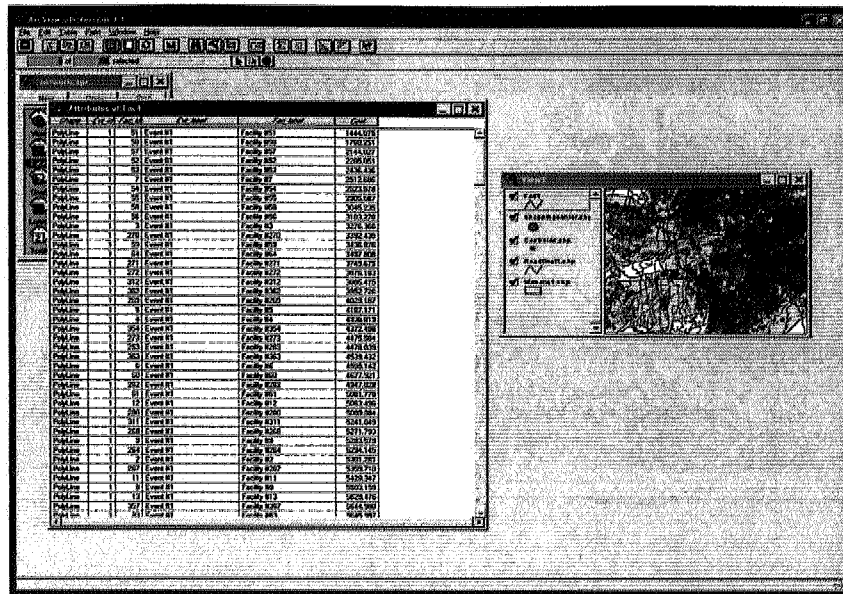


Figure 4.16
Shortest Paths from Quarters to Armada Shopping Center

On Figures 4.16, 4.17, 4.18 shortest transportation paths from quarters to each shopping center can be seen. The results of the analysis will be used in determination of costs in the next part of the study.

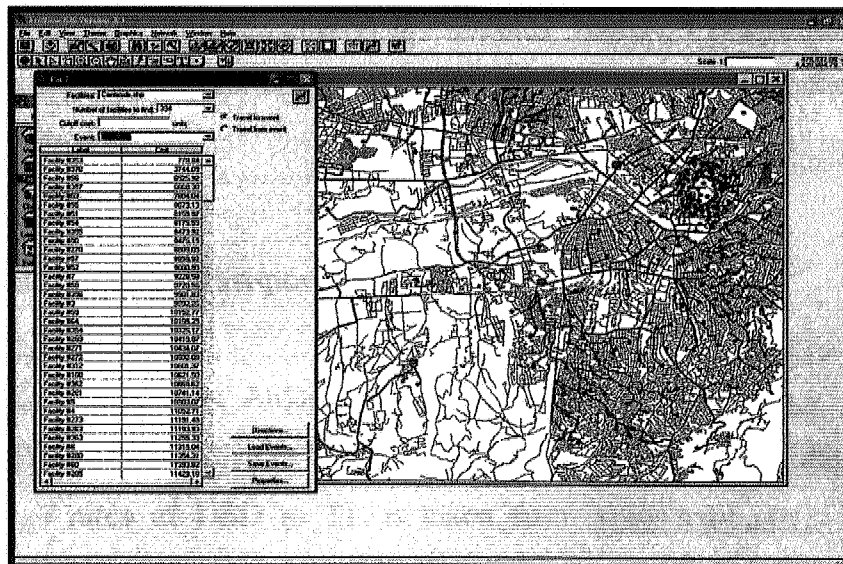


Figure 4.17
Shortest Paths from Quarters to Bilkent Shopping Center

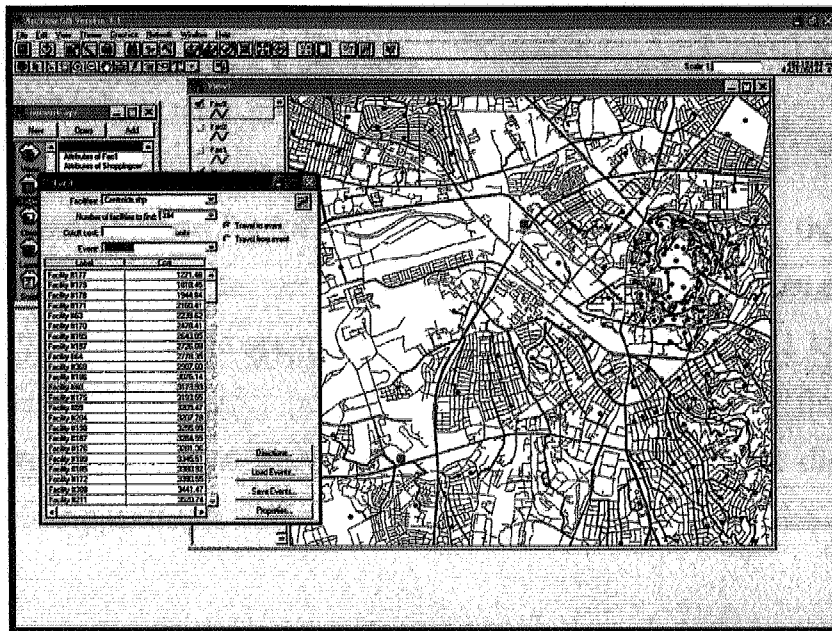


Figure 4.18
Shortest Paths from Quarters to 5 M Migros Shopping Center

4.5 Accessibility Cost Calculations

In the previous part of the study all shortest distances from each quarter to each shopping center is calculated. In this part, a transportation cost matrix is created. Since the distance is known for each quarter to shopping center, it is possible to calculate transportation costs from quarters to shopping centers. In this study, the accessibility costs are calculated as financial costs of transportation and time costs of transportation.

4.5.1 Financial Costs of Transportation

The prices of petroleum in Ankara are taken from www.opet.com.tr web site and average sale price of each district is taken as reference. On the same date, 11.October 2004, exchange rates of USD to TL is taken from www.tcmb.gov.tr and price of petroleum per liter in USD is calculated. The liter of petroleum in US dollars cost as follows:

1 liter petroleum = 2.189.529 = 1,46 USD

11. October 2004 www.tcmb.gov.tr, www.opet.com.tr

Since the petroleum spent for km changes from car to car, one of the most common marks, Fiat Palio is taken as reference mark. Reference to www.fiat.com.tr web site, one average fiat automobile spent 11.5 liter per km, which means 1 km costs 0,1679 USD petroleum. All necessary parameters are put into matrix and financial costs for each distance are calculated in Microsoft Office Excel 2003. The distance costs are given below in Appendix A Table 4.8, Table 4.9 and Table 4.10 (Lakshmanan, Hansen, 1965).

$$\text{Cost} = \text{Distance} \times \text{Cost of Petroleum/lit} \quad (4.4.)$$

Table 4.8
Financial Cost Matrix of Transportation to Armada Shopping Center

Regions	Distance (m)	Seconds	Time cost	Cost/km USD	Cost (length*usd)	
1	14333,85	....	... ..	0,1679	2,406	... ..
2	5301,26	....	... ..	0,1679	0,890	... ..
3	3276,36	... ..	... ..	0,1679	0,550	... ..
....

Table 4.9
Financial Cost Matrix of Transportation to Bilkent Shopping Center

Quarters	Distance (m)	Seconds	Time cost	cost/km USD	Cost (length*usd)	
1	15902,52	....	... ..	0,1679	2,6700	... ..
2	12017,15	....	... ..	0,1679	2,0176	... ..
3	9992,260	... ..	... ..	0,1679	1,6777	... ..
4	11052,71	... ..	... ..	0,1679	1,8557	... ..
5	10903,06	... ..	... ..	0,1679	1,8306	... ..
...

Table 4.10
Financial Cost Matrix of Transportation to 5M Migros Shopping Center

Quarters	Distance (m)	Seconds	Time cost	cost/km USD	Cost (length*usd)	
1	11282,60	....	... ..	0,1679	1,8943	... ..
2	5332,04	....	... ..	0,1679	0,8952	... ..
3	4333,57	... ..	... ..	0,1679	0,7276	... ..
4	4273,22	... ..	... ..	0,1679	0,7174	... ..
5	5005,97	... ..	... ..	0,1679	0,8405	... ..
...

Tables 4.8, 4.9 and 4.10 show the costs of transportation in USD from quarters to each shopping center. In table 4.8, the distance from quarter 1 to Armada shopping centers is 11.282 meters and since one km, transportation costs 0.1679 USD, for a person to go to Migros shopping center for shopping from quarter 1 costs 1.894 USD.

4.5.2 Time Costs of Transportation

According to Lakshmanan – Hansen Model the cost of accessibility is measured by the sum of transportation cost with time cost of travel. Since the distance and average speed for each road is known, transportation time matrix is calculated by using following formula (Lakshmanan, Hansen, 1965):

$$t_{ij} = d_{ij} / \text{av.speed} \quad (4.5)$$

t_{ij} = time of transportation from i to j

d_{ij} = shortest distance of transportation from i to j

av.speed = average speed given for the road in km/hour

For travel time calculation of each shortest route, speed and cost information is written as field in the attribute table of road data. For one-way roads average speed of city traffic speed 40km/hour is given. For double way roads 70 km/hour is given as average speed. Since length and speed of each line segment is known by using a simple script on Seconds field, travel time for each line segment is calculated. Please see Figure 4.19.

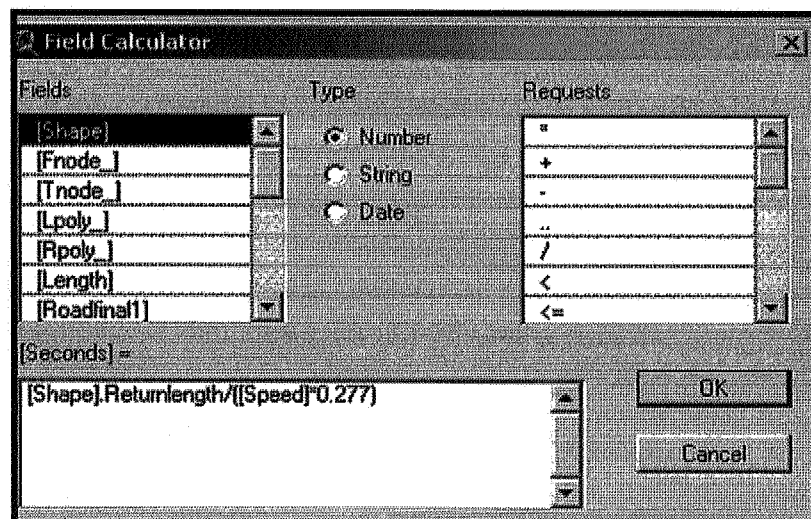


Figure 4.19
Transportation Cost Calculations According to Time

In the next step, the shortest routes are calculated one more time with the same tool of Network Analyst of Arcview 3.2, closest facility for each shopping center. As a difference, the cost unit is taken as seconds rather than meters. See Figure 4.20.

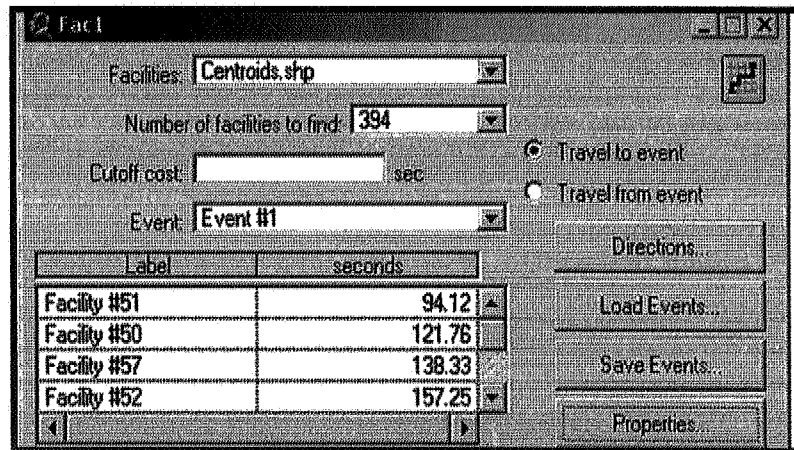


Figure 4.20
Transportation Cost Calculations According to Time

In Appendix A, Tables 4.8, 4.9 and 4.10 represent transportation time information, in seconds from quarters to Armada, Bilkent and Migros shopping centers in a single matrix.

In order to calculate the total cost of accessibility, the sum of time cost and financial cost should be taken. Since one of the parameters is in meter units and the other one is in second units, it is not possible to add them as they are calculated. They should be brought to a single unit and added afterwards.

The single cost units are calculated with the following formula:

$$\text{Cost} = (\text{Cost} - \text{Min Value}) / (\text{Max Value} - \text{Min Value}) \quad (4.6)$$

As a result, the time costs and financial costs are added together for each region and total accessibility costs are determined for all shopping centers.

Table 4.8
Transportation Costs Matrix for Armada Shopping Center

Quarters	Distance (m)	seconds	Time cost (time* k)	cost/km USD	Cost (length* Usd)	Time cost	Financial Cost	Tot cost
1	14333,85	940,57	940,57	0,1679	2,406	0,56510	0,503	0,534
2	5301,261	355,87	355,87	0,1679	0,89	0,17475	0,150	0,162
3	3276,366	213,34	213,34	0,1679	0,550	0,07960	0,071	0,075
4	4336,819	310,27	310,27	0,1679	0,728	0,14431	0,112	0,128
...

4.5.3 Mapping Accessibility

In this part of the study the accessibility of shopping centers are determined in terms of distance and time.

In Figure 4.21, the accessibility of Armada Shopping Center is seen. The darkest colors quarters show the most accessible quarters for Armada. These quarters can be summarized as Bahçelievler, Emek, Söğütözü, Devlet, 110.yıl, Balgat, Övecler, Kocatepe, Mesrutiyet ... etc. As can be seen from Figure 4.21 the accessibility analysis concerning parameters such as traffic flow, turn restrictions, time distance affects the result of accessible quarters. Quarters such as Ostim, Ivedik, may not seem closer than Bahçekapı quarter on map but accessibility analysis shows that within road network they are closer than quarters such as Bahçekapı. Since Eskişehir yolu is double-way road and Bahçekapı is on the opposite direction of traffic flow to Armada, Armada is closer to Bahçekapı but less accessible from it when it is compared with Ostim and Ivedik.

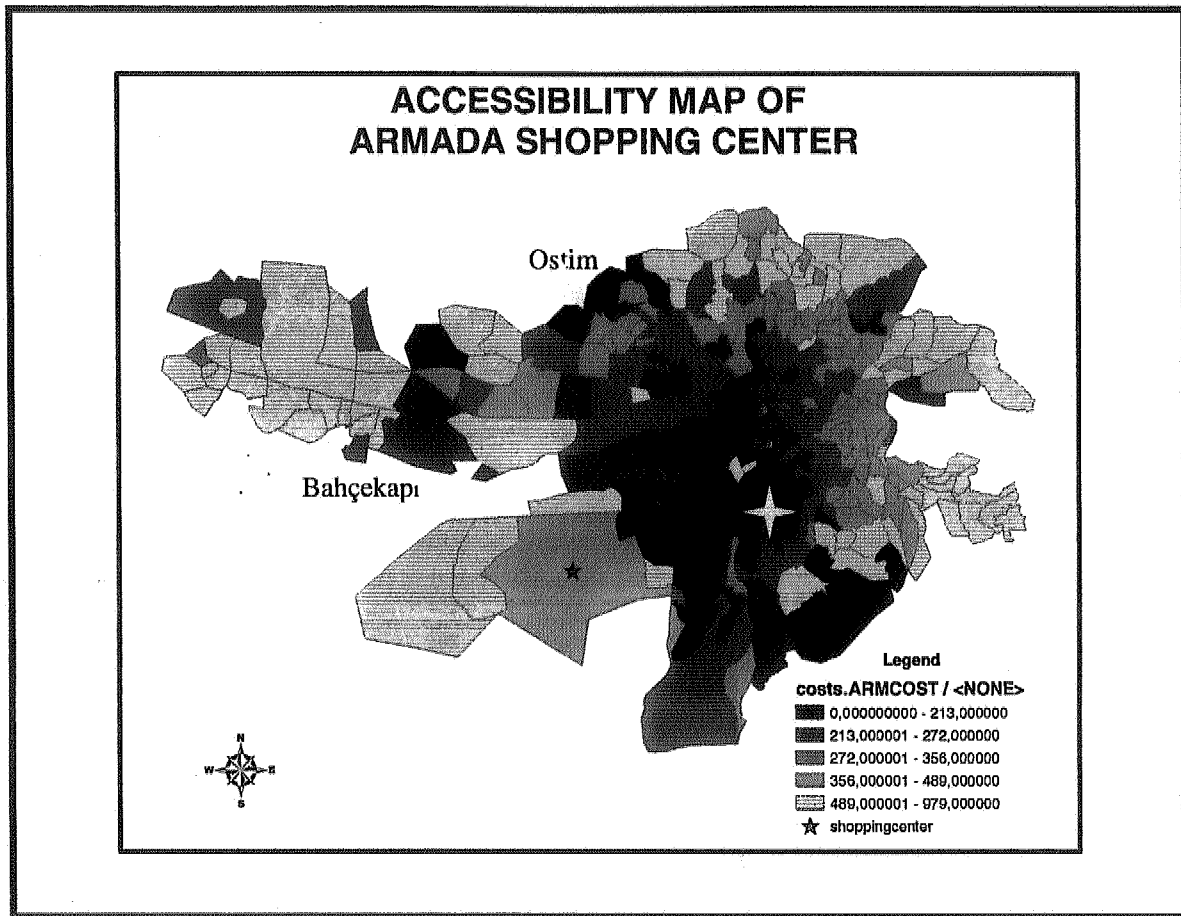


Figure 4.21
Accessibility Map of Armada Shopping Center

Figure 4.22 shows Bilkent Shopping Center's accessibility among quarters. For quarters around Eskişehir Yolu, Bilkent shopping center is more accessible than other parts of the city. When Figure 4.22 is compared with 4.21 it is seen that they have a similarity that both of their accessibility is mainly based on Eskişehir Yolu.

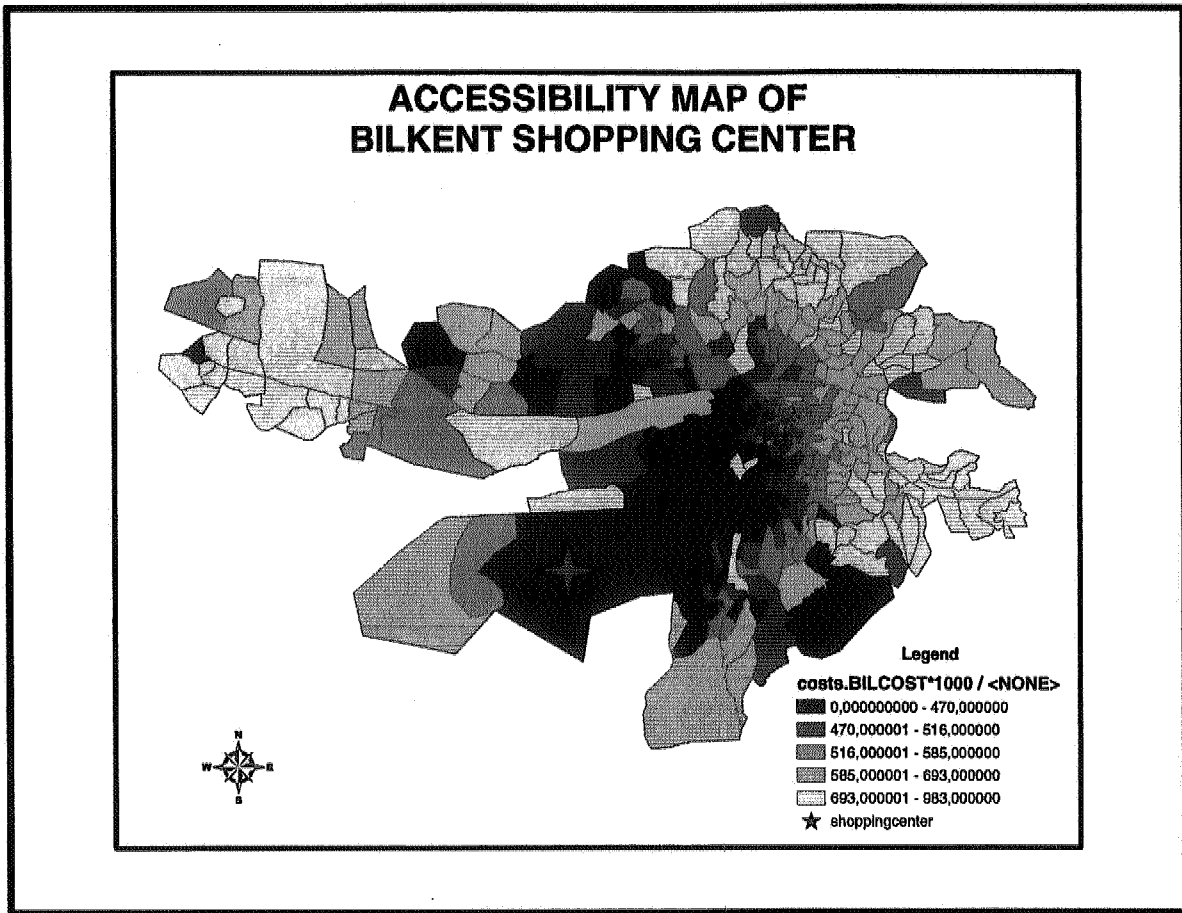


Figure 4.22
Accessibility Map of Bilkent Shopping Center

Figure 4.23 shows the accessibility map of 5 M Migros shopping center. It is expected to be different than maps of Bilkent and Armada. Migros is more accessible for the quarters around Turgut Özal Bulvarı, Etlik Caddesi and Kazım Karabekir Caddesi and Tanzimat Bulvarı.

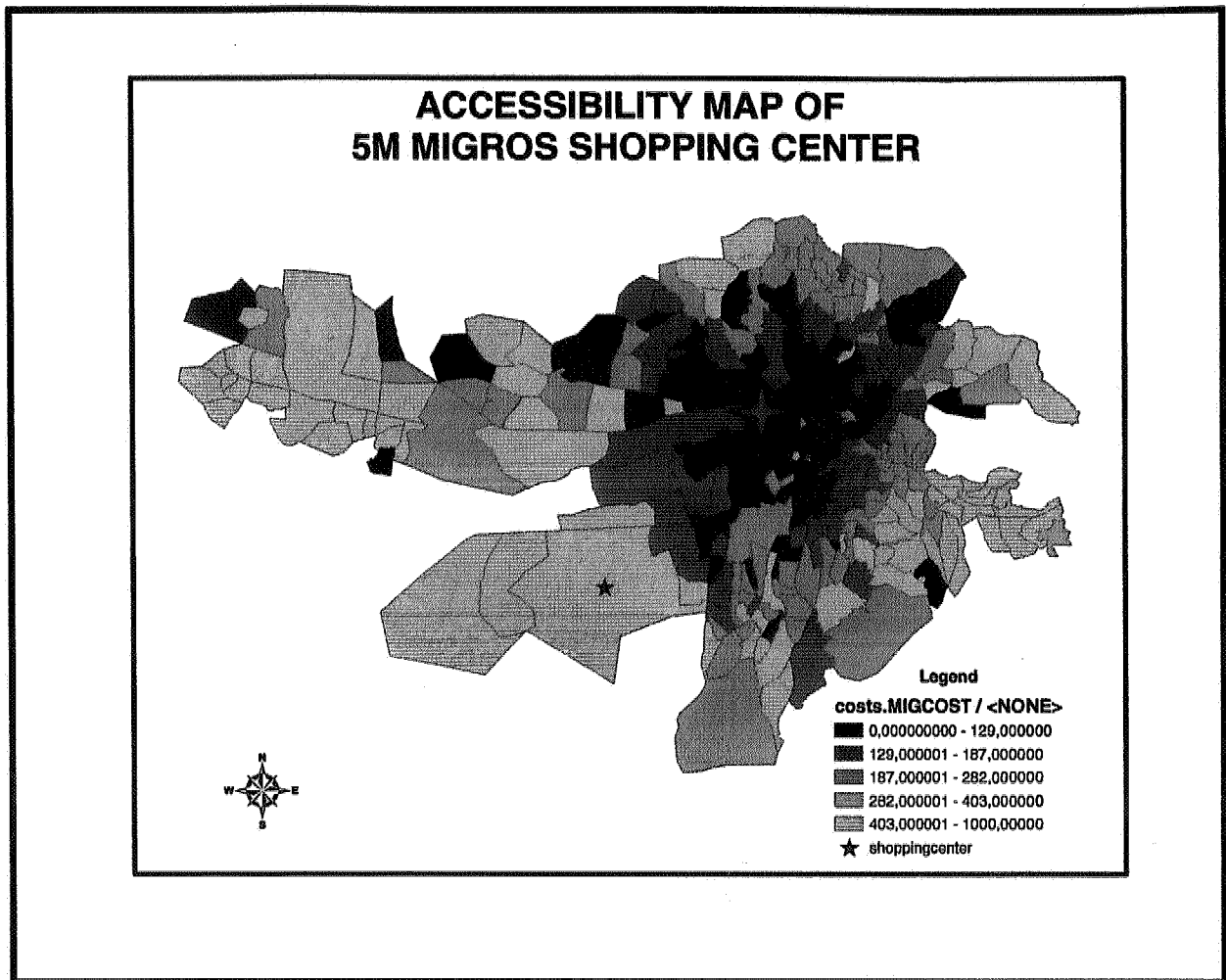


Figure 4.23
Accessibility Map of 5M Migros Shopping Center

If we compare the accessibility results, assuming that the quarters will choose the most accessible shopping center, Figure 4.24 gives the results of the share of quarters according to accessibility.

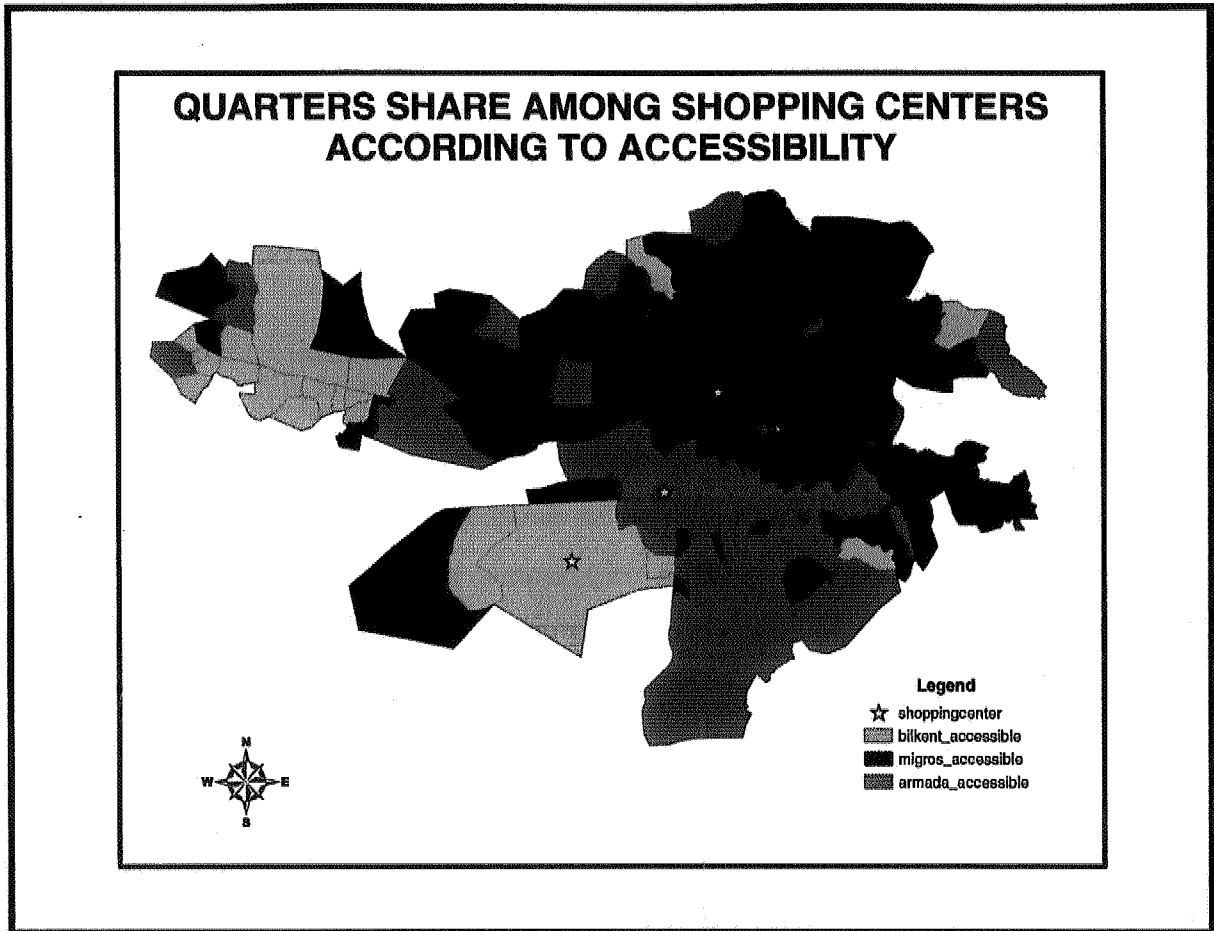


Figure 4.24
Quarters Share among Shopping Centers According to Accessibility

It is seen from Figure 4.24 that, quarters in Etimesgut and quarters around Bilkent prefers Bilkent Shopping Center in terms of accessibility. The Çankaya District seems to prefer Armada and Keçiören, Yenimahalle, Mamak and north part of Çankaya districts prefer Migros shopping center in terms of accessibility.

During the preparation of network database, the service roads and secondary roads weren't taken into consideration since it will require huge editing work. Because of that reason in results of analysis there are some exceptions. Some quarters seems to behave different then their neighbor quarters. This can be explained by the affects of secondary roads which couldn't be adapted to the network database.

4.6 Determining Attractiveness of Shopping Center

Attractiveness of shopping centers change with various factors. Size of shopping center, number of products, entertainment activities, parking capacity etc. affects the attractiveness. In this study, it is assumed that numbers of products and size are main factors which determine the attractiveness of shopping center. Assuming that as long as the size of shopping center increases the numbers and specialty of products will increase, the attractiveness of shopping center is measured by the size of itself. So the closed areas of the shopping centers in m² are taken as the attractiveness of the shopping centers and the other factors such as inner design, parking capacity, prices payment opportunities are disregarded.

Migros is the most attractive shopping center with 126.500 m² closed area. Bilkent Shopping Center is the second attractive center with 54.000 m² and Armada has 50.000 m² closed area.

4.7 Attraction Power Calculations

The attraction power of shopping center is directly related with attractiveness of shopping center and inversely related with the transportation costs to the shopping center. The attraction power shows the share percent of the shopping centers between other centers. To sum up, it is possible to say attraction power shows the competition among centers. (Lakshmanan, Hansen, 1965)

$$\text{Attraction Power: } \frac{W_j^\alpha \cdot c_{ij}^{-\beta}}{\sum_{j=1}^N W_j^\alpha \cdot c_{ij}^{-\beta}} \quad (4.8)$$

W_j = The area (m²) of the shopping center in quarter j
 c_{ij} = Cost of transportation from i quarter to j shopping center
 α, β = constant (Gives importance weights to c_{ij} and W_j which differs for each city and population)

In this part of the study in order to calculate attraction power of shopping center, the sizes of shopping centers are taken in m² and divided by the total accessibility costs which were calculated in previous part for each region. In order to determine the power of each shopping center the size / cost value is divided by the sum of all size / cost values for the regions and attraction power of each shopping center on each region is found in Microsoft Officer Excel. Table 4.11 shows the table for attraction power calculations of Armada. The same calculations are done for Bilkent and Migros shopping centers. Appendix a Table 4.11, 4.12 and 4.13

Table 4.11
Attraction Power Calculations $\alpha = 1$ and $\beta = 1$

Quarters	Total Cost	Size	Size/Cost	Total Size/Total Cost	Attraction Power
1	0,5342	50000	93594,48	454534,15	0,2059
2	0,1626	50000	307339,3	1316301,39	0,233
3	0,0755	50000	661617,3	1868047,54	0,354
4	0,1286	50000	388695,3	1547206,61	0,251
5	0,1183	50000	422587,0	1466330,42	0,288
6	0,1351	50000	369967,1	1670727,5	0,221
7	0,0425	50000	1176078	2330394,23	0,504
...

The criticism of this calculation is that, it is assumed that the accessibility and attractiveness of the shopping centers have equal importance. And therefore, in these calculations α and β values are taken as 1. In the next part of the study, α and β values will be calculated and model will be calibrated according to these α , β values. Since these attraction powers do not give the calibrated results, the results will not be evaluated in this part. In part 4.8 the calibrated attraction power values will be determined and the results will be evaluated.

4.8 Calibration of Model

All cities have different properties such as different transportation system, different profile of inhabitants and different style of consumption. For example, 20 minutes transportation may be a long distance for a city like Ankara but it will not be a long travel distance for İstanbul. Similarly, 10 km may not mean same distance on a motorway like on a 3rd degree road. Therefore, the model may change according to the properties of the cities. For that reason, the model should be calibrated.

In this study the most important part of study was the calibration of model since it is based on real information of shopping centers which is very difficult to achieve. It is not possible to achieve the real monthly market share of shopping centers within the city. But monthly average customer numbers are known for all shopping centers. Since we can achieve the population share of shopping centers, the model is compared with the real numbers of the customer numbers of the shopping centers.

During the calibration of model α and β constant numbers are used to make the model calibration for the city. α and β matrix is created by running the same model for different α and β values.

It was mentioned in Chapter 3 that, Armada Shopping Center has an average of 640-720.000 customers in a month, which is taken as average 670.000, Bilkent has average 710.000 customers in a month and Migros has 1.125.000 customers. With reference to this information the model is run for each α and β combinations from 0,2 to 1,2. A population share matrix for each α and β values are created and the combinations are evaluated and compared with the real results.

In this study it is assumed that, all customers do their shopping activities only in these 3 shopping centers. Therefore, it was not possible to reach real results in the model application. α and β values which give minimum error for all shopping centers together is taken as the constants for the calibration of the model.

In order to find the minimum error population share of each shopping center is calculated for different α and β values. Each of them is subtracted by the original population share values which are taken from management offices of the shopping centers. Second power of each result is taken and sum up for three shopping centers. The minimum total of the calculations give the minimum error and so on the most appropriate α and β values for the calibration of model. Refer to Appendix A Table 4.14.

Table 4.14
Calibration of Model

		Calibrated Population Share of Shopping Center			Original Population Share of Shopping Centers			Population Differences Between Original Data and Calibrated Data			
α	β	Armada	Bilkent	Migros	Armada	Bilkent	Migros	Armada	Bilkent	Migros	Sum of 2nd power of diff. (million)
0,2	0,2	988085	918681	1230847	680000	710000	1125.000	-308.085	-208.681	-105.847	149.667
0,2	0,4	999333	841142	1297138	680000	710000	1125.000	-319.333	-131.142	-172.138	148.803
0,2	0,6	1007086	769426	1361101	680000	710000	1125.000	-327.086	-59.426	-236.101	166.260
0,2	0,8	1011631	704099	1421884	680000	710000	1125.000	-331.631	5.901	-296.884	198.154
0,2	1	1013334	645308	1478971	680000	710000	1.125.000	-333.334	64.692	-353.971	240.592
0,2	1,2	1012612	592893	1532108	680000	710000	1125.000	-332.612	117.107	-407.108	290.081
0,4	0,2	911240	861118	1365254	680000	710000	1125.000	-231.240	-151.118	-240.254	134.030
0,4	0,4	918908	786190	1432515	680000	710000	1125.000	-238.908	-76.190	-307.515	157.447
0,4	0,6	923934	717479	1496200	680000	710000	1125.000	-243.934	-7.479	-371.200	197.349
0,4	0,8	926640	655370	1555604	680000	710000	1125.000	-246.640	54.630	-430.604	249.235
...

In this study according to the constant matrix, α is taken 0,4 and β is taken 0,2. The constants show that the importance of attractiveness of shopping center is higher than the importance of accessibility in this application. When the results are compared with

the constant values found by Gunal (2001) for Ankara transportation constants, which is 0.25 , the results seems appropriate for the study. In the next part of the study, attraction power of the shopping centers is calculated again with the new constants and finally market share is determined.

4.9 Market Share Analysis

As can be understood from the formulation, attraction power determines the market share of shopping center among its competitors. So, the multiplication of market capacity of the region with the attraction power of shopping center gives the market share of shopping center on this region among its competitors. (Lakshmanan, Hansen, 1965)

$$\text{The Market Share of } = \text{Market Capacity} \times \text{Attraction Power Sh. Cent. } j \quad (4.9)$$

The model is run one more time with $\alpha = 0,4$ and $\beta = 0,2$ and market shares of the shopping centers are determined by simple calculation in Microsoft Office Excel 2003. Table 4.15 in Appendix A shows the market and population shares of shopping centers

4.10 Mapping and Results of Market Share Analysis

The attraction powers of shopping centers are classified with quintile method of classification. Figure 4.25 shows the classification of quarters according to attraction power of Armada shopping center. It is seen that since accessibility is an important factor Çankaya district seems similar with Figure 4.21 showing accessibility of Armada shopping center.

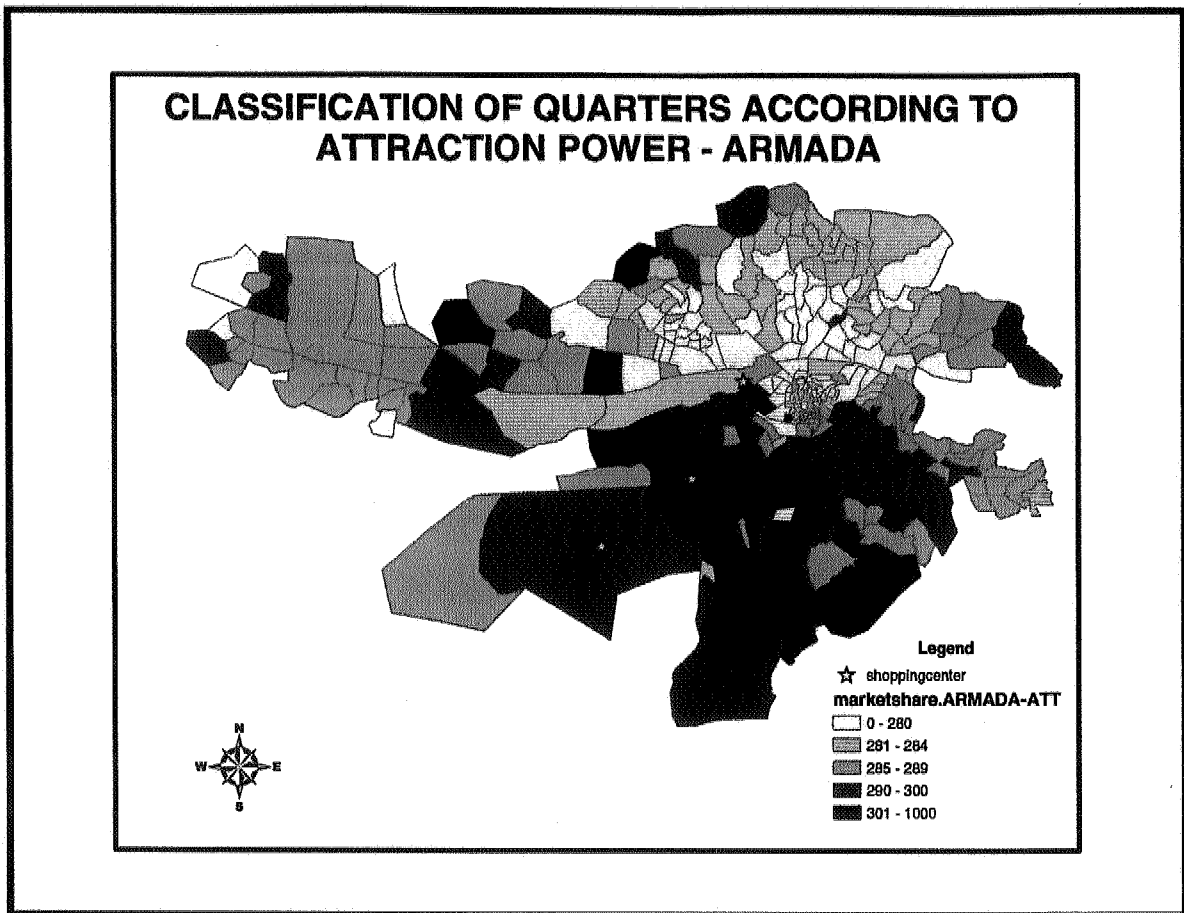


Figure 4.25
 Classification of Quarters According to Attraction Power- Armada Shopping Center

Figure 4.26 and 4.27 shows also classification of quarters according to attraction power. Similar to Accessibility Analysis Bilkent has more attractiveness on outer quarters and around itself. In Figure 4.26 it is seen that when attraction power is calculated to be located on Eskişehir Yolu is a disadvantage for Bilkent Center. Since it is far when it is compared with Armada and Migros it has difficulty on competing with the other shopping centers for the east-west line of city.

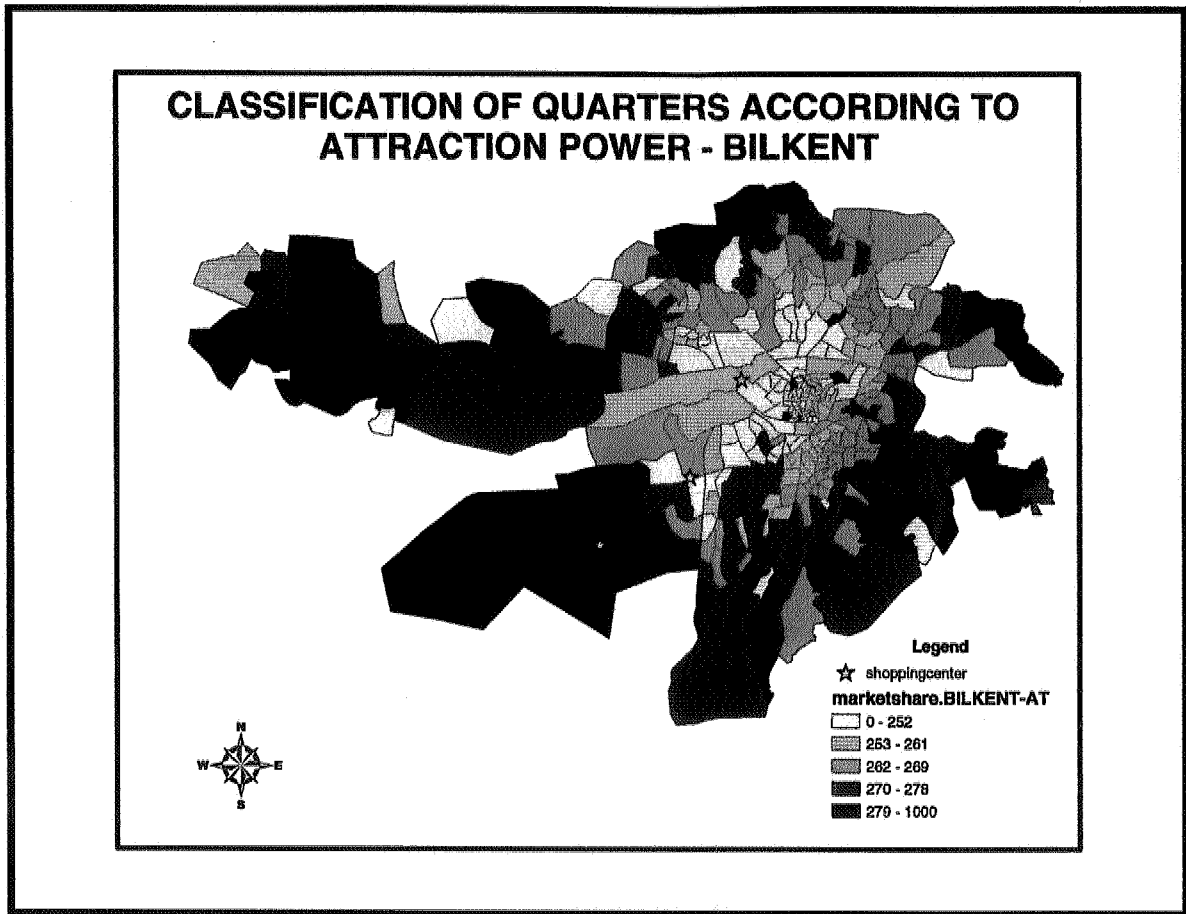


Figure 4.26
 Classification of Quarters According to Attraction Power- Bilkent Shopping Center

Migros in Figure 4.27 seems to have high attraction power in Keçiören district. It was quite evident during process that Migros will have the highest attraction power on these quarters because attraction power is related with attractiveness and accessibility. In accessibility analysis these quarters have lower costs and since Migros has high attractiveness therefore they have high attraction power. Migros has very strong power on the market, it has more then 40 percent of attraction power in 80 percent of the quarters. Armada and Bilkent Shopping Centers are attractive only on a few quarters. Please see Figure 4.28. Almost all quarters prefer Migros Shopping Center if they have to choose one.

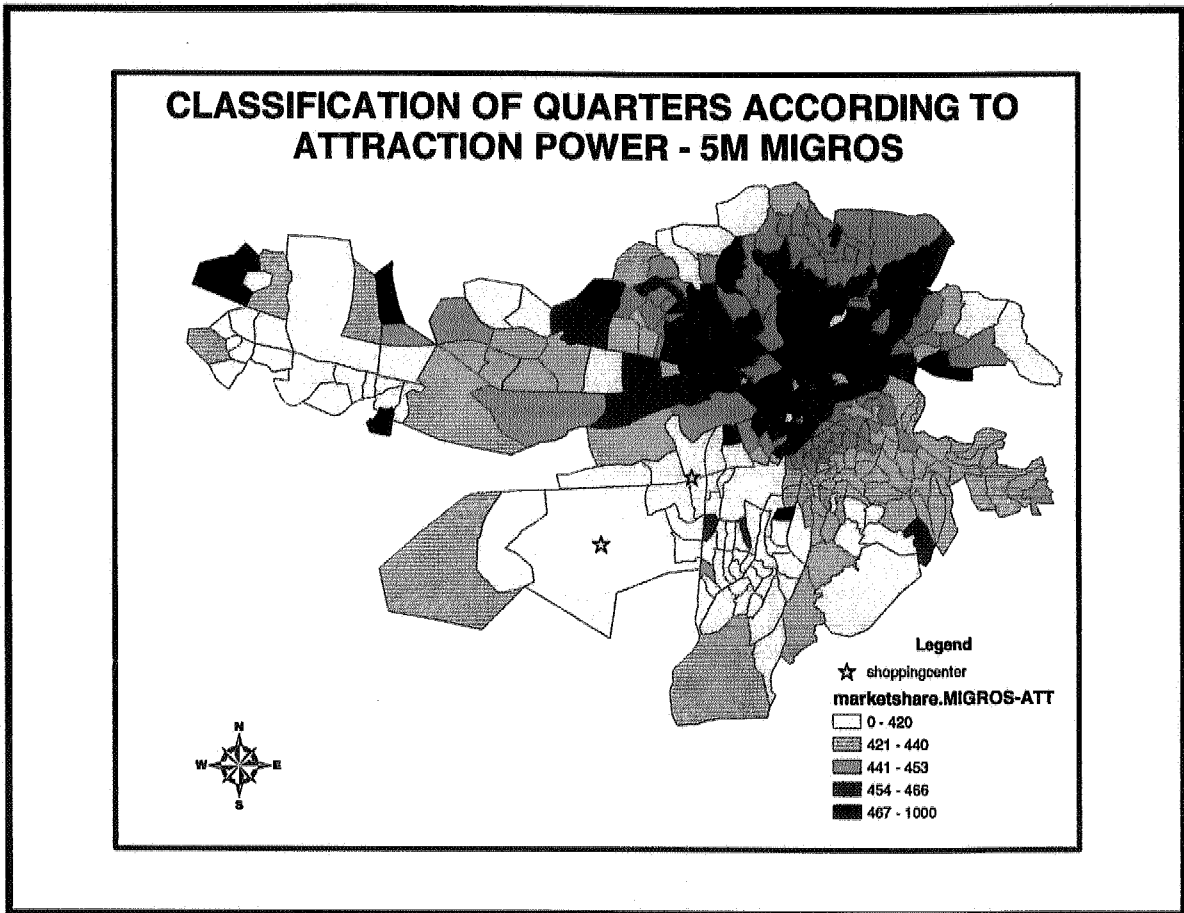


Figure 4.27
Classification of Quarters According to Attraction Power- Migros Shopping Center

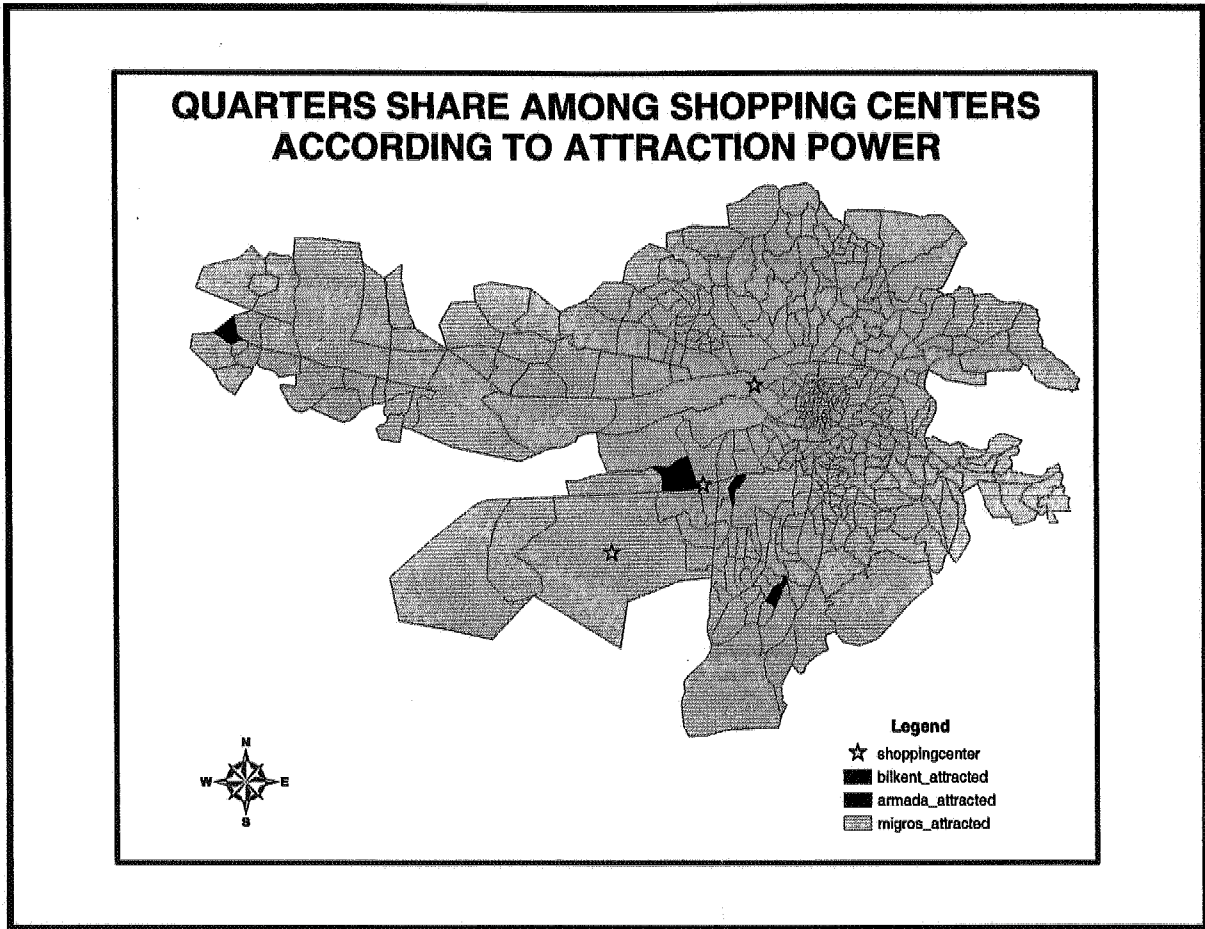


Figure 4.28
Quarters Share of Shopping Centers According to Attraction Power

According to Figure 4.29 Armada Shopping Center has its potential customers mainly from Çankaya District, Oran, Yıldız, Kavaklıdere, Ayrancı, GOP quarters. The opposite side of Eskişehir Yolu does not prefer Armada because of transportation problems. Armada also has some market share from a few quarters of Keçiören District. But if we evaluate the total share of Çankaya quarters in its market share, Çankaya is % 36 of Armada's market share. See Table 4.16

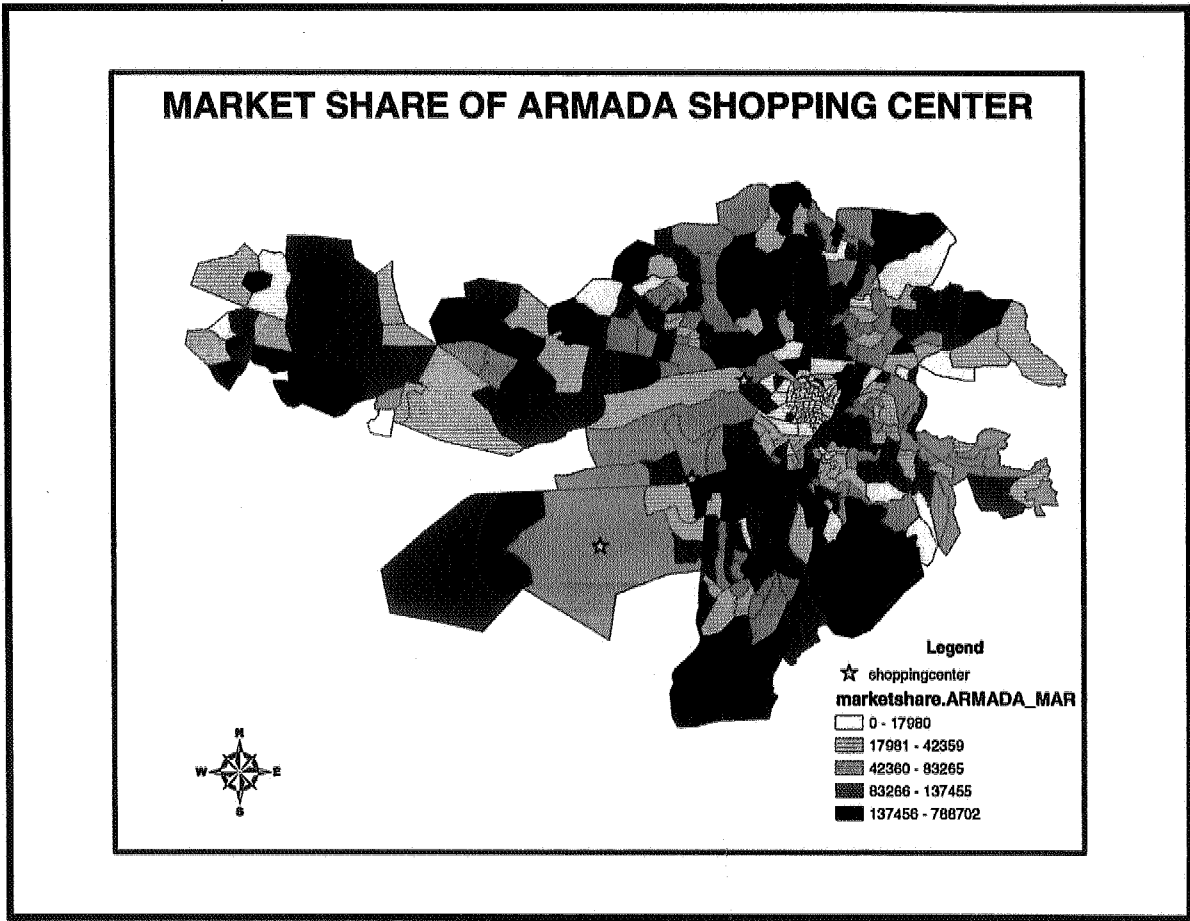


Figure 4.29
 Market Share of Armada Shopping Center

As can be seen in Figure 4.30 and 4.31, shopping centers show similar market share mapping results. All of them has evident market share in Çankaya and some part of Keçiören District. For Bilkent shopping center Etimesgut District seems more important for its market share.

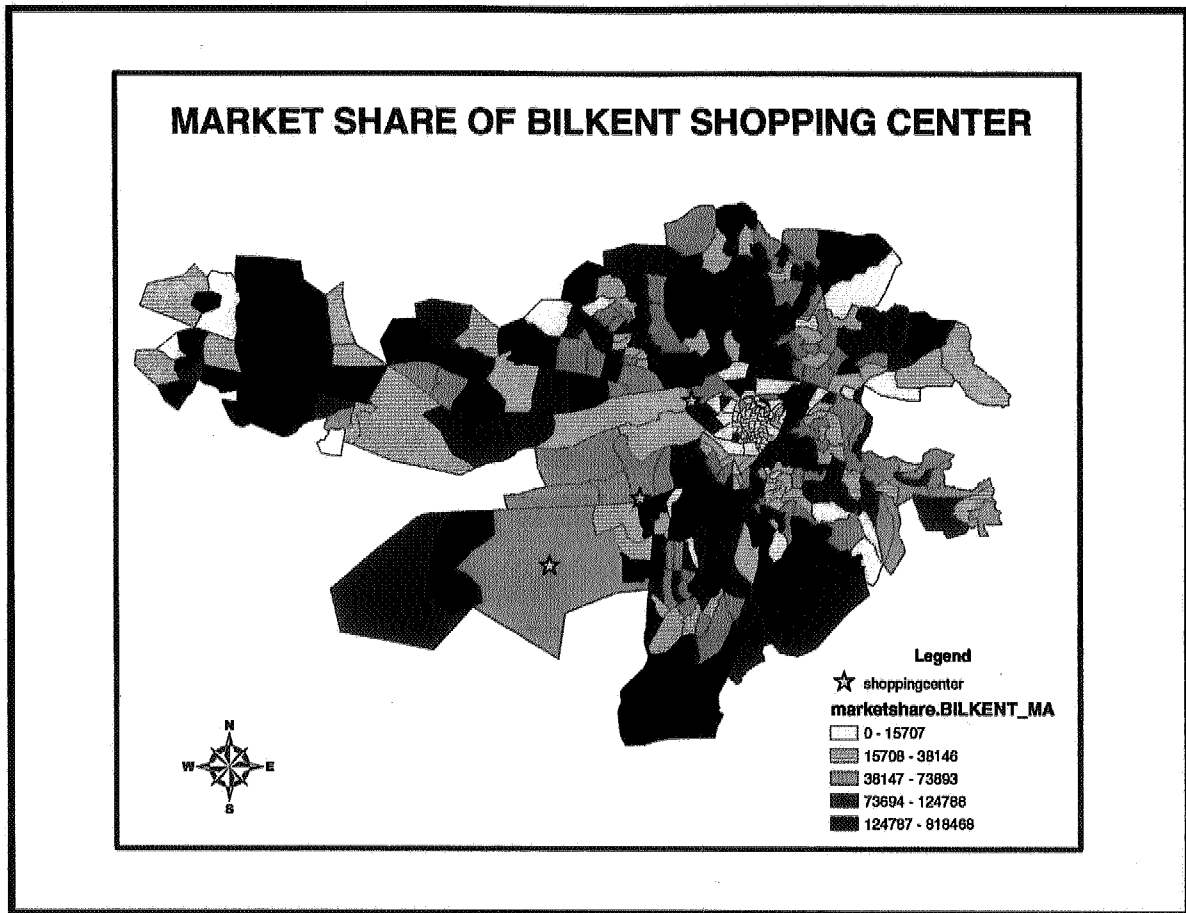


Figure 4.30
Market Share of Bilkent Shopping Center

As can be seen in Table 4.16 for all three shopping centers the biggest part of their market share comes from Çankaya District. Çankaya is followed by Keçiören and Yeni Mahalle. If we compare these results with the results we evaluated from Figure 4.4 Map of Market Capacities of the Quarters, the similarity can be easily seen for these district. The difference is also seen between these two figures. Some quarters from Yenimahalle and Etimesgut such as Batı Mah, Ertler, Bakçekapı seems to have bigger market capacities than other quarters but they do not have big market share percents in any of these shopping centers. The accessibility of shopping centers from these quarters is the main reason of that result. Comparing with other quarters any shopping centers are not highly accessible from these quarters.

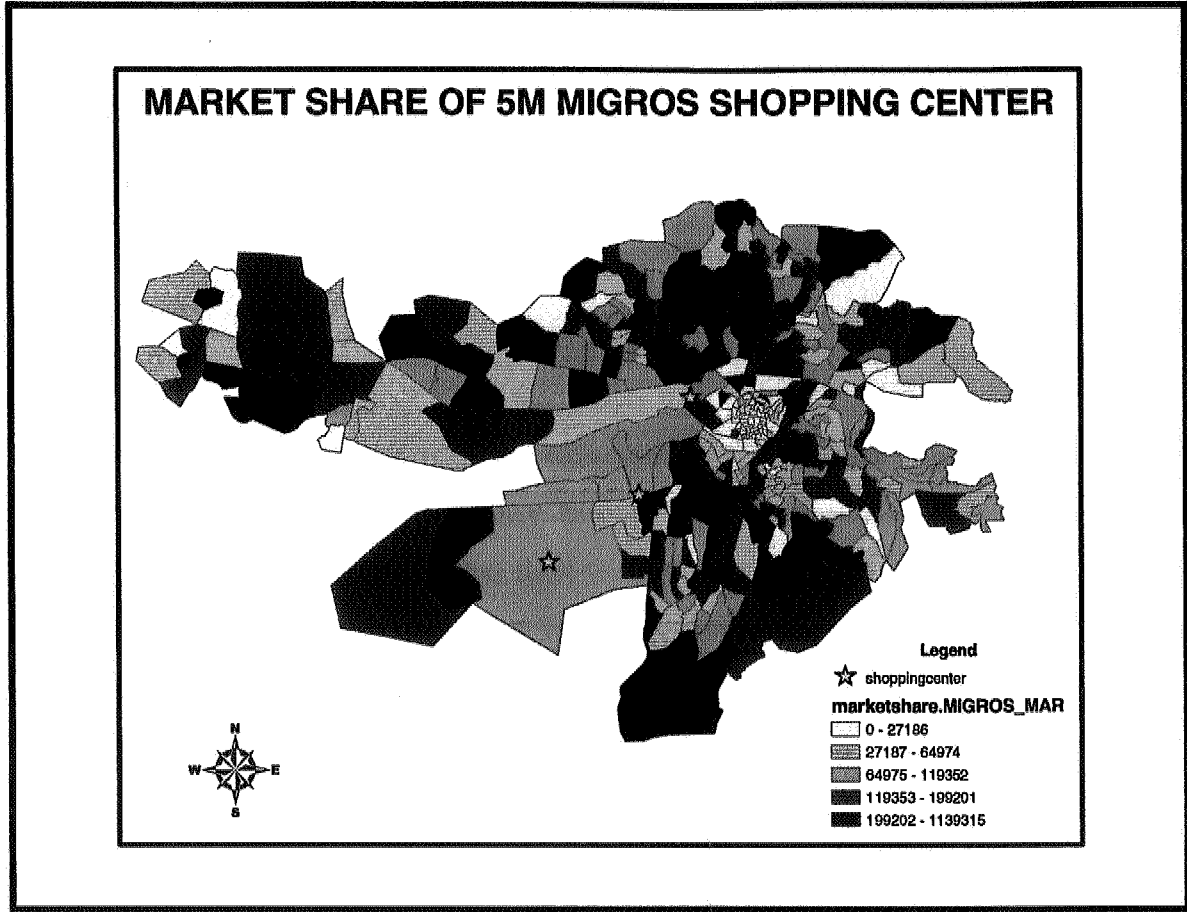


Figure 4.31
Market Share of 5M Migros Shopping Center

Table 4.16
Percentages of Market Share According to Districts

Shopping Centers	Total	Çankaya Share	Çankaya %	Keçiören Share	Keçiören %	Mamak Share	Mamak %
Armada	34466089	12456215	0,361405	7085674	0,205584	3574057	0,103698
Bilkent	31910156	10250953	0,321244	6607731	0,207073	3355416	0,105152
Migros	35085820	16362353	0,318568	11707794	0,33369	5388262	0,153574

Shopping Centers	Altındağ Share	Altındağ %	Etim. Share	Etim. %	Y.Mah. Share	Y. Mah. %	Gölbaşı Share	Gölbaşı %
Armada	3721894	0,107987	2316645	0,06722	5062913	0,1469	248691	0,00722
Bilkent	3431786	0,107545	2382943	0,07468	4795107	0,1503	1086220	0,03404
Çankaya	6241589	0,177895	3262297	0,09298	8059213	0,2297	340727	0,00971

CHAPTER 5

CONCLUSION

The changes in living style of people brought a new concept "shopping center". This concept brought people opportunity to buy various products, from one place, and entertain at the same time. By the time the number of shopping centers increased and this created a big competition among investors.

Ankara has also increasing trend for shopping centers and in order to understand the factors of market competition and share in Ankara, a market share analysis is done among the three biggest shopping centers of the city, Bilkent, 5M Migros and Armada shopping centers. The study is carried out on the side of shopping investors, so it is aimed to understand the potential market sites, factors of market share and actual market share among competitors in order to carry out investment decisions or increase market share within the competition.

From that side, the study tried to find answer to the following questions in order to find the market share among shopping centers in Ankara:

- Which quarters have higher market capacity
- How quarters are shared according to accessibility
- How is market share among the three biggest shopping centers of Ankara

In this respect the study started with a literature survey on the concept of market share analysis and the models used to make the analysis. The chapter 2 was used to understand that the market share is competitive and therefore it is a function of competitor's actions and their market shares. Market share is a big concept and the

factors of market share changes according to each product. The factors of the analysis can not be same for a product which is new in marketing and a product which already exists in market and have changes in price or quality level.

The factors of market share among shopping centers are related with the question. "What affects the customers' choice of shopping centers and which factors affects the market share of the shopping centers?" The answer can be given from our daily life. The number and quality of products, time of transportation, cost of transportation, (accessibility of center) number of entertainment facilities, prices payment opportunities, parking capacity, atmosphere and many other factors affect the customer's choice of shopping center which is the answer of first question. The first question in itself is a part of the answer of second question. The market share of a shopping center is related with customers' choice, customers' socio-economic profile and their consumption ability and the properties of its competitors.

In chapter 2, concerning these factors various models are evaluated starting from analog approach and later regression analysis and gravity models. It is understood that the gravity models are the most appropriate model for analysis concerning spatial and human interactions. Gravity models are used for such analysis because the human interaction can be assimilated by Newton's Gravity concept. The name of Gravity Model comes from the simplest version of Newton's Gravity Model. Reilly in 1931 developed the earliest version of gravity model and became a guide for the further gravity studies developed by other scientists. The major criticism with the traditional gravity model is that it uses only size and distance affects to estimate sales of retail centers and can be applied to only two retail centers. Later Huff in 1964 tried to estimate the shopping trips by determining the probability of a customer to shop in a specific shopping center. Lakshmanan and Hansen together in 1965, used also shopping trips in order to estimate the sales of shopping centers with calibrated model. The latest researches incorporate properties of retail centers and shoppers with the model. In 1994 Okoruwa, Nourse and Terza used Poision Distribution in order to estimate shopping trips and sales of shopping centers. In their study they used socio-economic

and demographic characteristics of shoppers and properties of shopping centers as variables.

For this study Lakshmanan-Hansen model is found most appropriate since it concerns the factors of accessibility, properties of shopping centers, economic profile of customers and the competition among centers.

The third chapter gives a description of study area, model and data used during the study.

The market share analysis is done in Chapter 4. A version of Lakshmanan and Hansen model is applied following these items: Determining market capacities, accessibility analysis, attractiveness of shopping centers, calculating attraction power, model calibration and determining market shares among shopping centers. During the analysis the main unit is taken as quarters and all analysis are done for quarters since it is easier to obtain data for that unit.

After the application of Lakshmanan – Hansen model the fourth chapter is reviewed and the results can be summarized in following headings:

- Classification of quarters according to wealth
- Classification of quarters according to their market capacities
- Accessibility maps of shopping centers
- Quarters share of shopping centers according to accessibility
- Classification of quarters according to attraction power
- Determination of constants for model calibration
- Quarters share of shopping centers according to attraction power
- Market Shares of Shopping Centers
- Percentages of market share according to districts of Ankara

Under these headings the results for the analysis can be summarized as:

- South part of the Ankara has better economic conditions than other parts of the city. The Çankaya district has the quarters with the highest wealth indexes. Quarters such as Ümitköy, Çayyolu, Ortadoğu, Oran, Çankaya, Ayrancı, GOP, Kavaklıdere, Bahçelievler, Emek, Altınpark, Kavacık Subayevleri, AOC, Erler, Bahçekapı have the highest wealth index in the city which shows they have higher economic conditions comparing with other quarters.
- The quarters with higher market capacities are grouped in four in the city. Oran, Çankaya, Yıldız, Birlik, GOP, Kavaklıdere, Ayrancı, Ortadoğu, Çayyolu have bigger market capacities in south part of the city. These quarters have high potential of consumption for shopping centers. In west part of the city a group of quarters is seen in Yenimahalle District. Kent Koop, Erler, Batı, Yenibatı, Ergazi, İnönü, Bahçekapı, Kardelen quarters have bigger market consumptions. The other two groups of quarters are located on Etimesgut district which include Emiryaman, Elvan, Atatürk, Topçu, Plevne regions and on south part of Keçiören District.
- When classification of quarters according to wealth index is evaluated Çankaya district quarters together with Ortadoğu, Çayyolu, Emiryaman, Erler, Bahçekapı quarters show similar results. The rest of the quarters which have bigger market areas do not have the highest group of wealth index but have a bigger population which affects the size of market capacity.
- The accessibility analysis concerning parameters such as traffic flow, turn restrictions, time distance effect the result of accessible quarters. Quarters such as Ostim and İvedik, may not seem closer than Bahçekapı quarter on map but accessibility analysis shows that within road network they are

closer than quarters such as Bahçekapı. Since Eskişehir yolu is double-way road and Bahçekapı is on the opposite direction of traffic flow to Armada, Armada is closer to Bahçekapı but less accessible from it when it is compared with Ostim and Ivedik. Since service roads are not taken into consideration during road network adaptation, some quarters show unexpected results. For best results all network system should be adopted to traffic flow and turn restrictions.

- Estimated population shares are compared with real results and constants giving minimum error are taken. α is taken 0,4 and β is taken 0,2 which shows that the importance of attractiveness of shopping center is higher than the importance of accessibility in that study.
- Armada Shopping center is accessible for quarters Bahçelievler, Emek, Söğütözü, Devlet, 110.yıl, Balgat, Öveçler, Kocatepe, Mesrutiyet.
- Bilkent and Armada shopping centers show similar accessibility maps since both of their accessibility is based on Eskişehir Yolu. The most accessible quarters are grouped around Eskişehir Yolu.
- Migros shopping center shows different accessibility map. Its transportation is based on different roads mainly, Turgut Özal Bulvarı, Tanzimat cad., Etlik cad, and Kazım Karabekir cad.
- When quarters share in terms of accessibility is evaluated, it is seen that, quarters in Etimesgut and quarters around Bilkent prefers Bilkent shopping center in terms of accessibility. The Çankaya District seems to prefer Armada and Keçiören, Yenimahalle, Mamak and north part of Çankaya districts prefer Migros shopping center in terms of accessibility.

- The closed areas of shopping centers in m^2 are taken as the attractiveness of the shopping centers so that Migros has the highest attractiveness on quarters and it is followed by Bilkent Center and Armada in order.
- Similar to accessibility analysis, attraction power analysis shows that, Bilkent has more attractiveness on outer quarters and around itself. To be located on Eskişehir Yolu is a disadvantage for Bilkent since it has to compete with Armada and it is more far from the city than Armada in case of accessibility.
- Migros have high attraction power in Keçiören district. It was quite evident during process that Migros will have the highest attraction power on these quarters because attraction power is related with attractiveness and accessibility. In accessibility analysis these quarters have lower costs and since Migros has high attractiveness therefore it has high attraction power on these quarters.
- Migros has very strong power on the market. Armada and Bilkent Shopping Centers attract only on a few quarters. Almost all quarters prefer Migros Shopping Center if they have to choose one.
- Armada Shopping Center has its potential customers mainly from Çankaya District, Oran, Yıldız, Kavaklıdere, Ayrancı and GOP quarters. The opposite side of Eskişehir Yolu does not prefer Armada because of transportation problems. Armada also has some market share from a few quarters of Keçiören District. But if we evaluate the total share of Çankaya quarters in its market share, Çankaya has 36 % of Armada's market share.
- Bilkent and Migros shopping centers show similar market share mapping results with Armada. All of them has evident market share in Çankaya and some part of Keçiören District. For Bilkent shopping center, Etimesgut District seems more important for its market share.

- Some quarters from Yenimahalle and Etimesgut such as Batı Mah, Erler, Bakçekapı seems to have bigger market areas than other quarters but they do not have big market share percents in any of these shopping centers. The accessibility of shopping centers from these quarters is the main reason of that result.
- For all three shopping centers the biggest part of their market share comes from Çankaya District average 30%. Çankaya is followed by Keçiören 20% and Yeni Mahalle districts 15%.

The market share analysis done among three shopping centers in Ankara was a site specific study. And therefore the results were site specific. Anyway concerning the site specific results, at the end the following results can be achieved:

- The market share of a center is related with accessibility, attractiveness of shopping centers and economic conditions of customers and its competitors.
- Being close to a point means different from being accessible to it. A point can be closer to a reference but may not be as accessible as second point which is far from this reference. Therefore accessibility analysis is an important factor which affects the result of the study.
- The gravity models should be adapted to each site application in terms of study areas properties. For example, for a city like Istanbul, the motor ways, should be adapted to network system and the network system should be differentiated more according to road classifications and speed information.
- The most important difficulty of the market share analysis is retrieval of real data in developing countries such as Turkey. The necessary data should be taken from different agencies and therefore are in different format. Because

of that reason preparation of data for the analysis is the most time consuming part of the analysis.

- GIS is an important tool for market share analysis since it has capability to store and manipulate data, build regulations on road network structure, calculate distances and costs, present maps and results with different mapping and presentation choices.
- Since the real data about real market conditions is not possible to be achieved the analysis is based on some assumption which is the main criticism of the analysis. The best application of model will be by evaluating real market and customer information and calibrating model according to real world results.

In addition to these results there are also some criticisms about the method of the study. These criticisms can be summarized as follows:

- Gravity models estimates the spatial interactions by imitating real world with mathematical formulations. But any mathematical model can not model real world as it is.
- First human behavior can not be predicted and each human being has her/his own properties. The model assumes that some groups of people pretend to behave similarly and it disregards the exceptions in the human behavior.
- The units of the method can be regions, zones, areas, quarters. As long as the size of the regions decrease it will give more accurate results since the homogeneity of regions will be represented in more classifications. But the smaller unit calculation will bring bigger calculation procedure.

- The size is taken as attractiveness but inner design factor together with prices, paying opportunities, atmosphere, parking capacity, entertainment facilities also effect the attractiveness of shopping centers.
- The shopping basket of customers change according to quarters. In this study this change is disregarded. The shopping basket of people shopping in Bilkent can not be same with customers from Keçiören shopping in Migros.
- The dwelling ownership information did not consider quarters diversification. Owning dwelling in Beysukent can not be same with owning dwelling in Mamak.

In this thesis, the expected information could not be achieved. Therefore some assumptions had to be made during the study.

- Since it is not possible to achieve necessary information about all shopping centers in Ankara, it is assumed that all quarters shop only from these three shopping centers. The study can be developed by applying model to all shopping centers of city.
- During estimation of market capacities since there is no information about consumption expenditures of each household the households assumed to have similar groups in the quarters. By making questionnaires to all household the study can be developed.
- During preparation of road network there was not any digital traffic flow information and since a city network has thousands of segments, it was not possible to model the precise road network.

- In calibration of model we do not know how much these shopping centers take from all shopping centers market in Ankara, so the calibration again assumes that the households will use any of these shopping centers.

The results of this study can be used for various purposes,

- Market Capacity map can give information about potential sites of further investments.
- The investors can model the location and size of their project centers and can estimate their market share within the competition.
- The shopping centers can evaluate results and try to raise their attraction power on weak quarters to increase their market share.
- In case of a change in network structure of the city the investors can estimate changes in market.

The purposes can be about various other subjects. Even the study has some critics and assumptions, it gives idea about the competition and its factors among the shopping centers.

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APPENDIX A

Additional Tables

Table 4.1
Consumption Expenditures of Ankara for Shopping Centers

%20 Group s acc. to cons. Expen d.	Food, Bevera ge and Tobacco	Cloth. Foot wear	House Furnis hing	Entert. and Culture	Hotel Rest. and Pastry Shop	Variou s Good and Service	Total Mil. TL	Number of people in the Househol d	Total USD/ Perso n
1.%20	288932	31061	20425	6341	10417	29889	387065	511823	23,9
2.%20	388578	66885	33571	18412	23233	47118	577797	530660	34,5
3.%20	451015	12770 0	58215	24488	30810	70404	964862	560824	54,5
4.%20	526421	19734 6	113281	57735	53389	106726	1054898	518908	64,4
5.%20	650562	35429 2	535111	134753	103284	216110	1994112	547794	115,3

This data is taken from 1994 Consumption Expenditure Survey of DIE. The consumption expenditures are ordered for 20 % groups of households. Only shopping center expenses are summarized in this table. Since all numbers in the survey was in TL prices are converted to USD. All conversions are done according to TL USD dolar rates of mid year in 1994.

1 USD = 31544,78 TL (15.06.1994) www.tcmb.gov.tr

Table 4.3
Table of Wealth Index

Quarters	1. House	2. House	Percentages of Questions		Wealth Index	Quarters	1. House	2. House	Percentages of Questions		Wealth Index
10001	50,0000	20,0000	0,5000	0,2000	0,2859	20076	53,57	35,00	0,54	0,3500	0,5002
10002	22,2222	22,2222	0,2222	0,2222	0,3175	20077	64,29	16,67	0,64	0,1667	0,2383
10003	9,0909	18,1818	0,0909	0,1818	0,2598	20078	45,61	21,05	0,46	0,2105	0,3009
10005	59,2593	3,7037	0,5926	0,0370	0,0531	20079	55,65	28,23	0,56	0,2823	0,4034
10006	54,0816	14,2857	0,5408	0,1429	0,2043	20080	41,94	16,13	0,42	0,1613	0,2306
10007	55,9140	16,1290	0,5591	0,1613	0,2306	20081	54,05	18,92	0,54	0,1892	0,2705
10008	8,3333	0,0000	0,0833	0,0000	0,0000	20083	69,78	19,42	0,70	0,1942	0,2777
10010	61,2903	27,4194	0,6129	0,2742	0,3919	20084	48,82	34,34	0,49	0,3434	0,4908
10013	50,0000	50,0000	0,5000	0,5000	0,7145	20085	55,00	28,75	0,55	0,2875	0,4109
10014	54,0541	10,8108	0,5405	0,1081	0,1546	20086	53,68	33,82	0,54	0,3382	0,4834
10015	47,3934	27,4882	0,4739	0,2749	0,3928	20087	52,17	18,84	0,52	0,1884	0,2693
10016	63,1579	13,1579	0,6316	0,1316	0,1882	20088	63,89	11,11	0,64	0,1111	0,1589
10017	84,0278	8,3333	0,8403	0,0833	0,1193	30001	59,09	0,00	0,59	0,0000	0,0002
10018	49,0566	8,4906	0,4906	0,0849	0,1215	30002	100,00	33,33	1,00	0,3333	0,4765
10019	65,9459	9,1892	0,6595	0,0919	0,1315	30003	53,25	25,97	0,53	0,2597	0,3712
10020	69,0722	8,2474	0,6907	0,0825	0,1181	30005	36,00	32,00	0,36	0,3200	0,4573
10021	52,9412	5,8824	0,5294	0,0588	0,0842	30006	53,13	15,63	0,53	0,1563	0,2234
10023	57,1429	4,7619	0,5714	0,0476	0,0682	30007	71,84	13,59	0,72	0,1359	0,1944
10024	56,4706	12,9412	0,5647	0,1294	0,1851	30008	80,00	16,36	0,80	0,1636	0,2340
10025	61,2500	15,0000	0,6125	0,1500	0,2145	30009	65,38	15,38	0,65	0,1538	0,2200
10026	56,2500	0,0000	0,5625	0,0000	0,0002	30010	68,75	12,50	0,69	0,1250	0,1788
10027	11,1111	22,2222	0,1111	0,2222	0,3175	40001	62,03	11,39	0,62	0,1139	0,1630
10029	16,6667	8,3333	0,1667	0,0833	0,1191	40002	62,90	17,74	0,63	0,1774	0,2537
10030	28,5714	42,8571	0,2857	0,4286	0,6123	40003	53,21	29,56	0,53	0,2956	0,4225
10031	66,6667	41,6667	0,6667	0,4167	0,5955	40004	74,31	10,42	0,74	0,1042	0,1491
10033	37,9310	13,7931	0,3793	0,1379	0,1972	40005	57,62	13,33	0,58	0,1333	0,1907
10034	57,8947	11,8421	0,5789	0,1184	0,1694	40006	67,82	18,39	0,68	0,1839	0,2630
10035	56,8627	5,8824	0,5686	0,0588	0,0842	40007	49,11	14,79	0,49	0,1479	0,2115
10036	45,0000	10,0000	0,4500	0,1000	0,1430	40008	57,25	15,27	0,57	0,1527	0,2183
10037	33,3333	8,3333	0,3333	0,0833	0,1192	40009	60,47	9,30	0,60	0,0930	0,1331
10038	19,4444	13,8889	0,1944	0,1389	0,1985	40010	55,75	15,93	0,56	0,1593	0,2277
10039	42,3077	7,6923	0,4231	0,0769	0,1100	40011	56,57	16,16	0,57	0,1616	0,2311
10040	28,5714	14,2857	0,2857	0,1429	0,2042	40012	65,58	12,34	0,66	0,1234	0,1765
10041	46,8750	12,5000	0,4688	0,1250	0,1787	40013	54,90	22,68	0,55	0,2268	0,3242
10042	77,2152	8,2278	0,7722	0,0823	0,1178	40014	54,89	14,67	0,55	0,1467	0,2098
10044	43,4783	17,3913	0,4348	0,1739	0,2486	40015	52,94	23,53	0,53	0,2353	0,3363
10045	61,1111	5,5556	0,6111	0,0556	0,0796	40016	60,00	3,33	0,60	0,0333	0,0478
10046	53,0612	4,0816	0,5306	0,0408	0,0585	40017	52,38	4,76	0,52	0,0476	0,0682
10047	33,3333	25,0000	0,3333	0,2500	0,3573	40018	52,92	17,12	0,53	0,1712	0,2448
10048	42,5926	12,9630	0,4259	0,1296	0,1853	40019	51,74	26,74	0,52	0,2674	0,3822
10049	46,9231	14,6154	0,4692	0,1462	0,2089	40020	53,96	13,67	0,54	0,1367	0,1955
10050	50,0000	7,6923	0,5000	0,0769	0,1101	40021	74,70	9,64	0,75	0,0964	0,1379
10051	59,0909	13,6364	0,5909	0,1364	0,1950	40022	48,24	18,24	0,48	0,1824	0,2607
10052	35,0000	15,0000	0,3500	0,1500	0,2144	40023	49,59	28,93	0,50	0,2893	0,4134
10053	20,0000	20,0000	0,2000	0,2000	0,2858	40024	70,00	15,00	0,70	0,1500	0,2145
10056	0,0000	11,1111	0,0000	0,1111	0,1587	40025	59,74	11,69	0,60	0,1169	0,1672
10057	12,5000	0,0000	0,1250	0,0000	0,0000	40026	57,37	22,63	0,57	0,2263	0,3235
10058	55,0000	11,6667	0,5500	0,1167	0,1669	40027	75,00	16,18	0,75	0,1618	0,2313
10059	81,4815	18,5185	0,8148	0,1852	0,2648	40028	91,67	0,00	0,92	0,0000	0,0003
10060	43,7500	12,5000	0,4375	0,1250	0,1787	40029	70,97	9,68	0,71	0,0968	0,1385
10061	57,8947	10,5263	0,5789	0,1053	0,1506	40030	50,00	18,84	0,50	0,1884	0,2693
10065	16,6667	25,0000	0,1667	0,2500	0,3572	40031	76,43	11,43	0,76	0,1143	0,1635
10066	16,6667	33,3333	0,1667	0,3333	0,4762	40032	55,85	22,68	0,56	0,2268	0,3242
10067	0,0000	33,3333	0,0000	0,3333	0,4762	40033	67,50	15,00	0,68	0,1500	0,2145
10068	44,4444	22,2222	0,4444	0,2222	0,3176	40034	56,15	22,71	0,56	0,2271	0,3247
10069	0,0000	16,6667	0,0000	0,1667	0,2381	40035	67,44	2,33	0,67	0,0233	0,0334
10071	46,8750	12,5000	0,4688	0,1250	0,1787	40036	64,22	11,93	0,64	0,1193	0,1706
10072	62,5000	31,2500	0,6250	0,3125	0,4466	40037	52,38	21,69	0,52	0,2169	0,3101
10073	47,3684	12,0301	0,4737	0,1203	0,1720	40038	72,48	10,74	0,72	0,1074	0,1536
10074	48,1172	16,7364	0,4812	0,1674	0,2393	40039	70,37	9,26	0,70	0,0926	0,1325
10077	52,3810	14,2857	0,5238	0,1429	0,2043	40040	74,73	7,69	0,75	0,0769	0,1101
10078	0,0000	40,0000	0,0000	0,4000	0,5714	40041	62,50	12,50	0,63	0,1250	0,1788

Table 4.3
Table of Wealth Index

Quarters	1. House	2. House	Percentages of Questions		Wealth Index	Quarters	1. House	2. House	Percentages of Questions		Wealth Index
10079	22,2222	11,1111	0,2222	0,1111	0,1588	40042	85,71	6,25	0,86	0,0625	0,0896
10080	52,9412	8,8235	0,5294	0,0882	0,1262	40043	55,78	21,09	0,56	0,2109	0,3014
10081	20,0000	30,0000	0,2000	0,3000	0,4286	50001	52,13	18,48	0,52	0,1848	0,2642
10082	36,8421	28,9474	0,3684	0,2895	0,4137	50002	52,56	8,97	0,53	0,0897	0,1284
10083	51,5152	12,1212	0,5152	0,1212	0,1733	50003	67,11	10,53	0,67	0,1053	0,1506
10084	75,0000	26,8519	0,7500	0,2685	0,3838	50004	63,33	6,67	0,63	0,0667	0,0954
10085	47,0588	11,7647	0,4706	0,1176	0,1682	50005	52,67	18,32	0,53	0,1832	0,2619
10086	50,0000	0,0000	0,5000	0,0000	0,0002	50006	34,78	15,22	0,35	0,1522	0,2175
10088	41,1765	17,6471	0,4118	0,1765	0,2522	50007	54,41	14,71	0,54	0,1471	0,2103
10089	76,4706	2,9412	0,7647	0,0294	0,0423	50008	54,88	18,29	0,55	0,1829	0,2615
10090	39,5833	10,4167	0,3958	0,1042	0,1489	50009	73,39	8,87	0,73	0,0887	0,1270
10092	33,3333	33,3333	0,3333	0,3333	0,4763	50010	63,04	13,04	0,63	0,1304	0,1865
10094	34,6154	19,2308	0,3462	0,1923	0,2748	50011	61,64	9,59	0,62	0,0959	0,1372
10096	15,0000	15,0000	0,1500	0,1500	0,2143	50012	46,94	12,24	0,47	0,1224	0,1751
10097	21,9512	9,7561	0,2195	0,0976	0,1394	50013	13,73	29,41	0,14	0,2941	0,4202
10098	38,4615	15,3846	0,3846	0,1538	0,2199	50014	50,36	19,42	0,50	0,1942	0,2777
10099	42,6087	10,4348	0,4261	0,1043	0,1492	50015	57,25	16,03	0,57	0,1603	0,2292
10101	0,0000	33,3333	0,0000	0,3333	0,4762	50016	79,55	9,09	0,80	0,0909	0,1301
10102	32,0000	4,0000	0,3200	0,0400	0,0572	50017	74,29	4,76	0,74	0,0476	0,0683
10103	46,1538	7,6923	0,4615	0,0769	0,1100	50018	60,61	12,12	0,61	0,1212	0,1734
10104	60,0000	20,0000	0,6000	0,2000	0,2859	50019	83,56	10,96	0,84	0,1096	0,1568
10107	28,5714	10,7143	0,2857	0,1071	0,1532	50020	70,00	10,67	0,70	0,1067	0,1526
10108	29,1667	12,5000	0,2917	0,1250	0,1787	50021	71,79	6,41	0,72	0,0641	0,0918
10109	50,0000	0,0000	0,5000	0,0000	0,0002	50022	44,14	14,41	0,44	0,1441	0,2061
10110	55,7377	8,1967	0,5574	0,0820	0,1173	50023	54,17	13,33	0,54	0,1333	0,1907
10111	23,0769	15,3846	0,2308	0,1538	0,2199	50024	64,21	7,37	0,64	0,0737	0,1055
10112	69,5652	4,3478	0,6957	0,0435	0,0623	50025	57,58	4,55	0,58	0,0455	0,0651
10113	46,4789	9,8592	0,4648	0,0986	0,1410	50026	64,10	12,82	0,64	0,1282	0,1834
10114	32,0755	24,5283	0,3208	0,2453	0,3505	50027	49,02	5,88	0,49	0,0588	0,0842
10115	39,4737	14,4737	0,3947	0,1447	0,2069	50028	57,14	11,43	0,57	0,1143	0,1635
10116	33,3333	20,0000	0,3333	0,2000	0,2858	50029	57,14	4,76	0,57	0,0476	0,0682
20001	57,6923	26,9231	0,5769	0,2692	0,3848	50030	70,97	19,35	0,71	0,1935	0,2767
20002	45,3608	29,8969	0,4536	0,2990	0,4272	50031	57,14	23,21	0,57	0,2321	0,3318
20003	41,1765	14,7059	0,4118	0,1471	0,2102	50032	70,49	3,28	0,70	0,0328	0,0471
20005	56,9231	10,7692	0,5692	0,1077	0,1540	50033	72,06	13,24	0,72	0,1324	0,1893
20006	64,9123	12,2807	0,6491	0,1228	0,1757	50034	58,70	10,87	0,59	0,1087	0,1555
20007	50,0000	27,9412	0,5000	0,2794	0,3993	50035	64,10	14,10	0,64	0,1410	0,2017
20008	61,1898	36,8272	0,6119	0,3683	0,5263	50036	67,33	9,96	0,67	0,0996	0,1425
20009	66,0287	42,1053	0,6603	0,4211	0,6017	50037	53,49	9,30	0,53	0,0930	0,1331
20010	37,5000	8,3333	0,3750	0,0833	0,1192	50038	52,89	17,36	0,53	0,1736	0,2481
20011	57,5510	34,2857	0,5755	0,3429	0,4900	50039	50,00	17,35	0,50	0,1735	0,2480
20012	58,5185	24,4444	0,5852	0,2444	0,3494	50040	75,00	8,33	0,75	0,0833	0,1193
20013	51,0101	25,2525	0,5101	0,2525	0,3609	50041	70,00	18,00	0,70	0,1800	0,2574
20014	60,2837	39,7163	0,6028	0,3972	0,5676	50042	54,55	9,09	0,55	0,0909	0,1301
20015	70,2128	17,0213	0,7021	0,1702	0,2434	50043	62,12	15,15	0,62	0,1515	0,2167
20016	46,8085	43,2624	0,4681	0,4326	0,6182	50044	63,16	12,28	0,63	0,1228	0,1756
20017	60,0000	28,1818	0,6000	0,2818	0,4028	50045	49,47	15,79	0,49	0,1579	0,2257
20018	67,3913	10,8696	0,6739	0,1087	0,1555	50046	58,88	10,28	0,59	0,1028	0,1471
20020	44,9541	30,2752	0,4495	0,3028	0,4327	50047	73,91	21,74	0,74	0,2174	0,3108
20021	62,8788	47,7273	0,6288	0,4773	0,6820	50048	54,55	9,09	0,55	0,0909	0,1301
20022	52,5000	17,5000	0,5250	0,1750	0,2502	50049	86,67	0,00	0,87	0,0000	0,0003
20023	57,1429	28,5714	0,5714	0,2857	0,4084	50050	70,69	12,07	0,71	0,1207	0,1726
20024	37,7778	29,4444	0,3778	0,2944	0,4208	60001	41,07	24,11	0,41	0,2411	0,3445
20025	40,6250	6,2500	0,4063	0,0625	0,0894	60002	54,36	11,28	0,54	0,1128	0,1614
20026	54,8387	20,9677	0,5484	0,2097	0,2997	60003	44,12	11,76	0,44	0,1176	0,1682
20027	56,2500	18,7500	0,5625	0,1875	0,2680	60004	46,15	21,54	0,46	0,2154	0,3078
20028	51,6796	31,5245	0,5168	0,3152	0,4505	60005	43,75	13,28	0,44	0,1328	0,1899
20029	54,8387	24,1935	0,5484	0,2419	0,3458	60006	66,67	11,11	0,67	0,1111	0,1590
20030	47,5000	30,0000	0,4750	0,3000	0,4287	60007	49,32	11,49	0,49	0,1149	0,1643
20034	40,5405	37,8378	0,4054	0,3784	0,5407	70001	38,95	11,58	0,39	0,1158	0,1655
20035	60,0000	45,8824	0,6000	0,4588	0,6557	70002	72,83	28,26	0,73	0,2826	0,4040

Table 4.3
Table of Wealth Index

Quarters	1. House	2. House	Percentages of Questions		Wealth Index	Quarters	1. Hous	2. House	Percentages of Questions		Wealth Index
20036	70,9091	9,0909	0,7091	0,0909	0,1301	70003	86,21	6,90	0,86	0,0690	0,0988
20037	60,9756	44,3902	0,6098	0,4439	0,6343	70004	69,77	23,26	0,70	0,2326	0,3325
20038	58,3333	41,6667	0,5833	0,4167	0,5954	70005	40,32	25,81	0,40	0,2581	0,3688
20039	52,0900	20,5788	0,5209	0,2058	0,2942	70006	62,30	9,02	0,62	0,0902	0,1290
20040	51,2195	19,5122	0,5122	0,1951	0,2789	70007	53,52	16,90	0,54	0,1690	0,2416
20041	46,7742	9,6774	0,4677	0,0968	0,1384	70008	32,61	19,57	0,33	0,1957	0,2796
20042	46,6667	22,2222	0,4667	0,2222	0,3176	70009	47,22	19,44	0,47	0,1944	0,2779
20043	58,5987	26,1146	0,5860	0,2611	0,3733	70010	63,75	11,25	0,64	0,1125	0,1609
20044	75,6757	8,1081	0,7568	0,0811	0,1161	70011	52,11	19,01	0,52	0,1901	0,2718
20045	49,2308	16,9231	0,4923	0,1692	0,2419	70012	54,24	23,62	0,54	0,2362	0,3376
20046	55,1237	18,7279	0,5512	0,1873	0,2677	70013	50,66	18,50	0,51	0,1850	0,2645
20047	55,4795	33,5616	0,5548	0,3356	0,4796	70014	53,19	23,40	0,53	0,2340	0,3345
20048	37,0000	45,0000	0,3700	0,4500	0,6430	70015	50,46	15,12	0,50	0,1512	0,2161
20049	57,2917	13,5417	0,5729	0,1354	0,1936	70016	61,02	26,27	0,61	0,2627	0,3755
20050	73,0769	5,1282	0,7308	0,0513	0,0735	70017	31,58	24,56	0,32	0,2456	0,3510
20051	61,2903	45,1613	0,6129	0,4516	0,6454	70018	44,44	18,06	0,44	0,1806	0,2581
20052	46,8750	21,8750	0,4688	0,2188	0,3127	70019	66,22	9,46	0,66	0,0946	0,1354
20053	50,0000	45,0000	0,5000	0,4500	0,6430	70020	46,77	9,68	0,47	0,0968	0,1384
20054	29,1667	33,3333	0,2917	0,3333	0,4763	70021	39,13	27,54	0,39	0,2754	0,3935
20055	59,0164	31,1475	0,5902	0,3115	0,4452	70022	77,78	11,11	0,78	0,1111	0,1590
20056	45,4545	37,6623	0,4545	0,3766	0,5382	70023	69,33	6,67	0,69	0,0667	0,0955
20057	53,8462	12,8205	0,5385	0,1282	0,1833	70024	41,32	20,36	0,41	0,2036	0,2910
20058	49,7076	35,0877	0,4971	0,3509	0,5014	70025	55,56	9,52	0,56	0,0952	0,1362
20059	55,9524	36,9048	0,5595	0,3690	0,5274	70026	59,38	15,63	0,59	0,1563	0,2234
20060	73,9130	34,7826	0,7391	0,3478	0,4971	70027	60,53	10,53	0,61	0,1053	0,1506
20061	55,0000	25,0000	0,5500	0,2500	0,3573	70028	51,30	19,13	0,51	0,1913	0,2735
20062	55,2239	29,8507	0,5522	0,2985	0,4266	70029	65,59	10,75	0,66	0,1075	0,1538
20063	55,0459	22,0183	0,5505	0,2202	0,3147	70030	38,78	10,20	0,39	0,1020	0,1459
20064	35,0000	32,5000	0,3500	0,3250	0,4644	70031	65,38	26,92	0,65	0,2692	0,3848
20065	62,5000	13,8889	0,6250	0,1389	0,1986	70032	61,90	16,67	0,62	0,1667	0,2383
20066	57,6087	18,4783	0,5761	0,1848	0,2642	70033	32,86	22,86	0,33	0,2286	0,3266
20067	9,0909	45,4545	0,0909	0,4545	0,6494	70034	60,29	19,12	0,60	0,1912	0,2733
20068	39,6552	45,6897	0,3966	0,4569	0,6528	70035	40,00	15,00	0,40	0,1500	0,2144
20070	50,8475	27,1186	0,5085	0,2712	0,3876	70036	52,82	19,01	0,53	0,1901	0,2718
20071	48,3871	23,6559	0,4839	0,2366	0,3381	70037	57,89	20,18	0,58	0,2018	0,2884
20072	55,7196	14,3911	0,5572	0,1439	0,2058	70607	50,00	16,67	0,50	0,1667	0,2383
20073	65,9091	40,9091	0,6591	0,4091	0,5846	MIN	0,00	0,00	0,00	0,0000	
20074	50,0000	50,0000	0,5000	0,5000	0,7145	MAX	100,00	100,00	1,00	1,0000	
20075	63,9640	13,5135	0,6396	0,1351	0,1933						

Table 4.5
Attribute Table of Quarters

ID	Quarter_name	District	Pop/	Kod_Pop	Rich_Index	Cons_exp	Market
1	Kent Koop	YENIMAHALLE	29040	0	216	53	1539120
2	Mesrutiyet Mah	CANKAYA	1142	20060	497	90	102780
3	Y ⁿ cetepe Mah	CANKAYA	7171	20085	410	90	645390
4	Mebusevleri- Anitkab	CANKAYA	5639	20059	527	90	507510
5	Namik Kemal Mah	CANKAYA	1617	20067	649	90	145530
6	Kizilay Mah	CANKAYA	2539	20051	645	90	228510
7	Y.bahcelievler Mah	CANKAYA	19061	20084	490	90	1715490
8	Kocatepe Mah	CANKAYA	1210	20053	643	90	108900
9	Cumhuriyet Mah	CANKAYA	215	20019	714	90	19350
10	Fidanlik Mah	CANKAYA	1866	20034	540	90	167940
11	Saglik Mah	CANKAYA	824	20074	714	90	74160
12	Kavaklidere Mah	CANKAYA	9088	20047	479	90	817920
13	Esatoglu Mah	CANKAYA	4553	20031	498	90	409770
14	Tinaztepe Mah	CANKAYA	7577	20079	403	90	681930
15	Seyran Mah	CANKAYA	9200	20076	500	90	828000
16	Dogus Mah	CANKAYA	3614	20028	450	90	325260
17	Zafertepe Mah	CANKAYA	3988	20087	269	60	239280
18	G ⁺ kt ^{rk} Mah	CANKAYA	3310	0	451	90	297900
19	||zg ^r rk - Metin Okt	CANKAYA	5135	0	212	53	272155
20	Umut Mah	CANKAYA	9121	20081	270	60	547260
21	Asikpasa Mah	CANKAYA	4940	20005	154	40	197600
22	Mimarsinan Mah	CANKAYA	3273	0	249	53	173469
23	Arkatopraklik Mah	CANKAYA	3183	20003	210	53	168699
24	Dilekler Mah	CANKAYA	2130	20025	89	36	76680
25	Sehit Cengiz Topel M	MAMAK	5440	50042	130	36	195840
26	Ellinci Yil Mah	CANKAYA	2095	20027	268	60	125700
27	||amlitepe Mah	CANKAYA	7653	20020	432	90	688770
28	Fak ^{lt} eler Mah	CANKAYA	6753	20033	503	90	607770
29	Ertugrulgazi Mah	CANKAYA	8582	20029	345	60	514920
30	Cebeci Mah	CANKAYA	7446	20017	402	90	670140
31	Abidinpasa Mah	MAMAK	15591	50001	264	60	935460
32	Asik Veysel Mah	MAMAK	12053	50005	261	53	638809
33	Kartaltepe Mah	MAMAK	5423	50029	68	36	195228
34	Mehtap Mah	MAMAK	5279	50034	155	40	211160
35	||aglayan Mah	MAMAK	3092	50012	175	40	123680
36	Tuzlurayir Mah	MAMAK	9325	50045	225	53	494225
37	Akdere Mah	MAMAK	8999	50002	128	36	323964
38	Peyami Sefa Mah	MAMAK	8550	50037	133	36	307800
39	Kazim Orbay Mah	MAMAK	5656	50031	331	60	339360
40	Barbaros Mah	CANKAYA	7304	20014	567	90	657360
41	Remzi Oguz Arik Mah	CANKAYA	6523	20073	584	90	587070
43	Aziziye Mah	CANKAYA	12769	20009	601	90	1149210
44	G ⁿ zeltepe Mah	CANKAYA	6090	20038	595	90	548100
45	Yildizevler Mah	CANKAYA	11869	20083	277	60	712140
46	Naci ||akir Mah	CANKAYA	10584	20066	264	60	635040
47	Osman Temiz Mah	CANKAYA	8637	20070	387	90	777330
48	M ^r rsel Ulur Mah	CANKAYA	12711	20065	198	53	673683
49	Ilker Mah	CANKAYA	4051	20044	116	36	145836
50	Metin Akkus Mah	CANKAYA	4152	20061	357	60	249120
51	Nasuh Akar Mah	CANKAYA	4713	0	408	90	424170
52	Balgat Mah	CANKAYA	6887	20013	360	60	413220
53	Emek Mah	CANKAYA	26262	20028	450	90	2363580
54	Kizilirmak Mah	CANKAYA	4036	20052	312	60	242160
55	Senyuva - Bestepeler	YENIMAHALLE	10343	70005	368	60	620580

Table 4.5 (cont'd)
Attribute Table of Quarters

ID	Quarter name	District	Population	Kod Pop	Rich Index	Cons exp	Market
56	||ukuranbar Mah	CANKAYA	5271	20022	250	53	279363
57	S+g ¹ t+z ² Mah	CANKAYA	5079	0	360	60	304740
58	Oguzlar Mah	CANKAYA	9482	0	300	60	568920
59	Ehlibeyt Mah	CANKAYA	3385	0	250	53	179405
60	Bahrelievler Mah	CANKAYA	15807	20011	489	90	1422630
61	Anittepe Mah	CANKAYA	6396	20002	427	90	575640
62	Eti Mah	CANKAYA	1232	20032	595	90	110880
63	lk ^a Mah	ALTINDAG	1110	10101	476	90	99900
64	Akk+pr ^a Mah	ALTINDAG	160	10004	219	53	8480
65	Emniyet Mah	YENIMAHALLE	7182	70014	334	60	430920
66	ncebeci Mah	CANKAYA	6119	20071	0	36	220284
67	K ² lr Mah	CANKAYA	4526	20056	538	90	407340
68	Incesu Mah	CANKAYA	4522	20045	241	53	239666
69	Ileri Mah	CANKAYA	5968	20042	317	60	358080
70	Topraklik Mah	CANKAYA	1867	20080	230	53	98951
71	Erzurum Mah	ALTINDAG	0	20030	428	90	0
72	Demirli Bahre Mah	MAMAK	12711	50014	277	60	762660
73	Balkiraz Mah	MAMAK	12214	50008	261	53	647342
74	Saimekadin Mah	MAMAK	9781	50038	248	53	518393
75	Safaktepe Mah	MAMAK	8405	50039	247	53	445465
76	H ² rel Mah	MAMAK	4385	50026	183	40	175400
77	Harman Mah	MAMAK	5000	50025	65	36	180000
78	H ² seyingazi Mah	MAMAK	4544	50027	84	36	163584
79	Misket Mah	MAMAK	6072	50035	201	53	321816
80	Altiagar Mah	MAMAK	7347	50003	150	40	293880
81	Bahreleri Mah	MAMAK	4767	50006	217	53	252651
82	Derbent Mah	MAMAK	11016	50015	229	53	583848
83	Dutluk Mah	MAMAK	5601	50018	173	40	224040
84	Sirintepe Mah	MAMAK	5521	50043	216	53	292613
85	Sahintepe Mah	MAMAK	8357	50041	257	53	442921
86	Bogazici Mah	MAMAK	5049	50009	126	36	181764
87	regil Mah	MAMAK	2273	50047	310	60	136380
88	Aksemsettin Mah	MAMAK	7930	0	97	36	285480
89	Durali Alir Mah	MAMAK	10897	50017	68	36	392292
90	Fahri Korut ² rk Mah	MAMAK	7457	50021	91	36	268452
91	General Zeki Dogan M	MAMAK	11472	50022	206	53	608016
92	Ege Mah	MAMAK	8511	50019	156	40	340440
93	Cengizhan Mah	MAMAK	7286	50011	137	40	174864
94	Yukari Imrahor Mah	MAMAK	402	50051	83	36	14472
95	Demirtas Mah	ALTINDAG	545	10030	612	90	49050
96	S ² mer Mah	ALTINDAG	376	10092	476	90	33840
97	Meydan Mah	ALTINDAG	705	10066	476	90	63450
98	G ² ndogdu Mah	ALTINDAG	2179	10047	357	60	130740
99	Turan Mah	ALTINDAG	1432	10096	214	53	75896
100	Akalar Mah	ALTINDAG	999	10002	317	60	59940
101	Alparslan Mah	ALTINDAG	800	10008	184	40	32000
102	Oguz Mah	ALTINDAG	234	10070	714	90	21060
103	Arbas Mah	ALTINDAG	893	10003	259	53	47329
104	Sakarya Mah	ALTINDAG	2127	10082	413	90	191430
105	S ² kriye Mah	ALTINDAG	3494	10094	274	60	209640
106	zбекler Mah	ALTINDAG	297	10075	357	60	17820
107	kekme Mah	ALTINDAG	510	10027	317	60	30600
108	Nazimbey Mah	ALTINDAG	708	10068	317	60	42480
109	Baskir Mah	ALTINDAG	1079	10021	84	36	38844

Table 4.5 (cont'd)
Attribute Table of Quarters

ID	Quarter_name	District	Population	Kod_Pop_9	Rich_Index	Cons_exp	Market
110	Pazar Mah	ALTINDAG	577	10079	158	40	23080
111	Kilicarslan Mah	ALTINDAG	76	10062	74	36	2736
112	Sutepe Mah	ALTINDAG	18	10091	0	36	648
113	Demirfirka Mah	ALTINDAG	574	10029	119	36	20664
114	Yeni Hayat Mah	ALTINDAG	1944	10107	153	40	77760
115	Yalrıkaya Mah	ALTINDAG	1758	10102	57	36	63288
116	Siginaklar Mah	ALTINDAG	1350	10085	168	40	54000
117	Yamar Mah	ALTINDAG	1162	10103	110	36	41832
118	Tabakhane Mah	ALTINDAG	176	10095	206	53	9328
119	Fatih Mah	ALTINDAG	2148	10039	110	36	77328
120	Yavuz Selim Mah	ALTINDAG	718	10104	285	60	43080
121	Sokollu Mah	ALTINDAG	1428	10088	252	53	75684
122	Aktas Mah	ALTINDAG	1606	10005	53	36	57816
123	Cemal Bey Mah	ALTINDAG	3632	10023	68	36	130752
124	Atilla Mah	ALTINDAG	2873	10014	154	40	114920
125	Hıriyet Mah	ALTINDAG	1500	10051	195	53	79500
126	ırgırk Mah	ALTINDAG	1424	10077	204	53	75472
127	Sinanpasa Mah	ALTINDAG	1229	10086	0	36	44244
128	Hayri Artmanlar Mah	ALTINDAG	1939	10050	110	36	69804
129	Orhangazi Mah	ALTINDAG	2474	10071	178	40	98960
130	Kartallar Mah	ALTINDAG	1328	10060	178	40	53120
131	ıandarli Mah	ALTINDAG	1072	10026	0	36	38592
132	ıncıler Mah	ALTINDAG	1261	10072	446	90	113490
133	Yilmazlar Mah	ALTINDAG	923	10111	219	53	48919
134	Altintas Mah	ALTINDAG	47	10011	141	40	1880
135	ıztırk Mah	ALTINDAG	398	10078	142	40	15920
136	Anafartalar Mah	ALTINDAG	129	10012	293	60	7740
137	Necatibey Mah	ALTINDAG	466	10069	238	53	24698
138	Senyurt Mah	ALTINDAG	160	10093	234	53	8480
139	Kızıhelma Mah	ALTINDAG	214	10063	217	53	11342
140	Misaki Milli Mah	ALTINDAG	177	10067	476	90	15930
141	Istiklal Mah	ALTINDAG	677	10056	158	40	27080
142	ızgen Mah	ALTINDAG	108	10076	256	53	5724
143	Sakalar Mah	ALTINDAG	398	10081	428	90	35820
144	Bahrelerıstı Mah	MAMAK	4198	50007	210	53	222494
145	Gıveren Mah	MAMAK	6859	50024	105	36	246924
146	Gıseren Mah	MAMAK	3639	50023	190	40	145560
147	Yatik Musluk Mah	MAMAK	5624	50048	130	36	202464
148	Siteler Mah	ALTINDAG	190	10087	264	60	11400
149	ıaliskanlar Mah	ALTINDAG	6789	10024	185	40	271560
150	Seyfi Demirsoy Mah	ALTINDAG	7363	10084	383	90	662670
151	Ali Ersoy Mah	ALTINDAG	7805	10007	230	53	413665
152	Yunusemre Mah	ALTINDAG	5229	10113	141	40	209160
153	Yildiztepe Mah	ALTINDAG	10473	10110	117	36	377028
154	Karakum Mah	ALTINDAG	5445	10058	166	40	217800
155	Gılpınar Mah	ALTINDAG	7777	10045	79	36	279972
156	Dođu Mah	ALTINDAG	4202	10035	84	36	151272
157	Dereboyu Mah	ALTINDAG	904	10031	595	90	81360
158	Yesilız Mah	KECIOREN	4662	40039	132	36	167832
159	ıaldıran Mah	KECIOREN	6337	40009	133	36	228132
160	Kamil Ocak Mah	KECIOREN	15234	40020	195	53	807402

Table 4.5 (cont'd)
Attribute Table of Quarters

ID	Quarter name	District	Population	Kod_Pop_9	Rich_Index	Cons_exp	Market
161	Sevkat Mah	KECIOREN	16877	40030	269	60	1012620
162	G'nesevler Mah	ALTINDAG	8808	10048	185	40	352320
163	Altinpark Mah	ALTINDAG	5027	10010	391	90	452430
164	Ahiler Mah	ALTINDAG	8899	10001	285	60	533940
165	Aydinlikevler Mah	ALTINDAG	15118	10015	392	90	1360620
170	Basinevleri Mah	KECIOREN	15214	40008	218	53	806342
171	G'm'sdere Mah	KECIOREN	2428	40015	336	60	145680
172	Altinbas Mah	ALTINDAG	181	10009	196	53	9593
173	K+pr'basi Mah	ALTINDAG	1613	10065	357	60	96780
174	Inkilap Mah	ALTINDAG	429	10053	285	60	25740
175	Fevzi Pasa Mah	ALTINDAG	917	10043	0	36	33012
176	Doganbey Mah	ALTINDAG	329	10032	357	60	19740
177	Bozkurt Mah	ALTINDAG	186	10022	109	36	6696
178	Evlilya ||elebi Mah	ALTINDAG	2886	10038	198	53	152958
179	Yeni Turan Mah	ALTINDAG	443	10108	178	40	17720
180	Z'beyde Hanim Mah	ALTINDAG	11501	10115	206	53	609553
181	Gazi Mah	YENIMAHALLE	6610	70018	360	60	396600
182	G'ltepe Mah - Asri M	ALTINDAG	4361	10046	58	36	156996
183	||rnekk Mah	ALTINDAG	17166	10074	239	53	909798
184	Fermanlilar Mah	ALTINDAG	963	10116	285	60	57780
185	Enver Pasa Mah	ALTINDAG	797	10037	119	36	28692
186	Atifbey Mah	ALTINDAG	870	10013	714	90	78300
187	Yildirim Beyazit Mah	ALTINDAG	967	10109	0	36	34812
188	Fazilet Mah	ALTINDAG	2479	10041	178	40	99160
189	G+kren Efe Mah	ALTINDAG	1426	10044	248	53	75578
190	Eng'm Mah	ALTINDAG	1534	10036	143	40	61360
191	Kemal Zeytinoglu Mah	ALTINDAG	1276	10061	150	40	51040
192	Dogansehir Mah	ALTINDAG	2108	10033	197	53	111724
193	G'r'lkaya Mah	KECIOREN	18524	40014	209	53	981772
194	Tepebasi Mah	KECIOREN	27076	40034	324	60	1624560
195	Yakacik Mah	KECIOREN	17074	40037	310	60	1024440
196	Ondokuz Mayıs Mah	KECIOREN	27403	40026	323	60	1644180
197	||irekli Mah	KECIOREN	11728	40010	227	53	621584
198	Isinlar Mah	YENIMAHALLE	8567	70021	393	90	771030
201	Tepealti Mah	YENIMAHALLE	5235	70030	145	40	209400
202	Baris Mah	YENIMAHALLE	3174	70004	332	60	190440
203	Esentepe Mah	YENIMAHALLE	6845	70017	350	60	410700
204	||arsi Mah	YENIMAHALLE	4195	70008	279	60	251700
205	Yenitag Mah	YENIMAHALLE	3588	70035	214	53	190164
206	||erri Deresi Mah (Ga	YENIMAHALLE	8790	70009	277	60	527400
207	Ayval Mah	KECIOREN	32209	40005	190	40	1288360
208	Pamuklar Mah	YENIMAHALLE	8002	70029	153	40	320080
209	Etluk Mah	KECIOREN	37039	40013	324	60	2222340
210	Yayla Mah	KECIOREN	14359	40038	153	40	574360
211	Asagi Eglence Mah	KECIOREN	30201	40003	422	90	2718090
212	Varlik Mah	YENIMAHALLE	4378	70032	238	53	232034
213	Emrah Mah	KECIOREN	15481	40011	231	53	820493
214	Baglarbasi Mah	KECIOREN	21487	40007	211	53	1138811
215	Aktepe Mah	KECIOREN	4876	40002	253	53	258428
216	Adnan Menderes Mah	KECIOREN	10999	40001	162	40	439960
217	G'izelyurt Mah	KECIOREN	2591	40016	47	36	93276
218	K+sk Mah	KECIOREN	7257	40024	214	53	384621
219	Yirmi ||t Nisan Mah	KECIOREN	5023	40041	178	40	200920

Table 4.5 (cont'd)
Attribute Table of Quarters

ID	Quarter_name	District	Population	Kod_Pop_9	Rich_Index	Cons_exp	Market
220	Senlik Mah	KECIOREN	30768	40032	324	60	1846080
221	Kucaz Mah	KECIOREN	15899	40025	167	40	635960
222	Incirli Mah	KECIOREN	27603	40018	244	53	1462959
223	Esertepe Mah	KECIOREN	17919	40012	176	40	716760
224	Atapark Mah	KECIOREN	13882	40004	149	40	555280
225	Ufuktepe Mah	KECIOREN	5115	40035	33	36	184140
226	Pinarbasi Mah	KECIOREN	33137	40043	301	60	1988220
227	Uyanis Mah	KECIOREN	10479	40036	170	40	419160
228	Bademlik Mah	KECIOREN	8708	40006	262	60	304780
229	Osmangazi Mah	KECIOREN	7674	40027	231	53	406722
230	Senyuva Mah	KECIOREN	3979	40033	214	53	210887
231	Yesiltepe Mah	KECIOREN	8384	40040	110	36	301824
232	Baraj Mah	ALTINDAG	18247	10017	119	36	656892
233	Dogantepe Mah	ALTINDAG	18049	10034	169	40	721960
234	Ulubey Mah	ALTINDAG	9789	10099	149	40	391560
235	Anayurt Mah	MAMAK	7693	0	149	40	307720
236	Yender Mah	ALTINDAG	10688	10073	172	40	427520
237	Yeniltepe Mah	MAMAK	2777	50013	138	40	111080
238	Ptt Evleri Mah	MAMAK	698	0	131	36	25128
239	Hacilar Mah	ALTINDAG	12533	10049	208	53	664249
240	Baspinar Mah	ALTINDAG	20713	10019	131	36	745668
241	Alemdag Mah	ALTINDAG	9089	10006	204	53	481717
242	Battalgazi Mah	ALTINDAG	9282	10018	121	36	334152
243	Araplar Mah	MAMAK	2599	50004	95	36	93564
244	Kestence Mah	MAMAK	5708	50032	47	36	205488
245	Dostlar Mah	MAMAK	11021	50016	130	36	396756
246	Tepecik Mah	MAMAK	6857	50044	175	40	274280
247	Kayabask Mah	MAMAK	6858	50030	276	60	411480
248	Sahap Garleri Mah	MAMAK	9983	50040	119	36	359388
249	Yesilbayir Mah	MAMAK	12373	50050	172	40	494920
250	Kayabask Mah	MAMAK	8576	50033	189	40	343040
251	Yeni Bayindir Mah	MAMAK	3925	50049	0	36	141300
252	Yamlik Mah	ALTINDAG	7543	10025	214	53	399779
253	Ekin Mah	MAMAK	10247	50020	152	40	409880
254	Karaagar Mah	MAMAK	2777	50028	163	40	111080
255	Turkce Mah	MAMAK	9303	50046	147	40	372120
256	Boztepe Mah	CANKAYA	2401	20015	243	53	127253
257	Karakesat Mah	CANKAYA	3711	20055	445	90	333990
258	Muhsin Ertugrul Mah	CANKAYA	4211	20062	426	90	378990
259	Gaziosmanpasa Mah	CANKAYA	5038	20035	655	90	453420
260	Yankaya Mah	CANKAYA	10890	20021	682	90	980100
261	Hilal Mah	CANKAYA	3427	20040	278	60	205620
262	S. Mevlit Merit Mah	CANKAYA	6690	0	300	60	401400
263	Harbiye Mah	CANKAYA	24334	20039	294	60	1460040
264	Yuvetler Mah	CANKAYA	8190	20072	205	53	434070
265	S.cevdet Yzdemir Mah	CANKAYA	7088	20078	300	60	425280
266	S.cengiz Karaca Mah	CANKAYA	4470	20077	238	53	236910
267	Malazgirt Mah	CANKAYA	4012	20057	183	40	160480
268	Ata Mah	CANKAYA	5277	20006	175	40	211080
269	Huzur Mah	CANKAYA	14309	20041	138	40	572360

Table 4.5 (cont'd)
Attribute Table of Quarters

ID	Quarter name	District	Population	Kod_Pop	Rich_Index	Cons_exp	Market
270	Cevizlidere Mah	CANKAYA	7095	20018	155	40	283800
271	100.Yil Isci Bloklar	CANKAYA	20818	0	250	53	1103354
272	Yukari Evler Mah	CANKAYA	3045	0	150	40	121800
273	Asagi Evler Mah	CANKAYA	8516	0	150	40	340640
274	Sokullu Mehmet Pasa	CANKAYA	10789	0	294	60	647340
275	Ickale Mah	ALTINDAG	1545	10052	214	53	81885
276	Izzettin Mah	ALTINDAG	540	10057	0	36	19440
277	Yegenbey Mah	ALTINDAG	214	10105	158	40	8560
278	Yenice Mah	ALTINDAG	243	10106	276	60	14580
279	Keklikpinari Mah	CANKAYA	10823	20049	193	53	573619
280	Karapinar Mah	CANKAYA	2922	20088	158	40	116880
281	Gokkusagi Mah	CANKAYA	4322	20036	130	36	155592
282	Hamlica Mah	YENIMAHALLE	9361	70007	241	53	496133
283	Demetgazi Mah	YENIMAHALLE	27346	70012	337	60	1640760
284	Demetfale Mah	YENIMAHALLE	20543	70013	264	60	1232580
285	Demet Mah	YENIMAHALLE	33211	70011	271	60	1992660
286	Mehmet Akif Ersoy Ma	YENIMAHALLE	7402	70027	150	40	296080
287	Ostim Sanayi Sitesi	YENIMAHALLE	7281	0	170	40	291240
288	Karsiyaka Mah	YENIMAHALLE	13056	70024	290	60	783360
289	Yesilevler Mah	YENIMAHALLE	12184	70036	271	60	731040
290	Evler Mah	YENIMAHALLE	9075	70028	273	60	544500
291	Yahyalar Mah	YENIMAHALLE	6318	70034	273	60	379080
292	Yedigörmüş Mah	YENIMAHALLE	9047	70010	160	40	361880
293	Burt Mah	YENIMAHALLE	4961	70006	129	36	178596
294	Baristepe Mah	YENIMAHALLE	5836	0	99	36	210096
295	Görmüş Mah	YENIMAHALLE	6529	70019	135	36	235044
298	Görmüş Mah	YENIMAHALLE	5229	70020	138	40	209160
299	Kayalar Mah	YENIMAHALLE	5380	70025	136	36	193680
300	Kaletepe Mah	YENIMAHALLE	7056	70023	95	36	254016
301	Sancaktepe Mah	KECIOREN	8603	40029	138	40	344120
302	Kanuni Mah	KECIOREN	10818	40021	137	40	259632
303	Ugur Mumcu (Zg) Ma	YENIMAHALLE	21924	0	220	53	1161972
304	Macun Mah	YENIMAHALLE	2638	70026	223	53	139814
305	Akpinar Mah	CANKAYA	4983	20001	384	90	448470
306	Sancak Mah	CANKAYA	18137	20075	193	53	961261
307	Yedigörmüş Mah	CANKAYA	7109	20086	483	90	639810
308	Kazim Karabekir Mah	CANKAYA	6283	20048	642	90	565470
309	B.Esat Mah	CANKAYA	9257	20016	618	90	833130
310	Bagcilar Mah	CANKAYA	1942	20010	119	36	69912
311	Kirkkonaklar Mah	CANKAYA	9055	20050	73	36	325980
312	Ayranci Mah	CANKAYA	20525	20008	526	90	1847250
313	Devlet Mah	CANKAYA	14669	20023	408	90	1320210
314	Ilkadam Mah	50	12938	20043	373	90	1164420
315	Asagi Dikmen Mah	50	9721	20024	420	90	874890
316	Oran Mah	CANKAYA	11200	20068	652	90	1008000
317	Birlik Mah	CANKAYA	22354	20012	349	60	1341240
318	Kardelen Mah	YENIMAHALLE	21703	0	220	53	1150259
319	Bati Sitesi Mah	YENIMAHALLE	13782	0	325	60	826920
320	Bahrekapi Mah	ETIMESGUT	8399	30001	400	90	755910
321	Feridun Celik Mah	ALTINDAG	18526	10042	117	36	666936
322	Besikkaya Mah	ALTINDAG	13727	10020	118	36	494172
323	Istasyon Mah	ETIMESGUT	8628	30005	457	90	776520
324	Etiler Mah	ETIMESGUT	4336	0	325	60	260160
325	Kazim Karabekir Mah	ETIMESGUT	12117	30006	223	53	642201
326	Onuz Agustos Mah	ETIMESGUT	9441	30007	194	53	500373
327	Sivri Mah	ETIMESGUT	5773	30009	219	53	305969
328	Piyade Mah	ETIMESGUT	8398	30008	234	53	445094
329	Elvan Mah	ETIMESGUT	8023	30002	476	90	722070
330	Topcu Mah	ETIMESGUT	25486	30010	178	40	1019440
331	Maresal Akmak Mah	SINCAN	78471	60005	189	40	3138840

Table 4.5 (cont'd)
Attribute Table of Quarters

ID	Quarter name	District	Population	Kod Pop	Rich Index	Cons_exp	Market
332	Atatrk Mah	SINCAN	25101	60001	344	60	1506060
333	Tandogan Mah	SINCAN	12753	60009	136	36	459108
334	Istasyon Mah	SINCAN	15948	60004	307	60	956880
335	Ulubatli Hasan Mah	SINCAN	19327	60010	87	36	695772
336	Bademlidere Mah	CANKAYA	1769	0	145	40	70760
337	Fatih Mah	SINCAN	17552	60002	161	40	702080
338	Gazi Osman Pasa	SINCAN	31848	60003	168	40	1273920
339	Birinci Sultan Murat	ALTINDAG	3266	10090	148	40	130640
340	Plevne Mah	ALTINDAG	2385	10080	126	36	85860
341	Server Somuncuoglu M	ALTINDAG	4336	10083	173	40	173440
342	Inonu Mah	YENIMAHALLE	20139	0	220	53	1067367
343	Ergazi Mah	YENIMAHALLE	17160	70015	216	53	909480
344	Kutlu Mah	MAMAK	7676	0	206	53	406828
345	Mutlu Mah	MAMAK	17368	50036	142	40	694720
347	Asagi Imrahor	CANKAYA	165	20004	138	40	6600
348	Orta Imrahor	CANKAYA	583	20069	87	36	20988
349	Emiryaman Mah	ETIMESGUT	16861	30003	371	90	1517490
350	Plevne Mah	SINCAN	44710	60007	164	40	1788400
351	Pinarbasi Mah	SINCAN	13172	60006	158	40	526880
352	Sanayi Sitesi Mah(At	SINCAN	4867	0	231	53	257951
353	Sazpinari	SINCAN	8732	60008	286	60	523920
354	Yesilkent (muhye) Ma	CANKAYA	812	20082	154	40	32480
355	Ortadogu Mah	CANKAYA	19760	0	450	90	1778400
356	Karakusunlar Mah	CANKAYA	12898	20046	267	60	773880
358	ayyolu Mah.	CANKAYA	8771	0	550	90	789390
359	mitkoy Mah	YENIMAHALLE	7532	70031	384	90	677880
360	Bahrekapi Mah	ETIMESGUT	8399	30001	1000	90	755910
361	Erler Mah	ETIMESGUT	16235	30004	450	90	1461150
362	Yeni Bati Mah	YENIMAHALLE	17028	0	270	60	1021680
363	Murat Mah	CANKAYA	4463	20063	314	60	267780
364	Bayraktar	CANKAYA	5349	0	214	53	283497
365	Maltepe	CANKAYA	10999	20058	501	90	989910
368	Bostancik	MAMAK	4182	50010	186	40	167280
369	Solfasol	ALTINDAG	3053	10089	42	36	109908
370	Ba lariti	ALTINDAG	4578	10016	188	40	183120
371	Fazil Ahmet Pasa Mah	ALTINDAG	655	10040	204	53	34715
372	Turgutreis Mah	ALTINDAG	3387	10097	139	40	135480
375	Yigitler Mah	ALTINDAG	1495	10112	62	36	53820
376	Sehit Kubilay	KECIOREN	13847	40031	163	40	553880
377	Ostim	YENIMAHALLE	7281	0	275	60	436860
378	Avcilar	YENIMAHALLE	6384	70003	98	36	229824
379	Ivedik Mah	YENIMAHALLE	1588	70022	158	40	63520
380	Ykseltepe	KECIOREN	12218	40042	89	36	439848
381	Mustafa Kemal Mah	CANKAYA	5347	20064	464	90	481230
382	imentepe Mah.	ALTINDAG	160	10028	408	90	14400
383	Koyunpazari Mah	ALTINDAG	3	10064	0	36	108
384	Gven Mah	CANKAYA	11360	20037	634	90	1022400
385	Altay	ETIMESGUT	11651	0	350	60	699060
386	Sehit Osman Avci	ETIMESGUT	9318	0	350	60	559080
387	Seker	ETIMESGUT	1274	0	325	60	76440
388	Alsancak Mah.	ETIMESGUT	6415	0	320	60	384900
389	25 Mart Mah.	YENIMAHALLE	7653	70037	288	60	459180
390	ilk Yerlesim Mah	YENIMAHALLE	18083	0	190	40	723320
391	Hask+y	KECIOREN	3513	40017	68	36	126468
392	Ovacik	KECIOREN	2905	40028	0	36	104580
393	Ulubatli Hasan Mah.	ALTINDAG	1026	10098	219	53	54378
394	Karaprrrek Mah.	ALTINDAG	6270	10059	264	60	376200

Table 4.6
One-way Restrictions on Main Roads

One-way Restrictions on Main Roads
Turan Güneş Bulvarı (double)
Mesnevi Sokak
Çetin Emeç Bulvarı (double)
Cinnah Caddesi (double)
İsmet İnönü Bulvarı (double)
Milli Müdafı Caddesi
Akay Caddesi
Dikmen Caddesi (double)
Ankara –Konya Yolu (double)
Ankara – Eskişehir Yolu(double)
Öğretmenler Caddesi
1.sokak Balgat (double)
Bilkent Üniversitesi Yolu (double)
Fahrettin Altay Caddesi (double)
Basın Caddesi (double)
Gülhane Caddesi (double)
Eşref Bitlis Caddesi (double)
İrfan Baştuğ Caddesi (double)
Anadolu Bulvarı (double)
Turgut Özal Bulvarı (double)
Çiftlik Caddesi (double)
İvedik Caddesi (double)
Tanzimat Bulvarı (double)
Hipodrom Caddesi (double)
1.Cadde Çamlıca Mahallesi (double)
Etilik Caddesi (double)
İstanbul Caddesi (double)
1.Cadde 25 Mart Mahallesi (double)
İstanbul-Samsun Yolu (double)
İstiklal Caddesi (double)
Celal Bayar Bulvarı (double)
Kazım Karabekir Caddesi (double)
Ankara-Eskişehir-İstanbul Yolu (double)
Talat Paşa Bulvarı (double)
Amı Caddesi (double)
Döğol Caddesi (double)
Atatürk Bulvarı (double)
Gazi Mustafa Kemal Bulvarı (double)
M.Fevzi Çakmak Caddesi (double)
Cemal Gürsel Caddesi (double)
Ziya Gökalp Caddesi
Akdeniz Caddesi (double)
Eskişehir-İstanbul yolu (double)
Söğütözü caddesi (double)

Table 4.7
Turn Table

Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.
5768	68782	68781	-1	33822	43618	43736	-1	25770	52794	52793	-1
5759	68830	68781	-1	33822	43736	43618	-1	25756	52850	53581	-1
5759	68830	69049	-1	41154	65162	65625	-1	25756	53581	52850	-1
5759	72019	69049	-1	41154	65232	65625	-1	25793	52849	53530	-1
5768	58830	68781	-1	40940	65644	65899	-1	23637	53823	53665	-1
7596	62109	62096	-1	40824	65921	66061	-1	23670	53504	53503	-1
7596	62163	62096	-1	40716	66126	66302	-1	23670	53505	53503	-1
7603	62163	62605	-1	40577	66359	67141	-1	23355	53535	53534	-1
7603	62576	62605	-1	40577	66303	67141	-1	22973	54020	53686	-1
8397	59001	58948	-1	40546	66303	66294	-1	22855	54846	53778	-1
8406	59001	60225	-1	40546	66297	66294	-1	22690	53638	53637	-1
8406	59365	60225	-1	40825	65764	65766	-1	22034	53708	53707	-1
14867	54665	54664	-1	40359	66621	66620	-1	22042	53836	53813	-1
14867	54722	54664	-1	40120	66982	66981	-1	21756	53814	53746	-1
14898	55375	54816	-1	40038	67206	67478	-1	21684	53754	53755	-1
14898	54722	54816	-1	39898	67525	67943	-1	21684	53755	53754	-1
16638	54227	54158	-1	39635	67802	67801	-1	21756	53746	53814	-1
18640	54227	54405	-1	39620	68065	68614	-1	21687	53827	53853	-1
16638	54227	54158	-1	39002	68826	69416	-1	21687	53853	53827	-1
25770	52793	52794	-1	38192	69415	70073	-1	21687	54029	53827	-1
25796	52776	52827	-1	38192	69442	70073	-1	21687	54029	53853	-1
25793	52849	53530	-1	38147	69596	69443	-1	21215	53999	54159	-1
18659	54157	54156	-1	38147	69442	69443	-1	20875	53870	53869	-1
18706	54362	54233	-1	38389	68975	68974	-1	20663	53890	53889	-1
18706	54232	54233	-1	38435	68931	68930	-1	207401	53928	53927	-1
18702	54149	54150	-1	39079	68516	68515	-1	20264	53939	53938	-1
18702	54232	54150	-1	39154	68459	68458	-1	20045	53980	53979	-1
21687	53827	53853	-1	39309	68361	68360	-1	19106	54149	54097	-1
21687	54029	53853	-1	38128	69480	69479	-1	18702	54149	54150	-1
21687	53827	53853	-1	37983	69856	69799	-1	18702	54232	54150	-1
21684	53755	53754	-1	37727	70111	70061	-1	18659	54157	54156	-1
21684	53754	53755	-1	37758	70135	70749	-1	18706	54233	54362	-1
21756	53814	53746	-1	37050	70759	71097	-1	18640	54405	54427	-1
21756	53746	53814	-1	36820	70854	70853	-1	18640	54427	54405	-1
27942	51868	51906	-1	36462	71012	70978	-1	19107	54969	54160	-1
25770	52794	52793	-1	36462	71012	71011	-1	19061	55344	54231	-1
25793	53530	52849	-1	36059	71118	71337	-1	17576	54309	54308	-1
25756	52850	53581	-1	26938	71218	71929	-1	17558	54312	54311	-1
25796	52827	52776	-1	26938	71219	71929	-1	17284	54343	54342	-1
25756	53581	52850	-1	35837	71127	71126	-1	17110	54361	54360	-1
27914	52457	51912	-1	35558	71223	71222	-1	16923	54390	54389	-1
27914	53139	52457	-1	35167	71648	71445	-1	17140	54950	54454	-1
27947	53155	51911	-1	34743	71522	71714	-1	16852	54710	54510	-1
27942	51906	51868	-1	34743	71446	71714	-1	16548	54427	54426	-1
27942	51869	51868	-1	34753	71446	71421	-1	16362	54695	54570	-1
27908	51881	51880	-1	34753	71422	71421	-1	16115	54677	54690	-1
27914	51912	52457	-1	34392	71574	71528	-1	16100	54453	54452	-1

Table 4.7 (cont'd)
Turn Table

Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.
31675	50797	50699	-1	33496	71715	71806	-1	15528	54851	54691	-1
31675	50547	50699	-1	33480	71715	71699	-1	15500	55491	54721	-1
31678	50498	50497	-1	33480	71701	71699	-1	14898	55375	54816	-1
34215	50562	50494	-1	33480	70700	71699	-1	14898	54772	54816	-1
27947	51911	53155	-1	31831	71798	71870	-1	14867	54772	54664	-1
34140	50485	50484	-1	31816	71798	71791	-1	14867	54665	54664	-1
34157	50417	50435	-1	31816	71783	71791	-1	13337	56379	55045	-1
34215	34737	50494	-1	31111	71836	71835	-1	13328	54870	54871	-1
27908	51880	51881	-1	30879	71923	71948	-1	11898	55837	55250	-1
34734	51339	50606	-1	30164	72006	71954	-1	11520	55430	55254	-1
34157	50435	50417	-1	30064	71938	71937	-1	11062	55605	56472	-1
34140	50484	50485	-1	27676	72086	72085	-1	11062	56214	56472	-1
37074	51264	51265	-1	26282	72415	72144	-1	9516	56382	56381	-1
34737	50605	50643	-1	25774	72191	72073	-1	9411	56560	56559	-1
34737	50561	50643	-1	25774	72073	72191	-1	9315	56871	57534	-1
37082	51242	51235	-1	25817	72072	72142	-1	8993	57416	57415	-1
37074	51265	51264	-1	25817	72142	72072	-1	8987	57639	59000	-1
37103	51924	51276	-1	25767	72057	72040	-1	8468	58760	58732	-1
37112	51275	51626	-1	25767	72041	72040	-1	8397	59001	58948	-1
37205	51241	50934	-1	23417	74371	74311	-1	8406	59001	60225	-1
38369	51665	51664	-1	23911	74759	74629	-1	8406	59365	60225	-1
38408	51652	51662	-1	23966	74836	74837	-1	7953	60683	60993	-1
37103	51276	51924	-1	24604	74836	74905	-1	7787	61039	61455	-1
38814	51663	53798	-1	26342	71890	71865	-1	7783	60922	60921	-1
38369	51631	51625	-1	24816	74914	74904	-1	7708	61559	62162	-1
38369	51625	51631	-1	24816	74904	74914	-1	7631	61797	61796	-1
38414	53798	51663	-1	24758	74908	74909	-1	7603	62576	62605	-1
37112	51626	51275	-1	24758	74909	74908	-1	7603	62163	62605	-1
27914	52457	51912	-1	24777	74922	74919	-1	7596	62163	62096	-1
27942	51868	51906	-1	40189	57929	57878	-1	7596	62109	62096	-1
Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.
27908	51880	51881	-1	40392	58376	58315	-1	7510	62643	62934	-1
38382	51665	51664	-1	40471	58629	58537	-1	7427	63047	63945	-1
38414	51663	53798	-1	40472	58862	58705	-1	7188	64280	64500	-1
38369	51631	51625	-1	40592	59564	59485	-1	7013	65651	65946	-1
27643	58364	58367	-1	40644	57798	59772	-1	7172	63901	63900	-1
27694	58403	58365	-1	39817	57930	57948	-1	7172	63905	63900	-1
27694	58365	58403	-1	39714	57598	57597	-1	6740	65072	65071	-1
27643	58367	58364	-1	39667	57949	58373	-1	6611	65440	65439	-1
28900	58443	58346	-1	39512	58429	58626	-1	6432	65933	65932	-1
28897	58334	58456	-1	39464	58356	58355	-1	6461	66034	66684	-1
28897	58304	58456	-1	39397	58641	62569	-1	6220	66526	66525	-1
29830	59009	58919	-1	39264	58778	58775	-1	6187	66847	66844	-1
29835	58918	59055	-1	39189	58980	58968	-1	6026	67658	67657	-1
29835	58863	59055	-1	39112	59196	59182	-1	5759	72019	69049	-1
33085	59019	58654	-1	39031	59411	59410	-1	5759	68830	69049	-1
33085	58640	58654	-1	38893	59746	59475	-1	5768	68830	68781	-1
33088	58640	58609	-1	38789	60112	60111	-1	5768	68782	68781	-1

Table 4.7 (cont'd)
Turn Table

Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.
29830	58918	58919	-1	38704	60502	60501	-1	5102	62503	62282	-1
28900	58334	58346	-1	38586	61011	61010	-1	5094	62487	62170	-1
35110	58993	58557	-1	38564	61499	61226	-1	5094	62169	62170	-1
35110	58459	58557	-1	38560	61450	61414	-1	5097	62169	62266	-1
35185	58460	58730	-1	38593	62322	62248	-1	5102	62281	62282	-1
35132	58426	58424	-1	39217	54783	54771	-1	5112	62265	68455	-1
35132	58424	58426	-1	38915	53864	53741	-1	5112	62281	68455	-1
36602	58881	58882	-1	38670	52998	52905	-1	5154	60061	62152	-1
36602	59317	58882	-1	38541	52408	52407	-1	5148	60061	60024	-1
38661	62640	62585	-1	38361	50570	50568	-1	5148	60025	60024	-1
38661	62854	62585	-1	38361	50569	50568	-1	5658	42105	42102	-1
38661	62850	62585	-1	38329	50004	49998	-1	5666	42105	60060	-1
39894	57196	57447	-1	38396	49783	51630	-1	5666	42103	60060	-1
39894	57368	57447	-1	38486	47198	48512	-1	33006	35895	36557	-1
39837	57168	57141	-1	38462	47149	47148	-1	32172	34531	34983	-1
39837	57196	57141	-1	38516	46937	46936	-1	31951	34164	34532	-1
38942	53824	53825	-1	38121	44459	44452	-1	31951	34165	34532	-1
39021	53815	53803	-1	38811	49056	48556	-1	31574	33908	34166	-1
39021	53797	53803	-1	39024	48948	48483	-1	29578	34459	34564	-1
38408	51652	51662	-1	39259	48417	48443	-1	29578	34564	34459	-1
38369	51631	51625	-1	39773	48241	48296	-1	29505	34481	34482	-1
38369	51626	51625	-1	39735	48101	48100	-1	29505	34482	34481	-1
38382	51664	51665	-1	39998	48200	48173	-1	29552	34790	34581	-1
38382	51665	51664	-1	40260	48183	47874	-1	29552	34581	34790	-1
38414	51663	53798	-1	40495	47519	47620	-1	29614	34580	34784	-1
38308	48561	48560	-1	39997	47803	47802	-1	29614	34781	34580	-1
38336	48559	49784	-1	40225	47589	47588	-1	28172	34801	34800	-1
38336	48556	49784	-1	40928	47125	47251	-1	26651	35155	35154	-1
38340	48513	48557	-1	41265	46804	46963	-1	26851	35087	35087	-1
38340	48557	48513	-1	41535	46568	46572	-1	25160	35514	35513	-1
38310	48519	48520	-1	36670	52679	52678	-1	24638	35674	35673	-1
38644	46428	47159	-1	36577	53466	53069	-1	24133	35828	35827	-1
38644	46517	47159	-1	35994	56336	56332	-1	23856	35939	35938	-1
38624	46428	46395	-1	36046	56373	57836	-1	23626	36023	36022	-1
38624	46396	46395	-1	36188	58729	58777	-1	23578	36040	36039	-1
38624	46467	46395	-1	36334	58776	58859	-1	22949	36387	36386	-1
38531	45645	45644	-1	36318	59117	58793	-1	22644	37365	36834	-1
38524	45583	45570	-1	34286	58867	58610	-1	22628	36793	36654	-1
38559	45650	46427	-1	33629	58839	58611	-1	22628	36655	36654	-1
38559	45650	45751	-1	33365	58962	58639	-1	22593	36719	36720	-1
38205	43845	43844	-1	32888	59158	59060	-1	22593	36720	36719	-1
38359	43402	43830	-1	31848	59243	59127	-1	22602	36835	39439	-1
38556	45682	45649	-1	31848	59433	59127	-1	22602	39439	36835	-1
38556	45649	45682	-1	31291	59344	59139	-1	22483	36926	36925	-1
38255	43896	43855	-1	30652	59291	58864	-1	21915	37819	37818	-1
38219	43831	43821	-1	29598	58676	58677	-1	21639	38191	38190	-1
38205	43844	43845	-1	29270	58455	58320	-1	21077	38549	38548	-1
38308	48560	48561	-1	28667	58321	58338	-1	20627	38764	38763	-1

Table 4.7 (cont'd)
Turn Table

Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.	Node	Fedge	T edge	Sec.
38310	48520	48519	-1	28436	58339	58357	-1	20278	38988	38987	-1
38336	49784	48559	-1	28012	58358	58402	-1	19775	40145	39467	-1
38531	45645	45644	-1	27898	58661	58366	-1	19767	39357	39440	-1
38531	45644	45645	-1	27709	58210	57833	-1	19767	39440	39357	-1
38524	45570	45583	-1	27705	58255	57587	-1	19717	39387	39388	-1
38559	46427	45650	-1	27733	57588	57140	-1	19717	39388	39387	-1
38474	45582	45538	-1	27760	57154	58211	-1	19730	39468	39607	-1
38440	45514	45133	-1	27814	57127	55907	-1	19730	39607	39468	-1
38249	45132	43856	-1	27866	55915	55682	-1	18855	40506	39578	-1
38255	43896	43855	-1	27884	55683	55139	-1	18767	40192	39588	-1
38219	43831	43821	-1	27913	55140	57128	-1	18770	39530	39529	-1
38219	43821	43831	-1	28035	54128	53871	-1	18393	39487	39540	-1
38205	43844	43845	-1	27993	53947	54014	-1	16770	39446	39466	-1
38205	43845	43844	-1	28030	53323	53139	-1	16779	40345	39516	-1
38559	43402	43830	-1	27988	53211	51077	-1	16509	39430	39447	-1
39496	48779	48372	-1	36424	51037	51038	-1	16284	39428	39431	-1
39496	48297	48372	-1	35901	50874	50815	-1	16220	39920	39497	-1
39478	48297	48233	-1	35567	50770	35149	-1	15816	39400	39421	-1
39478	48234	48233	-1	35016	50642	50397	-1	15567	39399	39401	-1
40601	47450	47429	-1	32291	50398	50827	-1	15581	39678	39484	-1
40601	47252	47429	-1	30639	50828	51030	-1	15289	39644	39482	-1
40579	47252	47214	-1	30189	51031	51150	-1	14213	40058	39445	-1
40579	47215	47214	-1	29926	51151	51905	-1	14213	39444	39445	-1
41477	46324	46031	-1	30339	51257	51033	-1	14221	39444	39405	-1
41477	46031	46324	-1	30611	51216	50891	-1	14221	39346	39405	-1
41477	46366	46324	-1	31136	50769	50546	-1	13938	39313	39347	-1
41750	46008	46009	-1	32293	50506	50546	-1	13870	39311	39314	-1
41750	46009	46008	-1	33138	51170	50446	-1	13690	39309	39312	-1
41782	45976	46019	-1	35133	50819	50701	-1	13480	39291	39310	-1
39893	45681	45977	-1	35434	51153	50572	-1	13153	39294	39293	-1
39881	45817	45722	-1	35693	50913	50850	-1	13048	39747	39386	-1
39881	45721	45722	-1	35817	50989	50907	-1	12947	39280	39285	-1
39893	45721	45977	-1	35894	51059	50917	-1	12745	39284	39288	-1
34283	45571	42854	-1	36563	51335	51123	-1	12224	40080	39370	-1
34283	42854	45571	-1	31947	44906	44887	-1	11702	38811	39287	-1
34255	42790	42758	-1	32347	46153	46112	-1	11476	38461	38812	-1
34255	42758	42790	-1	32439	46372	46292	-1	11476	38530	38812	-1
34223	42833	42834	-1	32552	46708	46619	-1	11466	38772	38531	-1
34223	42834	42833	-1	32626	46897	46848	-1	11466	38530	38531	-1
33825	43560	43563	-1	32951	47592	47545	-1	11287	38255	38172	-1
33825	43563	43560	-1	34138	50000	50343	-1	11244	38033	38144	-1
33855	43620	43604	-1	34109	50125	50124	-1	10963	37205	38034	-1
33855	43604	43620	-1	32168	44440	44389	-1	10916	36933	37206	-1
33822	43618	43736	-1	32957	44171	44245	-1	10676	36132	36934	-1
33864	43621	43870	-1	33270	43995	43908	-1	10295	35194	36133	-1
36592	47103	46752	-1	33380	44235	43793	-1	9029	31394	35195	-1
36592	46751	46752	-1	32144	44189	44188	-1	8351	28792	28791	-1
36647	46751	46916	-1	32707	43966	43965	-1	8376	28893	29130	-1
36647	46705	46916	-1	33045	43804	43803	-1	8376	29130	28893	-1
34697	42397	42051	-1	33351	43688	43687	-1	8419	28900	31395	-1
34697	42051	42397	-1	33444	43642	43641	-1	8419	31395	28900	-1
34723	42050	42492	-1	34043	43854	43745	-1	7864	29584	29341	-1
34723	42492	42050	-1	34379	44158	43967	-1	7864	29131	29341	-1
34706	42013	41993	-1	35399	44789	44602	-1	7872	29131	28995	-1
34706	41993	42013	-1	35806	45214	45097	-1	7644	29064	29063	-1

Table 4.8
Transportation Cost Matrix For Armada Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
1	15902.5	1141.1	1141.1	0.17	2.6700	0.5841	0.6256	0.6049
2	12017.2	816.4	816.4	0.17	2.0177	0.4069	0.4649	0.4359
3	9992.3	673.8	673.8	0.17	1.6777	0.3291	0.3811	0.3551
4	11052.7	770.8	770.8	0.17	1.8558	0.3820	0.4250	0.4035
5	10903.1	748.6	748.6	0.17	1.8306	0.3699	0.4188	0.3943
6	11315.0	774.9	774.9	0.17	1.8998	0.3842	0.4358	0.4100
7	9228.6	619.5	619.5	0.17	1.5495	0.2994	0.3495	0.3244
8	12219.1	835.3	835.3	0.17	2.0516	0.4172	0.4732	0.4452
9	11999.5	840.4	840.4	0.17	2.0147	0.4200	0.4641	0.4421
10	12483.0	836.5	836.5	0.17	2.0959	0.4179	0.4841	0.4510
11	12144.2	863.2	863.2	0.17	2.0390	0.4324	0.4701	0.4513
12	11779.4	794.4	794.4	0.17	1.9778	0.3949	0.4550	0.4249
13	12345.4	844.1	844.1	0.17	2.0728	0.4220	0.4785	0.4502
14	12397.5	850.1	850.1	0.17	2.0815	0.4253	0.4806	0.4529
15	12803.8	885.2	885.2	0.17	2.1498	0.4444	0.4974	0.4709
16	12730.7	878.5	878.5	0.17	2.1375	0.4408	0.4944	0.4676
17	13379.6	936.5	936.5	0.17	2.2464	0.4724	0.5212	0.4968
18	13287.4	930.3	930.3	0.17	2.2310	0.4691	0.5174	0.4932
19	13561.3	951.8	951.8	0.17	2.2769	0.4808	0.5287	0.5048
20	13608.3	955.9	955.9	0.17	2.2848	0.4830	0.5307	0.5069
21	14325.0	1022.0	1022.0	0.17	2.4052	0.5191	0.5603	0.5397
22	13570.9	955.3	955.3	0.17	2.2786	0.4827	0.5291	0.5059
23	13685.4	944.2	944.2	0.17	2.2978	0.4766	0.5339	0.5053
24	14134.0	983.7	983.7	0.17	2.3731	0.4982	0.5524	0.5253
25	13915.3	985.7	985.7	0.17	2.3364	0.4993	0.5434	0.5213
26	14481.7	1007.1	1007.1	0.17	2.4315	0.5110	0.5668	0.5389
27	13533.5	916.3	916.3	0.17	2.2723	0.4614	0.5276	0.4945
28	13737.3	931.2	931.2	0.17	2.3065	0.4696	0.5360	0.5028
29	14466.8	995.5	995.5	0.17	2.4290	0.5046	0.5662	0.5354
30	14323.2	983.5	983.5	0.17	2.4049	0.4981	0.5603	0.5292
31	15178.7	1061.4	1061.4	0.17	2.5485	0.5406	0.5957	0.5682
32	16009.9	1136.1	1136.1	0.17	2.6881	0.5814	0.6300	0.6057
33	16463.0	1177.8	1177.8	0.17	2.7641	0.6042	0.6488	0.6265
34	16237.5	1157.6	1157.6	0.17	2.7263	0.5931	0.6395	0.6163
35	17137.3	1236.8	1236.8	0.17	2.8774	0.6364	0.6767	0.6565
36	17091.6	1232.1	1232.1	0.17	2.8697	0.6338	0.6748	0.6543
37	15080.6	1071.7	1071.7	0.17	2.5320	0.5463	0.5916	0.5689
38	16068.8	1149.5	1149.5	0.17	2.6979	0.5887	0.6325	0.6106
39	16049.9	1166.3	1166.3	0.17	2.6948	0.5979	0.6317	0.6148
40	12607.6	854.4	854.4	0.17	2.1168	0.4276	0.4893	0.4585
41	12914.7	862.8	862.8	0.17	2.1684	0.4322	0.5020	0.4671
42	12750.7	829.8	829.8	0.17	2.1408	0.4142	0.4952	0.4547
43	13122.1	863.5	863.5	0.17	2.2032	0.4326	0.5106	0.4716
44	14604.0	1017.6	1017.6	0.17	2.4520	0.5167	0.5719	0.5443
45	13081.6	948.4	948.4	0.17	2.1964	0.4790	0.5089	0.4939
46	13283.1	974.8	974.8	0.17	2.2302	0.4933	0.5172	0.5053
47	13840.4	1035.8	1035.8	0.17	2.3238	0.5266	0.5403	0.5335
48	14399.3	1084.4	1084.4	0.17	2.4176	0.5532	0.5634	0.5583
49	13901.8	1028.2	1028.2	0.17	2.3341	0.5225	0.5428	0.5327
50	8476.1	582.3	582.3	0.17	1.4231	0.2791	0.3184	0.2987
51	8160.0	554.6	554.6	0.17	1.3701	0.2640	0.3053	0.2846

Table 4.8 (cont'd)
Transportation Cost Matrix For Armada Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
52	9000.9	617.7	617.7	0.17	1.5113	0.2984	0.3401	0.3193
54	8175.6	609.3	609.3	0.17	1.3727	0.2938	0.3060	0.2999
55	8073.1	561.8	561.8	0.17	1.3555	0.2679	0.3017	0.2848
56	6525.9	491.6	491.6	0.17	1.0957	0.2296	0.2377	0.2336
57	8859.9	598.8	598.8	0.17	1.4876	0.2881	0.3343	0.3112
58	9720.6	657.7	657.7	0.17	1.6321	0.3202	0.3699	0.3451
59	10152.8	702.4	702.4	0.17	1.7047	0.3447	0.3878	0.3662
60	11393.8	780.1	780.1	0.17	1.9130	0.3870	0.4391	0.4131
61	11777.7	805.1	805.1	0.17	1.9775	0.4007	0.4550	0.4278
62	12647.4	877.8	877.8	0.17	2.1235	0.4404	0.4909	0.4657
63	12343.4	799.8	799.8	0.17	2.0725	0.3978	0.4784	0.4381
64	10195.3	661.3	661.3	0.17	1.7118	0.3222	0.3895	0.3558
65	12904.9	873.5	873.5	0.17	2.1667	0.4381	0.5016	0.4698
66	12403.9	846.8	846.8	0.17	2.0826	0.4235	0.4809	0.4522
67	13197.1	899.5	899.5	0.17	2.2158	0.4522	0.5137	0.4830
68	13244.4	903.1	903.1	0.17	2.2237	0.4542	0.5156	0.4849
69	13706.9	939.9	939.9	0.17	2.3014	0.4743	0.5348	0.5045
70	13656.5	923.5	923.5	0.17	2.2929	0.4654	0.5327	0.4990
71	14791.1	1026.4	1026.4	0.17	2.4834	0.5215	0.5796	0.5506
72	15062.8	1049.3	1049.3	0.17	2.5290	0.5340	0.5909	0.5625
73	15674.4	1104.6	1104.6	0.17	2.6317	0.5642	0.6162	0.5902
74	15548.7	1094.8	1094.8	0.17	2.6106	0.5588	0.6110	0.5849
75	16591.7	1189.7	1189.7	0.17	2.7857	0.6107	0.6541	0.6324
76	17948.9	1310.8	1310.8	0.17	3.0136	0.6768	0.7102	0.6935
77	18201.1	1263.8	1263.8	0.17	3.0560	0.6511	0.7207	0.6859
78	17918.5	1309.4	1309.4	0.17	3.0085	0.6760	0.7090	0.6925
79	18268.2	1261.1	1261.1	0.17	3.0672	0.6497	0.7234	0.6866
80	17932.3	1309.7	1309.7	0.17	3.0108	0.6762	0.7096	0.6929
81	19149.7	1420.8	1420.8	0.17	3.2152	0.7369	0.7599	0.7484
82	18613.2	1409.6	1409.6	0.17	3.1252	0.7307	0.7377	0.7342
83	18173.2	1368.7	1368.7	0.17	3.0513	0.7084	0.7195	0.7140
84	17559.1	1315.5	1315.5	0.17	2.9482	0.6794	0.6941	0.6867
85	19456.5	1485.6	1485.6	0.17	3.2667	0.7722	0.7726	0.7724
86	20184.5	1550.2	1550.2	0.17	3.3890	0.8075	0.8027	0.8051
87	20219.9	1554.7	1554.7	0.17	3.3949	0.8099	0.8042	0.8070
88	19737.4	1511.4	1511.4	0.17	3.3139	0.7863	0.7842	0.7853
89	18431.0	1393.1	1393.1	0.17	3.0946	0.7217	0.7302	0.7260
90	16858.6	1251.9	1251.9	0.17	2.8306	0.6446	0.6651	0.6549
91	17854.2	1343.2	1343.2	0.17	2.9977	0.6945	0.7063	0.7004
92	18948.3	1439.8	1439.8	0.17	3.1814	0.7472	0.7516	0.7494
93	20127.4	1546.4	1546.4	0.17	3.3794	0.8054	0.8004	0.8029
94	12899.4	900.8	900.8	0.17	2.1658	0.4529	0.5014	0.4772
95	13336.0	894.1	894.1	0.17	2.2391	0.4493	0.5194	0.4844
96	13533.1	911.9	911.9	0.17	2.2722	0.4590	0.5276	0.4933
97	13482.3	908.2	908.2	0.17	2.2637	0.4570	0.5255	0.4912
98	13741.7	942.6	942.6	0.17	2.3072	0.4758	0.5362	0.5060
99	13500.7	931.3	931.3	0.17	2.2668	0.4696	0.5262	0.4979
100	13500.72	931.29	931.29	0.1679	2.266770888	0.4696023	0.5262418	0.4979221
101	13280.54	911.46	911.46	0.1679	2.229802666	0.4587767	0.517134	0.4879554
102	13521.113	933.321	933.321	0.1679	2.270194873	0.4707111	0.5270853	0.4988982

Table 4.8 (cont'd)
 Transportation Cost Matrix For Armada Shopping Center+A52

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
103	14149.191	967.893	967.893	0.1679	2.375649169	0.4895847	0.5530659	0.5213253
104	14297.976	995.771	995.771	0.1679	2.40063017	0.5048038	0.5592204	0.5320121
105	13891.829	967.244	967.244	0.1679	2.332438089	0.4892304	0.5424201	0.5158252
106	13946.429	971.982	971.982	0.1679	2.341605429	0.4918169	0.5446786	0.5182478
107	13711.945	950.759	950.759	0.1679	2.302235566	0.4802309	0.5349791	0.507605
108	13845.187	963.884	963.884	0.1679	2.324606897	0.4873961	0.5404907	0.5139434
109	13802.757	960.771	960.771	0.1679	2.3174829	0.4856966	0.5387356	0.5122161
110	13456.77	926.936	926.936	0.1679	2.259391683	0.4672254	0.5244238	0.4958246
111	13466.146	927.754	927.754	0.1679	2.260965913	0.467672	0.5248116	0.4962418
112	13516.138	932.335	932.335	0.1679	2.26935957	0.4701728	0.5268796	0.4985262
113	13823.817	960.884	960.884	0.1679	2.321018874	0.4857583	0.5396067	0.5126825
114	14074.814	985.737	985.737	0.1679	2.363161271	0.4993261	0.5499892	0.5246577
115	14245.982	1001.771	1001.771	0.1679	2.391900378	0.5080793	0.5570696	0.5325745
116	15252.117	1050.17	1050.17	0.1679	2.560830444	0.5345013	0.5986885	0.5665949
117	13921.513	961.771	961.771	0.1679	2.337422033	0.4862425	0.5436479	0.5149452
118	14587.554	1017.771	1017.771	0.1679	2.449250317	0.5168141	0.5711988	0.5440064
119	14774.953	1045.771	1045.771	0.1679	2.480714609	0.5320998	0.5789506	0.5555252
120	14975.609	1064.771	1064.771	0.1679	2.514404751	0.5424723	0.5872507	0.5648615
121	15001.229	1057.366	1057.366	0.1679	2.518706349	0.5384298	0.5883105	0.5633701
122	14987.441	1067.242	1067.242	0.1679	2.516391344	0.5438213	0.5877401	0.5657807
123	15496.096	1110.186	1110.186	0.1679	2.601794518	0.5672653	0.6087807	0.588023
124	14778.804	1047.405	1047.405	0.1679	2.481361192	0.5329919	0.5791099	0.5560509
125	15283.578	1058.391	1058.391	0.1679	2.566112746	0.5389894	0.5999899	0.5694896
126	14923.479	1039.771	1039.771	0.1679	2.505652124	0.5288243	0.5850944	0.5569593
127	15116.879	1023.38	1023.38	0.1679	2.538123984	0.5198761	0.5930944	0.5564853
128	15164.352	1032.364	1032.364	0.1679	2.546094701	0.5247807	0.5950581	0.5599194
129	15453.978	1046.49	1046.49	0.1679	2.594722906	0.5324924	0.6070385	0.5697654
130	15468.082	1047.771	1047.771	0.1679	2.597090968	0.5331917	0.6076219	0.5704068
131	14137.457	955.752	955.752	0.1679	2.37367903	0.4829566	0.5525805	0.5177686
132	14393.699	978.811	978.811	0.1679	2.416702062	0.495545	0.56318	0.5293625
133	13672.541	913.871	913.871	0.1679	2.295619634	0.4600929	0.5333492	0.4967211
134	13635.196	910.97	910.97	0.1679	2.289349408	0.4585092	0.5318044	0.4951568
135	13420.692	891.936	891.936	0.1679	2.253334187	0.4481182	0.5229314	0.4855248
136	13420.554	916.145	916.145	0.1679	2.253311017	0.4613344	0.5229257	0.49213
137	13411.043	918.019	918.019	0.1679	2.25171412	0.4623574	0.5225323	0.4924449
138	13272.257	905.103	905.103	0.1679	2.22841195	0.4553063	0.5167914	0.4860489
139	13218.458	876.398	876.398	0.1679	2.219379098	0.4396357	0.514566	0.4771008
140	12992.484	881.248	881.248	0.1679	2.181438064	0.4422834	0.5052186	0.473751
141	12757.904	858.635	858.635	0.1679	2.142052082	0.4299385	0.4955151	0.4627268
142	12757.9	858.63	858.63	0.1679	2.14205141	0.4299358	0.495515	0.4627254
143	16550.629	1187.771	1187.771	0.1679	2.778850609	0.6096205	0.6524016	0.6310111
144	16494.9	1186.133	1186.133	0.1679	2.76949371	0.6087263	0.6500963	0.6294113
145	16757.549	1166.763	1166.763	0.1679	2.813592477	0.5981518	0.6609608	0.6295563
146	16849.811	1131.651	1131.651	0.1679	2.829083267	0.5789835	0.6647773	0.6218804
147	17920.906	1065.358	1065.358	0.1679	3.008920117	0.5427928	0.7090832	0.625938
148	16382.161	1056.564	1056.564	0.1679	2.750564832	0.537992	0.6454329	0.5917124
149	17052.9	1038.862	1038.862	0.1679	2.86318191	0.5283281	0.6731781	0.6007531
150	18194.051	1114.884	1114.884	0.1679	3.054781163	0.56983	0.7203819	0.645106
151	18291.93	1161.985	1161.985	0.1679	3.071215047	0.5955434	0.7244307	0.659987
152	18998.127	1217.457	1217.457	0.1679	3.189785523	0.6258267	0.7536426	0.6897346
153	19340.063	1254.529	1254.529	0.1679	3.247196578	0.6460651	0.7677868	0.7069259
154	18370.182	1169.004	1169.004	0.1679	3.084353558	0.5993752	0.7276676	0.6635214

Table 4.8 (cont'd)

Transportation Cost Matrix For Armada Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
155	18609.191	1190.476	1190.476	0.1679	3.124483169	0.6110973	0.7375542	0.6743257
156	19789.955	1297.596	1297.596	0.1679	3.322733445	0.6695762	0.7863966	0.7279864
157	19682.254	1289.996	1289.996	0.1679	3.304650447	0.6654272	0.7819415	0.7236844
158	18878.191	1226.766	1226.766	0.1679	3.169648269	0.6309087	0.7486814	0.689795
159	18204.096	1165.799	1165.799	0.1679	3.056467718	0.5976256	0.7207974	0.6592115
160	17759.387	1126.716	1126.716	0.1679	2.981801077	0.5762894	0.702402	0.6393457
161	17710.201	1109.84	1109.84	0.1679	2.973542748	0.5670764	0.7003674	0.6337219
162	17140.471	1057.333	1057.333	0.1679	2.877885081	0.5384118	0.6768004	0.6076061
163	16539.836	992.815	992.815	0.1679	2.777038464	0.5031901	0.6519551	0.5775726
164	15607.282	942.048	942.048	0.1679	2.620462648	0.4754753	0.6133799	0.5444276
165	14119.846	876.415	876.415	0.1679	2.370722143	0.439645	0.551852	0.4957485
166	15983.996	954.099	954.099	0.1679	2.683712928	0.4820542	0.6289627	0.5555085
167	16472.152	1010.771	1010.771	0.1679	2.765674321	0.5129926	0.6491554	0.581074
168	16229.559	988.133	988.133	0.1679	2.724942956	0.5006341	0.6391205	0.5698773
169	16307.701	1016.714	1016.714	0.1679	2.738062998	0.516237	0.6423528	0.5792949
170	14411.556	882.595	882.595	0.1679	2.419700252	0.4430187	0.5639186	0.5034687
171	13698.205	862.342	862.342	0.1679	2.29992862	0.4319622	0.5344108	0.4831865
172	13889.811	932.422	932.422	0.1679	2.332099267	0.4702203	0.5423366	0.5062784
173	13398.311	889.421	889.421	0.1679	2.249576417	0.4467452	0.5220056	0.4843754
174	13258.393	878.884	878.884	0.1679	2.226084185	0.4409928	0.5162179	0.4786054
175	12836.443	839.046	839.046	0.1679	2.15523878	0.4192445	0.4987639	0.4590042
176	13966.488	910.303	910.303	0.1679	2.344973335	0.4581451	0.5455083	0.5018267
177	13204.612	837.405	837.405	0.1679	2.217054355	0.4183486	0.5139933	0.4661709
178	13228.781	833.771	833.771	0.1679	2.22111233	0.4163647	0.514993	0.4656789
179	13751.597	860.599	860.599	0.1679	2.308893136	0.4310107	0.5366193	0.483815
180	10621.5	759.904	759.904	0.1679	1.78334985	0.3760392	0.4071426	0.3915909
181	16723.389	1102.063	1102.063	0.1679	2.807857013	0.5628308	0.6595478	0.6111893
182	16172.313	968.441	968.441	0.1679	2.715331353	0.4898838	0.6367525	0.5633182
183	14712.316	1007.746	1007.746	0.1679	2.470197856	0.5113412	0.5763596	0.5438504
184	14711.331	980.887	980.887	0.1679	2.470032475	0.4966783	0.5763188	0.5364986
185	14644.226	936.619	936.619	0.1679	2.458765545	0.4725115	0.573543	0.5230273
186	14358.446	910.646	910.646	0.1679	2.410783083	0.4583324	0.5617217	0.510027
187	14547.857	927.387	927.387	0.1679	2.44258519	0.4674716	0.5695567	0.5185142
188	14928.244	961.103	961.103	0.1679	2.506452168	0.4858779	0.5852915	0.5355847
189	15216.401	1030.954	1030.954	0.1679	2.554833728	0.5240109	0.5972111	0.560611
190	15475.382	1084.172	1084.172	0.1679	2.598316638	0.5530637	0.6079239	0.5804938
191	15146.041	987.287	987.287	0.1679	2.543020284	0.5001722	0.5943007	0.5472364
192	17331.443	1088.976	1088.976	0.1679	2.90994928	0.5556863	0.6847	0.6201932
193	18045.482	1152.744	1152.744	0.1679	3.029836428	0.5904986	0.7142363	0.6523674
194	18419.998	1186.082	1186.082	0.1679	3.092717664	0.6086985	0.7297282	0.6692133
205	8160.274	490.397	490.397	0.1679	1.370110005	0.2645616	0.2622614	0.2634115
206	9240.199	582.935	582.935	0.1679	1.551429412	0.3263412	0.3044315	0.3153863
207	9949.63	650.284	650.284	0.1679	1.670542877	0.3713043	0.3321341	0.3517192
208	10050.959	612.86	612.86	0.1679	1.687556016	0.3463195	0.3360909	0.3412052
209	11868.371	819.51	819.51	0.1679	1.992699491	0.4842817	0.4070592	0.4456704
210	9187.179	526.681	526.681	0.1679	1.542527354	0.2887853	0.3023611	0.2955732
211	7888.574	430.527	430.527	0.1679	1.324491575	0.2245917	0.2516518	0.2381217
212	9228.108	530.96	530.96	0.1679	1.549399333	0.291642	0.3039593	0.2978007
213	12472.767	793.071	793.071	0.1679	2.094177579	0.4666307	0.4306603	0.4486455
214	13576.167	892.648	892.648	0.1679	2.279438439	0.5331096	0.473747	0.5034283
215	13248.428	861.554	861.554	0.1679	2.224411061	0.5123508	0.4609491	0.48665
216	13915.604	921.273	921.273	0.1679	2.336429912	0.55222	0.4870017	0.5196109

Table 4.8 (cont'd)
Transportation Cost Matrix For Armada Shopping Center

Quarter	Distance (m)	seconds	(time* k)	USD	(length*usd)	Timecost	Financial C	Total Cost
217	13586.71	893.504	893.504	0.1679	2.281208609	0.5336811	0.4741587	0.5039199
195	11295.125	720.061	720.061	0.1679	1.896451488	0.4178883	0.3846744	0.4012814
196	10834.634	644.488	644.488	0.1679	1.819135049	0.3674348	0.3666927	0.3670637
197	7093.917	387.578	387.578	0.1679	1.191068664	0.1959183	0.2206211	0.2082697
198	7623.82	442.789	442.789	0.1679	1.280039378	0.2327779	0.2413134	0.2370456
199	7713.35	450.162	450.162	0.1679	1.295071465	0.2377002	0.2448094	0.2412548
200	8519.46	522.262	522.262	0.1679	1.430417334	0.2858351	0.2762873	0.2810612
201	8814.476	556.169	556.169	0.1679	1.47995052	0.3084719	0.2878074	0.2981396
202	8645.359	533.896	533.896	0.1679	1.451555776	0.2936021	0.2812035	0.2874028
203	8042.416	479.837	479.837	0.1679	1.350321646	0.2575116	0.2576591	0.2575854
204	7575.613	438.528	438.528	0.1679	1.271945423	0.2299332	0.2394309	0.2346821
218	13877.63	918.515	918.515	0.1679	2.330054077	0.5503787	0.4855189	0.5179488
219	12315.382	778.316	778.316	0.1679	2.067752638	0.4567801	0.4245145	0.4406473
220	12722.615	845.47	845.47	0.1679	2.136127059	0.501613	0.4404166	0.4710148
221	10356.487	636.152	636.152	0.1679	1.738854167	0.3618696	0.3480215	0.3549455
222	12232.023	801.934	801.934	0.1679	2.053756662	0.4725478	0.4212594	0.4469036
223	13878.428	952.557	952.557	0.1679	2.330188061	0.5731056	0.48555	0.5293278
224	14338.174	960.034	960.034	0.1679	2.407379415	0.5780974	0.5035027	0.5408
225	12776.406	821.362	821.362	0.1679	2.145158567	0.4855181	0.4425171	0.4640176
226	13571.047	893.889	893.889	0.1679	2.278578791	0.5339381	0.4735471	0.5037426
227	14581.15	984.53	984.53	0.1679	2.448175085	0.5944512	0.5129907	0.5537209
228	14519.985	976.507	976.507	0.1679	2.437905482	0.5890949	0.5106023	0.5498486
229	14576.599	985.273	985.273	0.1679	2.447410972	0.5949472	0.512813	0.5538801
230	13577.667	882.859	882.859	0.1679	2.279690289	0.5265743	0.4738056	0.50019
231	15512.126	1054.429	1054.429	0.1679	2.604485955	0.6411167	0.5493444	0.5952306
232	13829.085	845.39	845.39	0.1679	2.321903372	0.5015595	0.4836232	0.4925914
233	12572.838	727.55	727.55	0.1679	2.1109795	0.422888	0.434568	0.428728
234	10629.522	691.795	691.795	0.1679	1.784696744	0.3990175	0.3586833	0.3788504
235	12474.867	691.884	691.884	0.1679	2.094530169	0.399077	0.4307423	0.4149096
236	12481.822	668.2	668.2	0.1679	2.095697914	0.3832652	0.4310139	0.4071395
237	13059.968	693.443	693.443	0.1679	2.192768627	0.4001178	0.4535899	0.4268539
238	12880.177	733.737	733.737	0.1679	2.162581718	0.4270186	0.4465693	0.4367939
239	14399.001	892.99	892.99	0.1679	2.417592268	0.5333379	0.5058779	0.5196079
240	14071.271	839.719	839.719	0.1679	2.362566401	0.4977735	0.4930804	0.4954269
241	13883.975	806.941	806.941	0.1679	2.331119403	0.4758905	0.4857666	0.4808286
242	13911.937	1093.018	1093.018	0.1679	2.335814222	0.6668792	0.4868585	0.5768689
243	14396.735	1135.897	1135.897	0.1679	2.417211807	0.6955058	0.5057895	0.6006476
244	14923.313	1182.196	1182.196	0.1679	2.505624253	0.7264156	0.5263518	0.6269837
245	15375.036	1224.273	1224.273	0.1679	2.581468544	0.7545067	0.5439912	0.649249
246	16126.505	1305.273	1305.273	0.1679	2.70764019	0.8085834	0.5733354	0.6909594
247	15020.563	1230.121	1230.121	0.1679	2.521952528	0.7584109	0.5301494	0.6442801
248	16082.418	1323.46	1323.46	0.1679	2.700237982	0.8207252	0.5716138	0.6961695
249	16705.225	1381.168	1381.168	0.1679	2.804807278	0.8592518	0.5959339	0.7275929
250	17397.568	1442.359	1442.359	0.1679	2.921051667	0.9001037	0.6229692	0.7615365
251	15418.497	940.038	940.038	0.1679	2.588765646	0.5647478	0.5456883	0.555218
252	16419.986	1030.056	1030.056	0.1679	2.756915649	0.6248449	0.5847955	0.6048202
253	12024.302	769.805	769.805	0.1679	2.018880306	0.451098	0.4131481	0.4321231
254	7928.752	591.324	591.324	0.1679	1.331237461	0.3319418	0.2532207	0.2925812
255	8511.104	645.328	645.328	0.1679	1.429014362	0.3679956	0.275961	0.3219783
256	5971.004	410.261	410.261	0.1679	1.002531572	0.2110618	0.1767724	0.1939171
257	6350.593	442.627	442.627	0.1679	1.066264565	0.2326698	0.191595	0.2121324
258	6642.073	427.835	427.835	0.1679	1.115204057	0.2227944	0.202977	0.2128857
259	7375.365	449.209	449.209	0.1679	1.238323784	0.237064	0.2316114	0.2343377

Table 4.8 (cont'd)
Transportation Cost Matrix For Armada Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial C	Total Cost
260	8269.403	609.61	609.61	0.1679	1.388432764	0.3441498	0.2665228	0.3053363
261	5712.809	427.57	427.57	0.1679	0.959180631	0.2226175	0.1666901	0.1946538
262	4947.028	317.824	317.824	0.1679	0.830606001	0.1493497	0.1367871	0.1430684
263	4478.039	316.521	316.521	0.1679	0.751862748	0.1484798	0.1184735	0.1334766
264	5294.145	390.268	390.268	0.1679	0.888886946	0.1977142	0.1503417	0.174028
265	5665.8	423.004	423.004	0.1679	0.95128782	0.2195692	0.1648545	0.1922118
266	6518.466	502.637	502.637	0.1679	1.094450441	0.2727332	0.1981503	0.2354418
267	5359.71	394.836	394.836	0.1679	0.899895309	0.2007639	0.1529019	0.1768329
268	5271.793	398.925	398.925	0.1679	0.885134045	0.2034938	0.1494689	0.1764813
269	4029.187	283.667	283.667	0.1679	0.676500497	0.126546	0.1009462	0.1137461
270	3392.435	216.178	216.178	0.1679	0.569589837	0.0814895	0.0760817	0.0787856
271	3749.675	250.054	250.054	0.1679	0.629570433	0.1041056	0.0900316	0.0970686
272	3876.183	261.543	261.543	0.1679	0.650811126	0.1117758	0.0949716	0.1033737
273	4475.584	316.348	316.348	0.1679	0.751450554	0.1483643	0.1183776	0.133371
274	7025.624	485.317	485.317	0.1679	1.17960227	0.2611702	0.2179544	0.2395623
275	7208.981	475.273	475.273	0.1679	1.21038791	0.2544647	0.2251143	0.2397895
276	6206.563	410.971	410.971	0.1679	1.042081928	0.2115358	0.1859708	0.1987533
277	6097.946	380.848	380.848	0.1679	1.023845133	0.1914253	0.1817294	0.1865773
278	7465.373	582.514	582.514	0.1679	1.253436127	0.3260601	0.2351261	0.2805931
279	5786.723	434.28	434.28	0.1679	0.971590792	0.2270972	0.1695764	0.1983368
280	5089.384	369.43	369.43	0.1679	0.854507574	0.1838025	0.142346	0.1630742
281	8681.362	529.273	529.273	0.1679	1.45760068	0.2905158	0.2826094	0.2865626
282	8196.247	549.87	549.87	0.1679	1.376149871	0.3042666	0.2636661	0.2839663
283	8100.521	541.904	541.904	0.1679	1.360077476	0.2989484	0.2599281	0.2794382
284	8654.192	591.17	591.17	0.1679	1.453038837	0.331839	0.2815484	0.3066937
285	9724.06	532.695	532.695	0.1679	1.632669674	0.2928003	0.3233258	0.3080631
286	11626.014	712.218	712.218	0.1679	1.952007751	0.4126522	0.3975953	0.4051238
287	9148.597	615.846	615.846	0.1679	1.536049436	0.348313	0.3008545	0.3245838
288	9793.302	671.622	671.622	0.1679	1.644295406	0.3855498	0.3260296	0.3557897
289	10007.88	661.551	661.551	0.1679	1.680323052	0.3788263	0.3344087	0.3566775
290	10768.566	695.407	695.407	0.1679	1.808042231	0.401429	0.3641128	0.3827709
291	11975.137	831.089	831.089	0.1679	2.010625502	0.492012	0.4112283	0.4516201
292	10702.163	719.204	719.204	0.1679	1.796893168	0.4173161	0.3615198	0.389418
293	10461.627	696.747	696.747	0.1679	1.756507173	0.4023236	0.3521271	0.3772253
294	9933.908	650.896	650.896	0.1679	1.667903153	0.3717128	0.3315202	0.3516165
295	9287.989	591.562	591.562	0.1679	1.559453353	0.3321007	0.3062976	0.3191992
296	9318.298	593.127	593.127	0.1679	1.564542234	0.3331455	0.3074812	0.3203133
297	9696.017	629.011	629.011	0.1679	1.627961254	0.3571021	0.3222307	0.3396664
298	10140.139	703.135	703.135	0.1679	1.702529338	0.4065883	0.3395733	0.3730808
299	10803.777	751.56	751.56	0.1679	1.813954158	0.4389174	0.3654878	0.4022026
300	11451.187	784.175	784.175	0.1679	1.922654297	0.4606916	0.3907685	0.4257301
301	13474.486	1064.385	1064.385	0.1679	2.598166199	0.6477634	0.5478746	0.597819
302	12047.262	749.48	749.48	0.1679	2.02273529	0.4375288	0.4140447	0.4257867
303	11099.127	666.005	666.005	0.1679	1.863543423	0.3817998	0.3770209	0.3794104
304	6728.643	514.327	514.327	0.1679	1.12973916	0.2805376	0.2063575	0.2434476
305	11060.861	818.434	818.434	0.1679	1.857118562	0.4835634	0.3755266	0.429545
306	6991.287	491.273	491.273	0.1679	1.173837087	0.2651465	0.2166135	0.24088
307	7816.867	511.7	511.7	0.1679	1.312451969	0.2787838	0.2488517	0.2638177
308	8217.981	564.051	564.051	0.1679	1.37979901	0.313734	0.2645148	0.2891244
309	8208.815	609.124	609.124	0.1679	1.378260039	0.3438253	0.2641569	0.3039911
310	9568.274	733.731	733.731	0.1679	1.606513205	0.4270146	0.3172425	0.3721285
311	5241.049	297.204	297.204	0.1679	0.879972127	0.1355835	0.1482683	0.1419259
312	3885.475	267.321	267.321	0.1679	0.652371253	0.1156332	0.0953344	0.1054838
313	5830.096	369.031	369.031	0.1679	0.978873118	0.1835361	0.1712701	0.1774031
314	11788.844	865.273	865.273	0.1679	1.979346908	0.5148337	0.4039537	0.4593937
315	11267.849	898.092	898.092	0.1679	1.891871847	0.5367441	0.3836093	0.4601767

Table 4.8 (cont'd)
Transportation Cost Matrix For Armada Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial C	Total Cost
316	9371.302	662.337	662.337	0.1679	1.573441606	0.379351	0.3095509	0.344451
317	15475.979	1058.508	1058.508	0.1679	2.598416874	0.6438399	0.5479329	0.5958864
318	19063.842	1009.865	1009.865	0.1679	3.200819072	0.6113652	0.6880357	0.6497004
319	12041.362	695.161	695.161	0.1679	2.02174468	0.4012647	0.4138143	0.4075395
320	15744.804	999.544	999.544	0.1679	2.643552592	0.6044747	0.5584303	0.5814525
321	17459.498	1123.465	1123.465	0.1679	2.931449714	0.687206	0.6253875	0.6562968
322	16839.232	1130.208	1130.208	0.1679	2.827307053	0.6917077	0.6011667	0.6464372
323	16471.092	950.273	950.273	0.1679	2.765496347	0.5715808	0.5867912	0.579186
324	16991.354	1144.289	1144.289	0.1679	2.852848337	0.7011084	0.6071069	0.6541077
325	17348.148	1177.273	1177.273	0.1679	2.912754049	0.7231289	0.6210394	0.6720842
326	18244.012	1257.721	1257.721	0.1679	3.063169615	0.776837	0.6560221	0.7164296
327	18857.777	1311.478	1311.478	0.1679	3.166220758	0.8127259	0.679989	0.7463575
328	20527.324	1374.048	1374.048	0.1679	3.4465377	0.8544984	0.7451833	0.7998409
329	21255.359	1319.113	1319.113	0.1679	3.568774776	0.8178231	0.7736124	0.7957178
330	22248.713	1410.992	1410.992	0.1679	3.735558913	0.8791627	0.812402	0.8457824
331	23769.697	1457.922	1457.922	0.1679	3.990932126	0.9104938	0.871795	0.8911444
332	24098.469	1450.807	1450.807	0.1679	4.046132945	0.9057437	0.8846332	0.8951885
333	24092.465	1358.745	1358.745	0.1679	4.045124874	0.844282	0.8843988	0.8643404
334	25824.66	1463.102	1463.102	0.1679	4.335960414	0.913952	0.9520394	0.9329957
335	9214.611	704.943	704.943	0.1679	1.547133187	0.4077953	0.3034323	0.3556138
336	26258.781	1405.828	1405.828	0.1679	4.40884933	0.8757152	0.9689914	0.9223533
337	27052.873	1478.024	1478.024	0.1679	4.542177377	0.9239142	1	0.9619571
338	8592.924	587.137	587.137	0.1679	1.44275194	0.3291465	0.279156	0.3041512
339	8742.48	548.137	548.137	0.1679	1.467862392	0.3031096	0.284996	0.2940528
340	9186.188	615.709	615.709	0.1679	1.542360965	0.3482215	0.3023224	0.325272
341	13342.3	763.21	763.21	0.1679	2.24017217	0.4466951	0.4646147	0.4556549
342	13687.072	766.396	766.396	0.1679	2.298059389	0.4488221	0.4780778	0.4634499
343	9194.589	706.102	706.102	0.1679	1.543771493	0.4085691	0.3026504	0.3556098
344	10262.664	801.531	801.531	0.1679	1.723101286	0.4722787	0.3443578	0.4083182
345	10097.498	788.728	788.728	0.1679	1.695369914	0.4637313	0.3379082	0.4008197
346	12105.636	928.225	928.225	0.1679	2.032536284	0.5568613	0.4163241	0.4865927
347	23750.053	1486.273	1486.273	0.1679	3.987633899	0.9294213	0.8710279	0.9002246
348	22724.016	1453.677	1453.677	0.1679	3.815362286	0.9076598	0.8309621	0.869311
349	24911.65	1591.991	1591.991	0.1679	4.182666035	1	0.9163872	0.9581936
350	25995.506	1591.273	1591.273	0.1679	4.364645457	0.9995207	0.9587108	0.9791157
351	24793.773	1483.273	1483.273	0.1679	4.162874487	0.9274185	0.9117842	0.9196013
352	15229.168	1210.058	1210.058	0.1679	2.556977307	0.7450166	0.5382952	0.6416559
353	8435.509	573.589	573.589	0.1679	1.416321961	0.3201017	0.2730091	0.2965554
354	4372.486	302.689	302.689	0.1679	0.734140399	0.1392454	0.1143518	0.1267986
355	10640.34	662.5	662.5	0.1679	1.786513086	0.3794598	0.3591057	0.3692828
356	13656.237	856.515	856.515	0.1679	2.292882192	0.5089867	0.4768737	0.4929302
357	5644.98	290.023	290.023	0.1679	0.947792142	0.1307894	0.1640415	0.1474154
358	15098.394	1066.832	1066.832	0.1679	2.535020353	0.6493971	0.5331886	0.5912928
359	16513.424	1082.273	1082.273	0.1679	2.77260389	0.6597057	0.5884442	0.624075
360	7115.367	511.06	511.06	0.1679	1.194670119	0.2783565	0.2214587	0.2499076
361	7472.994	546.747	546.747	0.1679	1.254715693	0.3021816	0.2354237	0.2688027
362	3952.726	274.394	274.394	0.1679	0.663662695	0.1203553	0.0979605	0.1091579
363	4539.432	326.657	326.657	0.1679	0.762170633	0.1552467	0.1208708	0.1380588
364	8674.645	696.273	696.273	0.1679	1.456472896	0.4020071	0.2823471	0.3421771
365	14411.183	878.85	878.85	0.1679	2.419637626	0.5238979	0.5063536	0.5151258
366	13838.168	870.831	870.831	0.1679	2.323428407	0.5185443	0.4839779	0.5012611

Table 4.8 (cont'd)
Transportation Cost Matrix For Armada Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial C	Total Cost
367	8674.64	696.27	696.27	0.1679	1.456472056	0.4020051	0.2823469	0.342176
368	7493.466	435.092	435.092	0.1679	1.258152941	0.2276393	0.2362232	0.2319312
369	7419.263	493.273	493.273	0.1679	1.245694258	0.2664817	0.2333256	0.2499036
370	8755.931	592.444	592.444	0.1679	1.470120815	0.3326895	0.2855212	0.3091054
371	12106.575	843.273	843.273	0.1679	2.032693943	0.5001462	0.4163608	0.4582535
372	12052.321	746.809	746.809	0.1679	2.023584696	0.4357456	0.4142422	0.4249939
373	11485.102	789.894	789.894	0.1679	1.928348626	0.4645097	0.3920929	0.4283013
374	12354.722	854.314	854.314	0.1679	2.074357824	0.5075173	0.4260507	0.466784
375	12450.638	874.338	874.338	0.1679	2.09046212	0.5208856	0.4297962	0.4753409
376	5910.511	333.345	333.345	0.1679	0.992374797	0.1597117	0.1744102	0.167061
377	6277.351	425.453	425.453	0.1679	1.053967233	0.2212042	0.188735	0.2049696
378	6651.22	457.976	457.976	0.1679	1.116739838	0.242917	0.2033342	0.2231256
379	5799.664	348.109	348.109	0.1679	0.973763586	0.1695683	0.1700817	0.169825
380	22590.855	1224.592	1224.592	0.1679	3.793004555	0.7547197	0.8257623	0.790241
381	21759.33	1332.273	1332.273	0.1679	3.653391507	0.8266089	0.793292	0.8099505
382	18732.117	1059.273	1059.273	0.1679	3.145122444	0.6443506	0.6750821	0.6597164
383	17678.74	1249.421	1249.421	0.1679	2.968260446	0.7712958	0.6339487	0.7026223
384	7530.578	502.155	502.155	0.1679	1.264384046	0.2724114	0.2376723	0.2550419
385	14168.618	941.97	941.97	0.1679	2.378910962	0.5660376	0.4968817	0.5314596
386	10500.105	601.844	601.844	0.1679	1.76296763	0.3389651	0.3536296	0.3462974
387	14081.459	1019.87	1019.87	0.1679	2.364276966	0.6180446	0.4934782	0.5557614
388	8018.555	483.429	483.429	0.1679	1.346315385	0.2599097	0.2567274	0.2583186
389	17784.018	1152.004	1152.004	0.1679	2.985936622	0.706259	0.6380597	0.6721594
390	13869.749	965.251	965.251	0.1679	2.328730857	0.5815803	0.4852111	0.5333957
391	15718.369	1133.243	1133.243	0.1679	2.639114155	0.6937339	0.557398	0.625566
392	15068.41	1076.414	1076.414	0.1679	2.529986039	0.6557941	0.5320177	0.5939059
393	14566.432	1030.131	1030.131	0.1679	2.445703933	0.624895	0.512416	0.5686555
394	15436.184	1105.614	1105.614	0.1679	2.591735294	0.6752884	0.546379	0.6108337
MIN	1444.075	94.117	94.117	0.1679	0.242460193	0	0	0
MAX	27052.873	1591.991	1591.991	0.1679	4.542177377	1	1	1

Table 4.9

Transportation Cost Matrix For Bilkent Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
1	15902.5	1141.1	1141.1	0.17	2.6700	0.5841	0.6256	0.6049
2	12017.2	816.4	816.4	0.17	2.0177	0.4069	0.4649	0.4359
3	9992.3	673.8	673.8	0.17	1.6777	0.3291	0.3811	0.3551
4	11052.7	770.8	770.8	0.17	1.8558	0.3820	0.4250	0.4035
5	10903.1	748.6	748.6	0.17	1.8306	0.3699	0.4188	0.3943
6	11315.0	774.9	774.9	0.17	1.8998	0.3842	0.4358	0.4100
7	9228.6	619.5	619.5	0.17	1.5495	0.2994	0.3495	0.3244
8	12219.1	835.3	835.3	0.17	2.0516	0.4172	0.4732	0.4452
9	11999.5	840.4	840.4	0.17	2.0147	0.4200	0.4641	0.4421
10	12483.0	836.5	836.5	0.17	2.0959	0.4179	0.4841	0.4510
11	12144.2	863.2	863.2	0.17	2.0390	0.4324	0.4701	0.4513
12	11779.4	794.4	794.4	0.17	1.9778	0.3949	0.4550	0.4249
13	12345.4	844.1	844.1	0.17	2.0728	0.4220	0.4785	0.4502
14	12397.5	850.1	850.1	0.17	2.0815	0.4253	0.4806	0.4529
15	12803.8	885.2	885.2	0.17	2.1498	0.4444	0.4974	0.4709
16	12730.7	878.5	878.5	0.17	2.1375	0.4408	0.4944	0.4676
17	13379.6	936.5	936.5	0.17	2.2464	0.4724	0.5212	0.4968
18	13287.4	930.3	930.3	0.17	2.2310	0.4691	0.5174	0.4932
19	13561.3	951.8	951.8	0.17	2.2769	0.4808	0.5287	0.5048
20	13608.3	955.9	955.9	0.17	2.2848	0.4830	0.5307	0.5069
21	14325.0	1022.0	1022.0	0.17	2.4052	0.5191	0.5603	0.5397
22	13570.9	955.3	955.3	0.17	2.2786	0.4827	0.5291	0.5059
23	13685.4	944.2	944.2	0.17	2.2978	0.4766	0.5339	0.5053
24	14134.0	983.7	983.7	0.17	2.3731	0.4982	0.5524	0.5253
25	13915.3	985.7	985.7	0.17	2.3364	0.4993	0.5434	0.5213
26	14481.7	1007.1	1007.1	0.17	2.4315	0.5110	0.5668	0.5389
27	13533.5	916.3	916.3	0.17	2.2723	0.4614	0.5276	0.4945
28	13737.3	931.2	931.2	0.17	2.3065	0.4696	0.5360	0.5028
29	14466.8	995.5	995.5	0.17	2.4290	0.5046	0.5662	0.5354
30	14323.2	983.5	983.5	0.17	2.4049	0.4981	0.5603	0.5292
31	15178.7	1061.4	1061.4	0.17	2.5485	0.5406	0.5957	0.5682
32	16009.9	1136.1	1136.1	0.17	2.6881	0.5814	0.6300	0.6057
33	16463.0	1177.8	1177.8	0.17	2.7641	0.6042	0.6488	0.6265
34	16237.5	1157.6	1157.6	0.17	2.7263	0.5931	0.6395	0.6163
35	17137.3	1236.8	1236.8	0.17	2.8774	0.6364	0.6767	0.6365
36	17091.6	1232.1	1232.1	0.17	2.8697	0.6338	0.6748	0.6543
37	15080.6	1071.7	1071.7	0.17	2.5320	0.5463	0.5916	0.5689
38	16068.8	1149.5	1149.5	0.17	2.6979	0.5887	0.6325	0.6106
39	16049.9	1166.3	1166.3	0.17	2.6948	0.5979	0.6317	0.6148
40	12607.6	854.4	854.4	0.17	2.1168	0.4276	0.4893	0.4585
41	12914.7	862.8	862.8	0.17	2.1684	0.4322	0.5020	0.4671
42	12750.7	829.8	829.8	0.17	2.1408	0.4142	0.4952	0.4547
43	13122.1	863.5	863.5	0.17	2.2032	0.4326	0.5106	0.4716
44	14604.0	1017.6	1017.6	0.17	2.4520	0.5167	0.5719	0.5443
45	13081.6	948.4	948.4	0.17	2.1964	0.4790	0.5089	0.4939
46	13283.1	974.8	974.8	0.17	2.2302	0.4933	0.5172	0.5053
47	13840.4	1035.8	1035.8	0.17	2.3238	0.5266	0.5403	0.5335
48	14399.3	1084.4	1084.4	0.17	2.4176	0.5532	0.5634	0.5583
49	13901.8	1028.2	1028.2	0.17	2.3341	0.5225	0.5428	0.5327
50	8476.1	582.3	582.3	0.17	1.4231	0.2791	0.3184	0.2987
51	8160.0	554.6	554.6	0.17	1.3701	0.2640	0.3053	0.2846
52	9000.9	617.7	617.7	0.17	1.5113	0.2984	0.3401	0.3193

Table 4.9 (cont'd)
Transportation Cost Matrix For Bilkent Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
53	7804.0	561.8	561.8	0.17	1.3103	0.2679	0.2906	0.2792
54	8175.6	609.3	609.3	0.17	1.3727	0.2938	0.3060	0.2999
55	8073.1	561.8	561.8	0.17	1.3555	0.2679	0.3017	0.2848
56	6525.9	491.6	491.6	0.17	1.0957	0.2296	0.2377	0.2336
57	8859.9	598.8	598.8	0.17	1.4876	0.2881	0.3343	0.3112
58	9720.6	657.7	657.7	0.17	1.6321	0.3202	0.3699	0.3451
59	10152.8	702.4	702.4	0.17	1.7047	0.3447	0.3878	0.3662
60	11393.8	780.1	780.1	0.17	1.9130	0.3870	0.4391	0.4131
61	11777.7	805.1	805.1	0.17	1.9775	0.4007	0.4550	0.4278
62	12647.4	877.8	877.8	0.17	2.1235	0.4404	0.4909	0.4657
63	12343.4	799.8	799.8	0.17	2.0725	0.3978	0.4784	0.4381
64	10195.3	661.3	661.3	0.17	1.7118	0.3222	0.3895	0.3558
65	12904.9	873.5	873.5	0.17	2.1667	0.4381	0.5016	0.4698
66	12403.9	846.8	846.8	0.17	2.0826	0.4235	0.4809	0.4522
67	13197.1	899.5	899.5	0.17	2.2158	0.4522	0.5137	0.4830
68	13244.4	903.1	903.1	0.17	2.2237	0.4542	0.5156	0.4849
69	13706.9	939.9	939.9	0.17	2.3014	0.4743	0.5348	0.5045
70	13656.5	923.5	923.5	0.17	2.2929	0.4654	0.5327	0.4990
71	14791.1	1026.4	1026.4	0.17	2.4834	0.5215	0.5796	0.5506
72	15062.8	1049.3	1049.3	0.17	2.5290	0.5340	0.5909	0.5625
73	15674.4	1104.6	1104.6	0.17	2.6317	0.5642	0.6162	0.5902
74	15548.7	1094.8	1094.8	0.17	2.6106	0.5588	0.6110	0.5849
75	16591.7	1189.7	1189.7	0.17	2.7857	0.6107	0.6541	0.6324
76	17948.9	1310.8	1310.8	0.17	3.0136	0.6768	0.7102	0.6935
77	18201.1	1263.8	1263.8	0.17	3.0560	0.6511	0.7207	0.6859
78	17918.5	1309.4	1309.4	0.17	3.0085	0.6760	0.7090	0.6925
79	18268.2	1261.1	1261.1	0.17	3.0672	0.6497	0.7234	0.6866
80	17932.3	1309.7	1309.7	0.17	3.0108	0.6762	0.7096	0.6929
81	19149.7	1420.8	1420.8	0.17	3.2152	0.7369	0.7599	0.7484
82	18613.2	1409.6	1409.6	0.17	3.1252	0.7307	0.7377	0.7342
83	18173.2	1368.7	1368.7	0.17	3.0513	0.7084	0.7195	0.7140
84	17559.1	1315.5	1315.5	0.17	2.9482	0.6794	0.6941	0.6867
85	19456.5	1485.6	1485.6	0.17	3.2667	0.7722	0.7726	0.7724
86	20184.5	1550.2	1550.2	0.17	3.3890	0.8075	0.8027	0.8051
87	20219.9	1554.7	1554.7	0.17	3.3949	0.8099	0.8042	0.8070
88	19737.4	1511.4	1511.4	0.17	3.3139	0.7863	0.7842	0.7853
89	18431.0	1393.1	1393.1	0.17	3.0946	0.7217	0.7302	0.7260
90	16858.6	1251.9	1251.9	0.17	2.8306	0.6446	0.6651	0.6549
91	17854.2	1343.2	1343.2	0.17	2.9977	0.6945	0.7063	0.7004
92	18948.3	1439.8	1439.8	0.17	3.1814	0.7472	0.7516	0.7494
93	20127.4	1546.4	1546.4	0.17	3.3794	0.8054	0.8004	0.8029
94	12899.4	900.8	900.8	0.17	2.1658	0.4529	0.5014	0.4772
95	13336.0	894.1	894.1	0.17	2.2391	0.4493	0.5194	0.4844
96	13533.1	911.9	911.9	0.17	2.2722	0.4590	0.5276	0.4933
97	13482.3	908.2	908.2	0.17	2.2637	0.4570	0.5255	0.4912
98	13741.7	942.6	942.6	0.17	2.3072	0.4758	0.5362	0.5060
99	13500.7	931.3	931.3	0.17	2.2668	0.4696	0.5262	0.4979
101	13280.54	911.46	911.46	0.1679	2.229802666	0.4587767	0.517134	0.4879554
102	13521.113	933.321	933.321	0.1679	2.270194873	0.4707111	0.5270853	0.4988982
103	14149.191	967.893	967.893	0.1679	2.375649169	0.4895847	0.5530659	0.5213253
104	14297.976	995.771	995.771	0.1679	2.40063017	0.5048038	0.5592204	0.5320121

Table 4.9 (cont'd)
 Transportation Cost Matrix For Bilkent Shopping Center

Quarter	Distance (m)	seconds	timecost	cost/km	Cost	Timecost	Financial	Total Cost
105	13891.829	967.244	967.244	0.1679	2.332438089	0.4892304	0.5424201	0.5158252
106	13946.429	971.982	971.982	0.1679	2.341605429	0.4918169	0.5446786	0.5182478
107	13711.945	950.759	950.759	0.1679	2.302235566	0.4802309	0.5349791	0.507605
108	13845.187	963.884	963.884	0.1679	2.324606897	0.4873961	0.5404907	0.5139434
109	13802.757	960.771	960.771	0.1679	2.3174829	0.4856966	0.5387356	0.5122161
110	13456.77	926.936	926.936	0.1679	2.259391683	0.4672254	0.5244238	0.4958246
111	13466.146	927.754	927.754	0.1679	2.260965913	0.467672	0.5248116	0.4962418
112	13516.138	932.335	932.335	0.1679	2.26935957	0.4701728	0.5268796	0.4985262
113	13823.817	960.884	960.884	0.1679	2.321018874	0.4857583	0.5396067	0.5126825
114	14074.814	985.737	985.737	0.1679	2.363161271	0.4993261	0.5499892	0.5246577
115	14245.982	1001.771	1001.771	0.1679	2.391900378	0.5080793	0.5570696	0.5325745
116	15252.117	1050.17	1050.17	0.1679	2.560830444	0.5345013	0.5986885	0.5665949
117	13921.513	961.771	961.771	0.1679	2.337422033	0.4862425	0.5436479	0.5149452
118	14587.554	1017.771	1017.771	0.1679	2.449250317	0.5168141	0.5711988	0.5440064
119	14774.953	1045.771	1045.771	0.1679	2.480714609	0.5320998	0.5789506	0.555252
120	14975.609	1064.771	1064.771	0.1679	2.514404751	0.5424723	0.5872507	0.5648615
121	15001.229	1057.366	1057.366	0.1679	2.518706349	0.5384298	0.5883105	0.5633701
122	14987.441	1067.242	1067.242	0.1679	2.516391344	0.5438213	0.5877401	0.5657807
123	15496.096	1110.186	1110.186	0.1679	2.601794518	0.5672653	0.6087807	0.588023
124	14778.804	1047.405	1047.405	0.1679	2.481361192	0.5329919	0.5791099	0.5560509
125	15283.578	1058.391	1058.391	0.1679	2.566112746	0.5389894	0.5999899	0.5694896
126	14923.479	1039.771	1039.771	0.1679	2.505652124	0.5288243	0.5850944	0.5569593
127	15116.879	1023.38	1023.38	0.1679	2.538123984	0.5198761	0.5930944	0.5564853
128	15164.352	1032.364	1032.364	0.1679	2.546094701	0.5247807	0.5950581	0.5599194
129	15453.978	1046.49	1046.49	0.1679	2.594722906	0.5324924	0.6070385	0.5697654
130	15468.082	1047.771	1047.771	0.1679	2.597090968	0.5331917	0.6076219	0.5704068
131	14137.457	955.752	955.752	0.1679	2.37367903	0.4829566	0.5525805	0.5177686
132	14393.699	978.811	978.811	0.1679	2.416702062	0.495545	0.56318	0.5293625
133	13672.541	913.871	913.871	0.1679	2.295619634	0.4600929	0.5333492	0.4967211
134	13635.196	910.97	910.97	0.1679	2.289349408	0.4585092	0.5318044	0.4951568
135	13420.692	891.936	891.936	0.1679	2.253334187	0.4481182	0.5229314	0.4855248
136	13420.554	916.145	916.145	0.1679	2.253311017	0.4613344	0.5229257	0.49213
137	13411.043	918.019	918.019	0.1679	2.25171412	0.4623574	0.5225323	0.4924449
138	13272.257	905.103	905.103	0.1679	2.22841195	0.4553063	0.5167914	0.4860489
139	13218.458	876.398	876.398	0.1679	2.219379098	0.4396357	0.514566	0.4771008
140	12992.484	881.248	881.248	0.1679	2.181438064	0.4422834	0.5052186	0.473751
141	12757.904	858.635	858.635	0.1679	2.142052082	0.4299385	0.4955151	0.4627268
142	12757.9	858.63	858.63	0.1679	2.14205141	0.4299358	0.495515	0.4627254
143	16550.629	1187.771	1187.771	0.1679	2.778850609	0.6096205	0.6524016	0.6310111
144	16494.9	1186.133	1186.133	0.1679	2.76949371	0.6087263	0.6500963	0.6294113
145	16757.549	1166.763	1166.763	0.1679	2.813592477	0.5981518	0.6609608	0.6295563
146	16849.811	1131.651	1131.651	0.1679	2.829083267	0.5789835	0.6647773	0.6218804
147	17920.906	1065.358	1065.358	0.1679	3.008920117	0.5427928	0.7090832	0.625938
148	16382.161	1056.564	1056.564	0.1679	2.750564832	0.537992	0.6454329	0.5917124
149	17052.9	1038.862	1038.862	0.1679	2.86318191	0.5283281	0.6731781	0.6007531
150	18194.051	1114.884	1114.884	0.1679	3.054781163	0.56983	0.7203819	0.645106
151	18291.93	1161.985	1161.985	0.1679	3.071215047	0.5955434	0.7244307	0.659987
152	18998.127	1217.457	1217.457	0.1679	3.189785523	0.6258267	0.7536426	0.6897346
153	19340.063	1254.529	1254.529	0.1679	3.247196578	0.6460651	0.7677868	0.7069259
154	18370.182	1169.004	1169.004	0.1679	3.084353558	0.5993752	0.7276676	0.6635214
155	18609.191	1190.476	1190.476	0.1679	3.124483169	0.6110973	0.7375542	0.6743257
156	19789.955	1297.596	1297.596	0.1679	3.322733445	0.6695762	0.7863966	0.7279864
157	19682.254	1289.996	1289.996	0.1679	3.304650447	0.6654272	0.7819415	0.7236844
158	18878.191	1226.766	1226.766	0.1679	3.169648269	0.6309087	0.7486814	0.689795
159	18204.096	1165.799	1165.799	0.1679	3.056467718	0.5976256	0.7207974	0.6592115
160	17759.387	1126.716	1126.716	0.1679	2.981801077	0.5762894	0.702402	0.6393457

Table 4.9 (cont'd)
Transportation Cost Matrix For Bilkent Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
161	17710.201	1109.84	1109.84	0.1679	2.973542748	0.5670764	0.7003674	0.6337219
162	17140.471	1057.333	1057.333	0.1679	2.877885081	0.5384118	0.6768004	0.6076061
163	16539.836	992.815	992.815	0.1679	2.777038464	0.5031901	0.6519551	0.5775726
164	15607.282	942.048	942.048	0.1679	2.620462648	0.4754753	0.6133799	0.5444276
165	14119.846	876.415	876.415	0.1679	2.370722143	0.439645	0.551852	0.4957485
166	15983.996	954.099	954.099	0.1679	2.683712928	0.4820542	0.6289627	0.5555085
167	16472.152	1010.771	1010.771	0.1679	2.765674321	0.5129926	0.6491554	0.581074
168	16229.559	988.133	988.133	0.1679	2.724942956	0.5006341	0.6391205	0.5698773
169	16307.701	1016.714	1016.714	0.1679	2.738062998	0.516237	0.6423528	0.5792949
170	14411.556	882.595	882.595	0.1679	2.419700252	0.4430187	0.5639186	0.5034687
171	13698.205	862.342	862.342	0.1679	2.29992862	0.4319622	0.5344108	0.4831865
172	13889.811	932.422	932.422	0.1679	2.332099267	0.4702203	0.5423366	0.5062784
173	13398.311	889.421	889.421	0.1679	2.249576417	0.4467452	0.5220056	0.4843754
174	13258.393	878.884	878.884	0.1679	2.226084185	0.4409928	0.5162179	0.4786054
175	12836.443	839.046	839.046	0.1679	2.15523878	0.4192445	0.4987639	0.4590042
176	13966.488	910.303	910.303	0.1679	2.344973335	0.4581451	0.5455083	0.5018267
177	13204.612	837.405	837.405	0.1679	2.217054355	0.4183486	0.5139933	0.4661709
178	13228.781	833.771	833.771	0.1679	2.22111233	0.4163647	0.514993	0.4656789
179	13751.597	860.599	860.599	0.1679	2.308893136	0.4310107	0.5366193	0.483815
180	10621.5	759.904	759.904	0.1679	1.78334985	0.3760392	0.4071426	0.3915909
181	16723.389	1102.063	1102.063	0.1679	2.807857013	0.5628308	0.6595478	0.6111893
182	16172.313	968.441	968.441	0.1679	2.715331353	0.4898838	0.6367525	0.5633182
183	14712.316	1007.746	1007.746	0.1679	2.470197856	0.5113412	0.5763596	0.5438504
184	14711.331	980.887	980.887	0.1679	2.470032475	0.4966783	0.5763188	0.5364986
185	14644.226	936.619	936.619	0.1679	2.458765545	0.4725115	0.573543	0.5230273
186	14358.446	910.646	910.646	0.1679	2.410783083	0.4583324	0.5617217	0.510027
187	14547.857	927.387	927.387	0.1679	2.44258519	0.4674716	0.5695567	0.5185142
188	14928.244	961.103	961.103	0.1679	2.506452168	0.4858779	0.5852915	0.5355847
189	15216.401	1030.954	1030.954	0.1679	2.554833728	0.5240109	0.5972111	0.560611
190	15475.382	1084.172	1084.172	0.1679	2.598316638	0.5530637	0.6079239	0.5804938
191	15146.041	987.287	987.287	0.1679	2.543020284	0.5001722	0.5943007	0.5472364
192	17331.443	1088.976	1088.976	0.1679	2.90994928	0.5556863	0.6847	0.6201932
193	18045.482	1152.744	1152.744	0.1679	3.029836428	0.5904986	0.7142363	0.6523674
194	18419.998	1186.082	1186.082	0.1679	3.092717664	0.6086985	0.7297282	0.6692133
191	8445.064	526.79	526.79	0.1679	1.417926246	0.2888581	0.2733822	0.2811201
195	17992.572	1180.558	1180.558	0.1679	3.020952839	0.6056828	0.7120477	0.6588652
196	17532.082	1104.985	1104.985	0.1679	2.943636568	0.564426	0.6929995	0.6287127
197	13791.361	848.076	848.076	0.1679	2.315569512	0.4241741	0.5382642	0.4812192
198	12685.588	835.286	835.286	0.1679	2.129910225	0.4171918	0.4925238	0.4548578
199	13372.934	910.66	910.66	0.1679	2.245315619	0.45834	0.5209559	0.489648
200	13003.567	887.759	887.759	0.1679	2.183298899	0.4458379	0.505677	0.4757574
201	12754.195	845.667	845.667	0.1679	2.141429341	0.422859	0.4953617	0.4591104
202	13377.474	920.148	920.148	0.1679	2.246077885	0.4635197	0.5211437	0.4923317
203	13581.549	940.207	940.207	0.1679	2.280342077	0.4744703	0.5295853	0.5020278
204	14018.284	899.025	899.025	0.1679	2.353669884	0.4519882	0.5476509	0.4998195
205	14213.657	950.895	950.895	0.1679	2.38647301	0.4803051	0.5557325	0.5180188
206	15416.118	1043.433	1043.433	0.1679	2.588366212	0.5308235	0.6054724	0.5681479
207	15163.392	1064.781	1064.781	0.1679	2.545933517	0.5424778	0.5950184	0.5687481
208	16285.461	1073.357	1073.357	0.1679	2.734328902	0.5471596	0.6414329	0.5942962
209	17860.418	1280.007	1280.007	0.1679	2.998764182	0.659974	0.7065811	0.6832776
210	15884.623	987.179	987.179	0.1679	2.667028202	0.5001133	0.6248522	0.5624827
211	14586.019	891.025	891.025	0.1679	2.44899259	0.4476209	0.5711353	0.5093781
212	15925.554	991.458	991.458	0.1679	2.673900517	0.5024493	0.6265453	0.5644973

Table 4.9 (cont'd)
Transportation Cost Matrix For Bilkent Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
213	19170.209	1253.569	1253.569	0.1679	3.218678091	0.645541	0.7607607	0.7031509
214	20273.604	1353.146	1353.146	0.1679	3.403938112	0.6999021	0.8064028	0.7531525
215	19945.865	1322.052	1322.052	0.1679	3.348910734	0.6829273	0.7928458	0.7378866
216	20613.045	1381.771	1381.771	0.1679	3.460930256	0.7155291	0.8204438	0.7679864
217	20284.143	1354.001	1354.001	0.1679	3.40570761	0.7003689	0.8068387	0.7536038
218	20575.07	1379.013	1379.013	0.1679	3.454554253	0.7140234	0.818873	0.7664482
219	19012.828	1238.814	1238.814	0.1679	3.192253821	0.6374859	0.7542507	0.6958683
220	19420.061	1305.967	1305.967	0.1679	3.260628242	0.6741461	0.7710959	0.722621
221	17053.934	1096.649	1096.649	0.1679	2.863355519	0.5598752	0.6732208	0.616548
222	18579.047	1262.432	1262.432	0.1679	3.119421991	0.6503795	0.7363073	0.6933434
223	20516.912	1413.054	1413.054	0.1679	3.444789525	0.7326071	0.8164672	0.7745372
224	21035.623	1420.531	1420.531	0.1679	3.531881102	0.736689	0.8379238	0.7873064
225	19473.852	1281.86	1281.86	0.1679	3.269659751	0.6609856	0.773321	0.7171533
226	20268.486	1354.386	1354.386	0.1679	3.403078799	0.7005791	0.8061911	0.7533851
227	21278.594	1445.027	1445.027	0.1679	3.572675933	0.7500618	0.8479743	0.7990181
228	21217.434	1437.005	1437.005	0.1679	3.562407169	0.7456825	0.8454444	0.7955634
229	21274.039	1445.771	1445.771	0.1679	3.571911148	0.750468	0.8477859	0.7991269
230	20275.104	1343.357	1343.357	0.1679	3.404189962	0.6945581	0.8064648	0.7505115
231	22209.576	1514.926	1514.926	0.1679	3.72898781	0.7882211	0.8864845	0.8373528
232	20526.529	1305.887	1305.887	0.1679	3.446404219	0.6741025	0.8168651	0.7454838
233	19288.738	1188.047	1188.047	0.1679	3.23857911	0.6097712	0.7656637	0.6877175
234	17345.416	1152.292	1152.292	0.1679	2.912295346	0.5902518	0.685278	0.6377649
235	19190.768	1152.381	1152.381	0.1679	3.222129947	0.5903004	0.7616112	0.6759558
236	19197.725	1128.697	1128.697	0.1679	3.223298028	0.5773708	0.7618989	0.6696349
237	19775.871	1153.94	1153.94	0.1679	3.320368741	0.5911515	0.785814	0.6884828
238	19596.078	1194.234	1194.234	0.1679	3.290181496	0.6131488	0.7783769	0.6957628
239	21096.445	1353.487	1353.487	0.1679	3.542093116	0.7000883	0.8404397	0.770264
240	20787.176	1300.216	1300.216	0.1679	3.49016685	0.6710066	0.8276467	0.7493266
241	20599.875	1267.438	1267.438	0.1679	3.458719013	0.6531124	0.819899	0.7365057
242	20627.836	1553.515	1553.515	0.1679	3.463413664	0.8092876	0.8210556	0.8151716
243	21112.635	1596.395	1596.395	0.1679	3.544811417	0.8326967	0.8411094	0.836903
244	21639.215	1642.693	1642.693	0.1679	3.633224199	0.8579717	0.8628914	0.8604316
245	22090.934	1684.771	1684.771	0.1679	3.709067819	0.880943	0.8815768	0.8812599
246	22842.4	1765.771	1765.771	0.1679	3.83523896	0.9251625	0.9126613	0.9189119
247	21736.459	1690.618	1690.618	0.1679	3.649551466	0.884135	0.8669139	0.8755244
248	22798.311	1783.957	1783.957	0.1679	3.827836417	0.9350906	0.9108375	0.9229641
249	23421.129	1841.665	1841.665	0.1679	3.932407559	0.9665946	0.9366005	0.9515975
250	24113.465	1902.856	1902.856	0.1679	4.048650774	1	0.965239	0.9826195
251	22134.398	1400.536	1400.536	0.1679	3.716365424	0.7257733	0.8833747	0.804574
252	23135.879	1490.554	1490.554	0.1679	3.884514084	0.7749159	0.9248011	0.8498585
253	18740.191	1230.302	1230.302	0.1679	3.146478069	0.6328391	0.742973	0.687906
254	14644.648	1051.821	1051.821	0.1679	2.458836399	0.5354027	0.5735605	0.5544816
255	15227	1105.826	1105.826	0.1679	2.5566133	0.5648851	0.5976495	0.5812673
256	12686.9	870.758	870.758	0.1679	2.13013051	0.4365567	0.492578	0.4645674
257	13066.491	903.125	903.125	0.1679	2.193863839	0.4542265	0.5082799	0.4812532
258	13357.969	888.332	888.332	0.1679	2.242802995	0.4461507	0.5203369	0.4832438
259	14091.261	909.707	909.707	0.1679	2.365922722	0.4578197	0.5506696	0.5042447
260	14985.297	1070.108	1070.108	0.1679	2.516031366	0.5453859	0.5876515	0.5665187
261	12312.719	888.067	888.067	0.1679	2.06730552	0.446006	0.4771	0.461553
262	11662.926	778.322	778.322	0.1679	1.958205275	0.386094	0.4502213	0.4181576
263	11193.935	777.019	777.019	0.1679	1.879461687	0.3853827	0.4308214	0.408102
264	11894.056	850.765	850.765	0.1679	1.997012002	0.4256421	0.459782	0.442712
265	12171.272	883.502	883.502	0.1679	2.043556569	0.4435139	0.471249	0.4573815
266	13023.938	963.134	963.134	0.1679	2.18671919	0.4869866	0.5065197	0.4967531

Table 4.9 (cont'd)
 Transportation Cost Matrix For Bilkent Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
267	11865.185	855.333	855.333	0.1679	1.992164562	0.4281359	0.4585877	0.4433618
268	11750.917	859.422	859.422	0.1679	1.972978964	0.4303681	0.453861	0.4421146
269	10419.868	744.165	744.165	0.1679	1.749495837	0.367447	0.3988021	0.3831245
270	8809.054	652.675	652.675	0.1679	1.479040167	0.3175007	0.3321706	0.3248357
271	10434.065	710.551	710.551	0.1679	1.751879514	0.3490964	0.3993893	0.3742429
272	10592.08	722.04	722.04	0.1679	1.778410232	0.3553685	0.4059256	0.3806471
273	11191.479	776.845	776.845	0.1679	1.879049324	0.3852877	0.4307198	0.4080037
274	13741.521	945.815	945.815	0.1679	2.307201376	0.4775318	0.5362025	0.5068672
275	13906.428	935.771	935.771	0.1679	2.334889261	0.4720486	0.5430239	0.5075363
276	12922.459	871.469	871.469	0.1679	2.169680866	0.4369448	0.502322	0.4696334
277	12813.842	841.345	841.345	0.1679	2.151444072	0.4204995	0.497829	0.4591643
278	13730.295	1043.011	1043.011	0.1679	2.305316531	0.5305931	0.5357382	0.5331656
279	12088.021	894.778	894.778	0.1679	2.029578726	0.4496697	0.4678054	0.4587375
280	11354.306	829.928	829.928	0.1679	1.906387977	0.4142668	0.4374552	0.425861
281	10741.142	729.771	729.771	0.1679	1.803437742	0.359589	0.4120916	0.3858403
282	12135.968	789.367	789.367	0.1679	2.037629027	0.3921237	0.4697887	0.4309562
283	12040.242	781.401	781.401	0.1679	2.021556632	0.3877749	0.465829	0.4268019
284	12227.209	824.667	824.667	0.1679	2.052948391	0.4113947	0.4735629	0.4424788
285	11429.185	733.192	733.192	0.1679	1.918960162	0.3614566	0.4405525	0.4010046
286	13194.686	912.715	912.715	0.1679	2.215387779	0.4594619	0.5135827	0.4865223
287	13088.316	876.344	876.344	0.1679	2.197528256	0.4396062	0.5091827	0.4743944
288	13363.086	908.422	908.422	0.1679	2.243662139	0.4571182	0.5205485	0.4888334
289	12829.185	862.048	862.048	0.1679	2.154020162	0.4318017	0.4984637	0.4651327
290	13224.621	895.905	895.905	0.1679	2.220413866	0.4502849	0.5148209	0.4825529
291	15783.593	1130.955	1130.955	0.1679	2.650065265	0.5786035	0.6206731	0.5996383
292	14986.827	1047.701	1047.701	0.1679	2.516288253	0.5331535	0.5877147	0.5604341
296	13397.67	905.917	905.917	0.1679	2.249468793	0.4557507	0.5219791	0.4888649
297	13781.824	938.508	938.508	0.1679	2.31396825	0.4735428	0.5378697	0.5057062
298	14079.858	966.633	966.633	0.1679	2.364008158	0.4888968	0.5301979	0.5195473
299	14163.646	983.485	983.485	0.1679	2.378076163	0.4980966	0.5536638	0.5258802
300	17015.441	1231.672	1231.672	0.1679	2.856892544	0.633587	0.6716286	0.6526078
301	21959.596	1524.882	1524.882	0.1679	3.687016168	0.7936563	0.876144	0.8349002
302	13615.934	949.978	949.978	0.1679	2.286115319	0.4798045	0.5310076	0.5054061
303	12667.799	866.502	866.502	0.1679	2.126923452	0.4342332	0.4917879	0.4630106
304	12993.565	974.824	974.824	0.1679	2.181619564	0.4933684	0.5052633	0.4993159
305	17776.76	1278.932	1278.932	0.1679	2.984718004	0.6593872	0.7031206	0.6812539
306	13707.185	951.771	951.771	0.1679	2.301436362	0.4807833	0.5347822	0.5077828
307	14532.763	972.197	972.197	0.1679	2.440050908	0.4919343	0.5689323	0.5304333
308	14933.878	1024.548	1024.548	0.1679	2.507398116	0.5205138	0.5855245	0.5530191
309	14924.715	1069.621	1069.621	0.1679	2.505859649	0.54512	0.5851455	0.5651328
310	16284.173	1194.228	1194.228	0.1679	2.734112647	0.6131455	0.6413796	0.6272626
311	11956.946	757.701	757.701	0.1679	2.007571233	0.3748366	0.4623834	0.41861
312	10601.368	727.818	727.818	0.1679	1.779969687	0.3585228	0.4063098	0.3824163
313	12545.993	829.528	829.528	0.1679	2.106472225	0.4140484	0.4867494	0.4503989
314	18294.32	1325.771	1325.771	0.1679	3.071616328	0.6849575	0.7245295	0.7047435
315	16517.232	1358.589	1358.589	0.1679	2.773243253	0.7028736	0.6510201	0.6769468
316	16087.198	1122.834	1122.834	0.1679	2.701040544	0.5741701	0.6332317	0.6037009
317	17044.648	1259.005	1259.005	0.1679	2.861796399	0.6485086	0.6728367	0.6606727
318	18547.676	1210.363	1210.363	0.1679	3.1141548	0.621954	0.7350096	0.6784818
319	13264.684	895.658	895.658	0.1679	2.227140444	0.4501501	0.5164781	0.4833141
320	22460.705	1460.041	1460.041	0.1679	3.77115237	0.7582583	0.8968724	0.8275654
321	24175.393	1583.962	1583.962	0.1679	4.059048485	0.8259093	0.9678007	0.896855
322	14672.814	1226.705	1226.705	0.1679	2.463565471	0.6308754	0.5747256	0.6028005
323	14304.674	1150.771	1150.771	0.1679	2.401754765	0.5894215	0.5594974	0.5744595

Table 4.9 (cont'd)
Transportation Cost Matrix For Bilkent Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
324	14824.932	1240.787	1240.787	0.1679	2.489106083	0.6385631	0.5810179	0.6097905
325	15181.731	1273.771	1273.771	0.1679	2.549012635	0.6565697	0.595777	0.6261733
326	16077.594	1354.218	1354.218	0.1679	2.699428033	0.7004873	0.6328344	0.6666609
327	16691.357	1407.976	1407.976	0.1679	2.80247884	0.7298349	0.6582228	0.6940289
328	18360.906	1499.546	1499.546	0.1679	3.082796117	0.7798249	0.7272839	0.7535544
329	19088.939	1519.61	1519.61	0.1679	3.205032858	0.7907782	0.757399	0.7740886
330	20082.293	1611.49	1611.49	0.1679	3.371816995	0.8409374	0.7984892	0.8197133
331	21603.277	1658.42	1658.42	0.1679	3.627190208	0.8665574	0.8614048	0.8639811
332	21932.049	1651.304	1651.304	0.1679	3.682391027	0.8626726	0.8750045	0.8688386
333	21926.045	1559.242	1559.242	0.1679	3.681382956	0.8124141	0.8747562	0.8435851
334	24782.814	1663.599	1663.599	0.1679	4.161034471	0.8693847	0.9929267	0.9311557
335	15930.507	1165.441	1165.441	0.1679	2.674732125	0.5974301	0.6267502	0.6120901
336	24159.719	1606.325	1606.325	0.1679	4.05641682	0.8381177	0.9671523	0.902635
337	24953.811	1678.521	1678.521	0.1679	4.189744867	0.877531	1	0.9387655
338	15308.82	1047.634	1047.634	0.1679	2.570350878	0.5331169	0.601034	0.5670755
339	15443.458	1008.634	1008.634	0.1679	2.592956598	0.511826	0.6066033	0.5592147
340	15902.084	1076.206	1076.206	0.1679	2.669959904	0.5487149	0.6255744	0.5871447
341	14565.622	963.707	963.707	0.1679	2.445567934	0.4872994	0.5702916	0.5287955
342	14910.395	966.894	966.894	0.1679	2.503455321	0.4890393	0.5845531	0.5367962
343	15910.485	1166.599	1166.599	0.1679	2.671370432	0.5980623	0.625922	0.6119921
344	16978.559	1262.029	1262.029	0.1679	2.850700056	0.6501595	0.6701029	0.6601312
345	16813.393	1249.225	1249.225	0.1679	2.822968685	0.6431695	0.6632708	0.6532202
346	18821.531	1388.722	1388.722	0.1679	3.160135055	0.7193238	0.7463376	0.7328307
347	23233.889	1686.771	1686.771	0.1679	3.900969963	0.8820348	0.9288553	0.905445
348	20557.596	1654.174	1654.174	0.1679	3.451620368	0.8642394	0.8181501	0.8411948
349	22745.23	1792.489	1792.489	0.1679	3.818924117	0.9397484	0.9086418	0.9241951
350	23829.086	1791.771	1791.771	0.1679	4.000903539	0.9393564	0.9534756	0.946416
351	22627.354	1683.771	1683.771	0.1679	3.799132737	0.880397	0.9037659	0.8920815
352	21945.064	1670.556	1670.556	0.1679	3.684576246	0.8731827	0.8755429	0.8743628
353	778.84	71.087	71.087	0.1679	0.130767236	0	0	0
354	10325.167	763.187	763.187	0.1679	1.733595539	0.3778315	0.3948847	0.3863581
355	8473.924	664.998	664.998	0.1679	1.42277184	0.3242281	0.3183079	0.321268
356	9901.83	859.012	859.012	0.1679	1.662517257	0.4301443	0.3773734	0.4037588
357	6868.302	490.52	490.52	0.1679	1.153187906	0.228977	0.2518912	0.2404341
358	12931.976	1069.329	1069.329	0.1679	2.17127877	0.5449606	0.5027156	0.5238381
359	18082.096	1282.771	1282.771	0.1679	3.035983918	0.661483	0.7157508	0.6886169
360	13831.263	971.557	971.557	0.1679	2.322269058	0.4915849	0.5399147	0.5157498
361	14188.889	1007.245	1007.245	0.1679	2.382314463	0.5110677	0.554708	0.5328878
362	10668.621	734.892	734.892	0.1679	1.791261466	0.3623847	0.4090917	0.3857382
363	11255.326	787.154	787.154	0.1679	1.889769235	0.3909156	0.4333609	0.4121382
364	15180.118	1156.771	1156.771	0.1679	2.548741812	0.592697	0.5957102	0.5942036
365	21127.074	1339.347	1339.347	0.1679	3.547235725	0.692369	0.8417067	0.7670378
366	20535.615	1331.329	1331.329	0.1679	3.447929759	0.6879918	0.8172409	0.7526163
367	15180.12	1156.77	1156.77	0.1679	2.548742148	0.5926965	0.5957103	0.5942034
368	14190.912	895.589	895.589	0.1679	2.382654125	0.4501124	0.5547916	0.502452
369	14116.711	953.771	953.771	0.1679	2.370195777	0.4818752	0.5517223	0.5167987
370	15456.907	1052.942	1052.942	0.1679	2.595214685	0.5360146	0.6071597	0.5715871
371	17207.404	1258.771	1258.771	0.1679	2.889123132	0.6483809	0.6795691	0.663975
372	13808.944	947.306	947.306	0.1679	2.318521698	0.4783458	0.5389915	0.5086687
373	14537.754	1018.15	1018.15	0.1679	2.440888897	0.517021	0.5691388	0.5430799
374	14974.681	1054.812	1054.812	0.1679	2.51424894	0.5370355	0.5872123	0.5621239
375	17786.223	1306.835	1306.835	0.1679	2.986306842	0.67462	0.703512	0.689066
376	3744.095	335.842	335.842	0.1679	0.628633551	0.1445351	0.1226581	0.1335966

Table 4.9 (cont'd)
Transportation Cost Matrix For Bilkent Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
377	12993.246	885.951	885.951	0.1679	2.181566003	0.4448509	0.5052501	0.4750505
378	13367.114	918.474	918.474	0.1679	2.244338441	0.4626058	0.5207152	0.4916605
379	12515.56	808.606	808.606	0.1679	2.101362524	0.4026266	0.4854906	0.4440586
380	20725.973	1425.09	1425.09	0.1679	3.479890867	0.7391778	0.8251151	0.7821464
381	21243.164	1532.771	1532.771	0.1679	3.566727236	0.7979631	0.8465087	0.8222359
382	18215.951	1259.771	1259.771	0.1679	3.058458173	0.6489268	0.7212878	0.6851073
383	15512.326	1297.918	1297.918	0.1679	2.604519535	0.669752	0.6094521	0.639602
384	11470.298	741.653	741.653	0.1679	1.925863034	0.3660756	0.4422532	0.4041644
385	15737.29	1142.467	1142.467	0.1679	2.642290991	0.5848882	0.6187577	0.6018229
386	17197.555	1062.341	1062.341	0.1679	2.887469485	0.5411457	0.6791617	0.6101537
387	20073.502	1480.368	1480.368	0.1679	3.370340986	0.7693552	0.7981255	0.7837404
388	14719.531	943.927	943.927	0.1679	2.471409255	0.4765011	0.576658	0.5265796
389	24499.912	1612.501	1612.501	0.1679	4.113535225	0.8414893	0.9812244	0.9113569
390	15378.198	1389.793	1389.793	0.1679	2.581999444	0.7199085	0.6039038	0.6619062
391	16778.352	1513.801	1513.801	0.1679	2.817085301	0.787607	0.6618214	0.7247142
392	16215.637	1465.911	1465.911	0.1679	2.722605452	0.7614628	0.6385446	0.7000037
393	16004.221	1444.913	1444.913	0.1679	2.687108706	0.7499996	0.6297993	0.6898995
394	15341.896	1385.111	1385.111	0.1679	2.575904338	0.7173525	0.6024022	0.6598773
MIN	778.84	71.087	71.087	0.1679	0.130767236	0	0	0
MAX	24953.811	1902.856	1902.856	0.1679	4.189744867	1	1	1

Table 4.10

Transportation Cost Matrix For 5M Migros Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
1	11282.6	852.4	852.4	0.17	1.8944	0.5337	0.3983	0.4660
2	5332.0	280.7	280.7	0.17	0.8952	0.1245	0.1616	0.1430
3	4333.6	272.1	272.1	0.17	0.7276	0.1183	0.1218	0.1201
4	4273.2	285.1	285.1	0.17	0.7175	0.1277	0.1194	0.1236
5	5006.0	289.3	289.3	0.17	0.8405	0.1306	0.1486	0.1396
6	4474.7	231.3	231.3	0.17	0.7513	0.0891	0.1274	0.1083
7	4229.4	300.4	300.4	0.17	0.7101	0.1386	0.1177	0.1282
8	5323.5	299.6	299.6	0.17	0.8938	0.1381	0.1612	0.1496
9	4568.2	251.5	251.5	0.17	0.7670	0.1036	0.1312	0.1174
10	4731.4	272.4	272.4	0.17	0.7944	0.1186	0.1377	0.1281
11	4495.0	251.5	251.5	0.17	0.7547	0.1036	0.1283	0.1159
12	6071.4	329.7	329.7	0.17	1.0194	0.1596	0.1910	0.1753
13	6302.4	379.4	379.4	0.17	1.0582	0.1952	0.2002	0.1977
14	5780.4	353.8	353.8	0.17	0.9705	0.1768	0.1794	0.1781
15	5785.4	366.5	366.5	0.17	0.9714	0.1860	0.1796	0.1828
16	6476.2	413.9	413.9	0.17	1.0874	0.2198	0.2071	0.2135
17	6407.0	416.8	416.8	0.17	1.0757	0.2219	0.2043	0.2131
18	6754.6	453.6	453.6	0.17	1.1341	0.2483	0.2182	0.2332
19	7303.2	487.1	487.1	0.17	1.2262	0.2723	0.2400	0.2561
20	7350.2	491.2	491.2	0.17	1.2341	0.2752	0.2419	0.2585
21	8067.0	557.3	557.3	0.17	1.3544	0.3225	0.2704	0.2964
22	6825.0	456.6	456.6	0.17	1.1459	0.2504	0.2210	0.2357
23	6057.9	360.7	360.7	0.17	1.0171	0.1818	0.1904	0.1861
24	6426.2	390.0	390.0	0.17	1.0790	0.2028	0.2051	0.2039
25	6690.0	438.1	438.1	0.17	1.1232	0.2371	0.2156	0.2264
26	6588.9	404.4	404.4	0.17	1.1063	0.2131	0.2116	0.2123
27	5590.7	313.7	313.7	0.17	0.9387	0.1481	0.1718	0.1600
28	5748.1	328.6	328.6	0.17	0.9651	0.1588	0.1781	0.1684
29	6477.6	392.8	392.8	0.17	1.0876	0.2048	0.2071	0.2059
30	6039.1	380.8	380.8	0.17	1.0140	0.1962	0.1897	0.1929
31	6642.6	458.8	458.8	0.17	1.1153	0.2520	0.2137	0.2328
32	7371.2	533.4	533.4	0.17	1.2376	0.3054	0.2427	0.2740
33	7815.5	575.2	575.2	0.17	1.3122	0.3353	0.2604	0.2978
34	7590.1	554.9	554.9	0.17	1.2744	0.3208	0.2514	0.2861
35	8489.8	634.1	634.1	0.17	1.4254	0.3775	0.2872	0.3323
36	8444.1	629.4	629.4	0.17	1.4178	0.3741	0.2854	0.3298
37	7440.1	479.1	479.1	0.17	1.2492	0.2665	0.2454	0.2560
38	7822.6	546.9	546.9	0.17	1.3134	0.3150	0.2606	0.2878
39	8495.5	573.6	573.6	0.17	1.4264	0.3342	0.2874	0.3108
40	6899.6	389.8	389.8	0.17	1.1584	0.2026	0.2239	0.2132
41	7206.7	398.1	398.1	0.17	1.2100	0.2086	0.2361	0.2224
42	8571.0	460.1	460.1	0.17	1.4391	0.2529	0.2904	0.2717
43	9060.1	498.4	498.4	0.17	1.5212	0.2803	0.3099	0.2951
44	10424.0	597.3	597.3	0.17	1.7502	0.3511	0.3641	0.3576
45	9858.2	641.5	641.5	0.17	1.6552	0.3827	0.3416	0.3622
46	10281.9	684.1	684.1	0.17	1.7263	0.4133	0.3585	0.3859
47	11393.5	783.1	783.1	0.17	1.9130	0.4841	0.4027	0.4434
48	11780.4	756.5	756.5	0.17	1.9779	0.4651	0.4181	0.4416
49	10900.6	708.5	708.5	0.17	1.8302	0.4307	0.3831	0.4069
50	5946.2	341.6	341.6	0.17	0.9984	0.1681	0.1860	0.1770
51	5721.4	314.0	314.0	0.17	0.9606	0.1483	0.1770	0.1627

Table 4.10
Transportation Cost Matrix For 5M Migros Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial Cost	Total Cost
52	4018.7	257.1	257.1	0.17	0.6747	0.1076	0.1093	0.1085
53	6713.8	395.1	395.1	0.17	1.1272	0.2064	0.2165	0.2115
54	4404.5	292.7	292.7	0.17	0.7395	0.1331	0.1247	0.1289
55	7182.9	402.1	402.1	0.17	1.2060	0.2114	0.2352	0.2233
56	7380.6	431.9	431.9	0.17	1.2392	0.2328	0.2431	0.2379
57	6421.4	358.2	358.2	0.17	1.0782	0.1800	0.2049	0.1924
58	7322.6	417.1	417.1	0.17	1.2295	0.2221	0.2408	0.2314
59	3205.5	210.8	210.8	0.17	0.5382	0.0745	0.0769	0.0757
60	3173.9	186.4	186.4	0.17	0.5329	0.0570	0.0757	0.0664
61	3957.4	211.5	211.5	0.17	0.6644	0.0749	0.1069	0.0909
62	4351.4	238.2	238.2	0.17	0.7306	0.0941	0.1225	0.1083
63	2239.6	154.1	154.1	0.17	0.3760	0.0339	0.0385	0.0362
64	2778.4	170.6	170.6	0.17	0.4665	0.0457	0.0600	0.0528
65	5277.5	288.9	288.9	0.17	0.8861	0.1304	0.1594	0.1449
66	5249.6	303.2	303.2	0.17	0.8814	0.1406	0.1583	0.1494
67	5569.7	343.4	343.4	0.17	0.9351	0.1694	0.1710	0.1702
68	5617.0	335.5	335.5	0.17	0.9431	0.1637	0.1729	0.1683
69	5848.1	337.3	337.3	0.17	0.9819	0.1650	0.1821	0.1735
70	5667.3	320.9	320.9	0.17	0.9515	0.1533	0.1749	0.1641
71	5867.1	415.8	415.8	0.17	0.9851	0.2212	0.1828	0.2020
72	6415.3	446.7	446.7	0.17	1.0771	0.2433	0.2047	0.2240
73	7026.9	501.9	501.9	0.17	1.1798	0.2828	0.2290	0.2559
74	6746.5	492.1	492.1	0.17	1.1327	0.2758	0.2178	0.2468
75	7944.2	587.1	587.1	0.17	1.3338	0.3438	0.2655	0.3046
76	9301.4	670.1	670.1	0.17	1.5617	0.4032	0.3195	0.3614
77	8470.6	533.2	533.2	0.17	1.4222	0.3052	0.2864	0.2958
78	9271.0	660.8	660.8	0.17	1.5566	0.3965	0.3183	0.3574
79	9431.1	530.5	530.5	0.17	1.5835	0.3033	0.3246	0.3140
80	9284.8	630.1	630.1	0.17	1.5589	0.3746	0.3188	0.3467
81	10502.2	720.2	720.2	0.17	1.7633	0.4391	0.3673	0.4032
82	10539.2	724.3	724.3	0.17	1.7695	0.4421	0.3687	0.4054
83	10283.6	754.2	754.2	0.17	1.7266	0.4634	0.3586	0.4110
84	9426.2	717.9	717.9	0.17	1.5827	0.4374	0.3244	0.3809
85	11658.9	823.0	823.0	0.17	1.9575	0.5127	0.4133	0.4630
86	11993.6	855.6	855.6	0.17	2.0137	0.5360	0.4266	0.4813
87	13010.9	989.2	989.2	0.17	2.1845	0.6317	0.4671	0.5494
88	12528.1	953.8	953.8	0.17	2.1035	0.6063	0.4479	0.5271
89	10820.3	844.5	844.5	0.17	1.8167	0.5281	0.3799	0.4540
90	9306.4	709.0	709.0	0.17	1.5625	0.4311	0.3197	0.3754
91	11266.9	841.5	841.5	0.17	1.8917	0.5259	0.3977	0.4618
92	11905.4	929.1	929.1	0.17	1.9989	0.5886	0.4231	0.5059
93	13084.5	1035.8	1035.8	0.17	2.1969	0.6650	0.4700	0.5675
94	4443.4	272.1	272.1	0.17	0.7460	0.1184	0.1262	0.1223
95	4979.7	291.4	291.4	0.17	0.8361	0.1322	0.1475	0.1399
96	5176.8	309.2	309.2	0.17	0.8692	0.1449	0.1554	0.1502
97	4940.0	305.5	305.5	0.17	0.8294	0.1423	0.1460	0.1441
98	4816.0	306.9	306.9	0.17	0.8086	0.1433	0.1410	0.1422
99	4574.9	285.6	285.6	0.17	0.7681	0.1280	0.1314	0.1297

Table 4.10 (cont'd)
 Transportation Cost Matrix For 5M Migros Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial C	Total Cost
100	4574.94	285.64	285.64	0.1679	0.768132426	0.1280431	0.1314338	0.1297385
101	4354.759	265.808	265.808	0.1679	0.731164036	0.1138478	0.1226736	0.1182607
102	4595.333	287.669	287.669	0.1679	0.771556411	0.1294954	0.1322452	0.1308703
103	5223.409	343.241	343.241	0.1679	0.877010371	0.1692726	0.1572341	0.1632534
104	5372.193	357.119	357.119	0.1679	0.901991205	0.1792061	0.1631537	0.1711799
105	4966.047	321.592	321.592	0.1679	0.833799291	0.1537767	0.1469946	0.1503857
106	5020.647	326.33	326.33	0.1679	0.842966631	0.1571681	0.1491669	0.1531675
107	4786.164	305.107	305.107	0.1679	0.803596936	0.1419771	0.1398377	0.1409074
108	4919.407	318.232	318.232	0.1679	0.825968435	0.1513717	0.145139	0.1482553
109	4876.978	315.119	315.119	0.1679	0.818844606	0.1491435	0.1434509	0.1462972
110	4530.99	281.284	281.284	0.1679	0.760753221	0.1249252	0.1296852	0.1273052
111	4414.345	282.102	282.102	0.1679	0.741168526	0.1255107	0.1250443	0.1252775
112	4481.464	286.683	286.683	0.1679	0.752437806	0.1287897	0.1277147	0.1282522
113	4898.038	315.232	315.232	0.1679	0.82238058	0.1492244	0.1442888	0.1467566
114	4866.736	340.084	340.084	0.1679	0.817124974	0.1670129	0.1430434	0.1550281
115	5059.469	356.119	356.119	0.1679	0.849484845	0.1784903	0.1507115	0.1646009
116	4632.122	352.518	352.518	0.1679	0.777733284	0.1759128	0.1337089	0.1548109
117	4759.229	316.119	316.119	0.1679	0.799074549	0.1498593	0.138766	0.1443127
118	4768.314	368.119	368.119	0.1679	0.800599921	0.1870797	0.1391275	0.1631036
119	4660.266	350.119	350.119	0.1679	0.782458661	0.1741957	0.1348286	0.1545122
120	4915.772	373.119	373.119	0.1679	0.825358119	0.1906585	0.1449943	0.1678264
121	5085.164	387.524	387.524	0.1679	0.853799036	0.2009693	0.1517339	0.1763516
122	4813.871	362.59	362.59	0.1679	0.808248941	0.1831221	0.1409401	0.1620311
123	5322.526	405.703	405.703	0.1679	0.893652115	0.2139814	0.1611777	0.1875795
124	4646.18	348.484	348.484	0.1679	0.780093622	0.1730254	0.1342682	0.1536468
125	4703.772	345.739	345.739	0.1679	0.789763319	0.1710606	0.1365596	0.1538101
126	4501.797	342.119	342.119	0.1679	0.755851716	0.1684695	0.1285237	0.1484966
127	4329.923	318.728	318.728	0.1679	0.726994072	0.1517267	0.1216854	0.1367061
128	4435.041	334.712	334.712	0.1679	0.744643384	0.1631677	0.1258677	0.1445177
129	4584.393	348.837	348.837	0.1679	0.769719585	0.1732781	0.1318099	0.152544
130	4598.498	350.119	350.119	0.1679	0.772087814	0.1741957	0.1323711	0.1532834
131	4077.866	306.1	306.1	0.1679	0.684673701	0.1426879	0.111657	0.1271724
132	4261.476	322.159	322.159	0.1679	0.71550182	0.1541826	0.1189622	0.1365724
133	3829.36	268.219	268.219	0.1679	0.642949544	0.1155736	0.1017698	0.1086717
134	3936.458	265.318	265.318	0.1679	0.660931298	0.1134971	0.1060308	0.109764
135	3777.794	246.284	246.284	0.1679	0.634291613	0.099873	0.0997182	0.0997956
136	4073.325	270.493	270.493	0.1679	0.683911268	0.1172013	0.1114763	0.1143388
137	4170.089	272.366	272.366	0.1679	0.700157943	0.1185419	0.1153262	0.1169341
138	4239.91	259.45	259.45	0.1679	0.711880889	0.1092969	0.1181041	0.1137005
139	3915.751	230.746	230.746	0.1679	0.657454593	0.0887513	0.105207	0.0969791
140	4006.82	235.596	235.596	0.1679	0.672745078	0.0922228	0.1088303	0.1005266
141	3772.241	212.983	212.983	0.1679	0.633359264	0.0760369	0.0994972	0.0877671
142	3772.24	212.98	212.98	0.1679	0.633359096	0.0760348	0.0994972	0.087766
143	7266.258	528.119	528.119	0.1679	1.220004718	0.3016039	0.238512	0.270058
144	7049.975	494.481	494.481	0.1679	1.183690803	0.2775266	0.2299069	0.2537167
145	6975.747	436.111	436.111	0.1679	1.171227921	0.2357467	0.2269536	0.2313502
146	6587.254	400.999	400.999	0.1679	1.105999947	0.2106144	0.2114968	0.2110556
147	6060.96	334.706	334.706	0.1679	1.017635184	0.1631634	0.1905574	0.1768604
148	5336.652	325.912	325.912	0.1679	0.896023871	0.1568689	0.1617397	0.1593043
149	5119.747	308.21	308.21	0.1679	0.859605521	0.1441982	0.1531098	0.148654
150	6260.896	384.232	384.232	0.1679	1.051204438	0.198613	0.1985121	0.1985626
151	6358.778	431.333	431.333	0.1679	1.067638826	0.2323268	0.2024065	0.2173666
152	7064.979	486.804	486.804	0.1679	1.186209974	0.2720316	0.2305038	0.2512677

Table 4.10 (cont'd)
Transportation Cost Matrix For 5M Migros Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial C	Total Cost
153	7406.914	523.877	523.877	0.1679	1.243620861	0.2985676	0.2441082	0.2713379
154	6437.031	438.352	438.352	0.1679	1.080777505	0.2373508	0.2055199	0.2214354
155	6676.037	459.824	459.824	0.1679	1.120906612	0.25272	0.2150292	0.2338746
156	7856.801	566.944	566.944	0.1679	1.319156888	0.3293939	0.2620077	0.2957008
157	7749.101	559.344	559.344	0.1679	1.301074058	0.323954	0.2577226	0.2908383
158	6945.04	496.114	496.114	0.1679	1.166072216	0.2786955	0.2257319	0.2522137
159	6270.948	435.147	435.147	0.1679	1.052892169	0.2350567	0.1989121	0.2169844
160	5826.236	396.064	396.064	0.1679	0.978225024	0.207082	0.1812185	0.1941503
161	5777.048	379.188	379.188	0.1679	0.969966359	0.1950026	0.1792615	0.1871321
162	5207.319	326.681	326.681	0.1679	0.87430886	0.1574193	0.156594	0.1570066
163	4606.683	262.163	262.163	0.1679	0.773462076	0.1112388	0.1326968	0.1219678
164	3674.13	211.396	211.396	0.1679	0.616886427	0.074901	0.0955937	0.0852474
165	2643.054	145.763	145.763	0.1679	0.443768767	0.0279224	0.0545708	0.0412466
166	4050.847	223.447	223.447	0.1679	0.680137211	0.0835268	0.110582	0.0970544
167	4539.002	280.119	280.119	0.1679	0.762098436	0.1240913	0.130004	0.1270476
168	4296.409	257.48	257.48	0.1679	0.721367071	0.1078869	0.120352	0.1141194
169	4374.552	286.062	286.062	0.1679	0.734487281	0.1283452	0.1234611	0.1259031
170	2478.406	151.943	151.943	0.1679	0.416124367	0.0323459	0.04802	0.040183
171	2160.414	185.69	185.69	0.1679	0.362733511	0.0565013	0.0353682	0.0459347
172	3390.551	240.77	240.77	0.1679	0.569273513	0.0959262	0.0843111	0.0901187
173	3678.413	243.769	243.769	0.1679	0.617605543	0.0980728	0.0957641	0.0969185
174	3615.496	233.232	233.232	0.1679	0.607041778	0.0905307	0.0932609	0.0918958
175	3193.546	193.394	193.394	0.1679	0.536196373	0.0620156	0.076473	0.0692443
176	3281.356	215.651	215.651	0.1679	0.550939672	0.0779466	0.0799666	0.0789566
177	1271.464	106.753	106.753	0.1679	0.213478806	0	0	0
178	1944.844	166.119	166.119	0.1679	0.326539308	0.0424928	0.0267914	0.0346421
179	1818.449	129.947	129.947	0.1679	0.305317587	0.0166017	0.0217626	0.0191822
180	4554.922	291.252	291.252	0.1679	0.764771404	0.1320601	0.1306374	0.1313487
181	5943.662	371.411	371.411	0.1679	0.99794085	0.189436	0.1858905	0.1876633
182	4360.962	237.789	237.789	0.1679	0.73220552	0.0937925	0.1229204	0.1083564
183	4580.093	351.094	351.094	0.1679	0.768997615	0.1748936	0.1316388	0.1532662
184	3841.54	284.235	284.235	0.1679	0.644994566	0.1270375	0.1022544	0.1146459
185	3360.916	239.967	239.967	0.1679	0.564297796	0.0953515	0.083132	0.0892417
186	3075.137	213.994	213.994	0.1679	0.516315502	0.0767606	0.0717619	0.0742612
187	3264.548	200.735	200.735	0.1679	0.548117609	0.0672701	0.0792979	0.073284
188	3644.935	251.786	251.786	0.1679	0.611984587	0.1038112	0.0944322	0.0991217
189	4395.272	333.302	333.302	0.1679	0.737966169	0.1621585	0.1242855	0.143222
190	4987.297	371.52	371.52	0.1679	0.837367166	0.189514	0.1478401	0.168677
191	3923.373	283.635	283.635	0.1679	0.658734327	0.126608	0.1055102	0.1160591
192	5398.292	358.324	358.324	0.1679	0.906373227	0.1800686	0.1641921	0.1721304
193	6112.333	422.092	422.092	0.1679	1.026260711	0.2257123	0.1926013	0.2091568
194	6486.848	455.43	455.43	0.1679	1.089141779	0.2495748	0.207502	0.2285384
195	6059.42	449.906	449.906	0.1679	1.017376618	0.2456209	0.1904961	0.2180585
196	5598.929	374.333	374.333	0.1679	0.940060179	0.1915275	0.1721748	0.1818511
197	2726.083	162.424	162.424	0.1679	0.457709336	0.039848	0.0578742	0.0488611
198	3255.986	217.634	217.634	0.1679	0.546680049	0.079366	0.0789572	0.0791616
199	3345.515	225.007	225.007	0.1679	0.561711969	0.0846434	0.0825193	0.0835814
200	4151.626	297.107	297.107	0.1679	0.697058005	0.1362509	0.1145916	0.1254213
201	4544.623	331.014	331.014	0.1679	0.763042202	0.1605208	0.1302276	0.1453742
202	4277.524	308.741	308.741	0.1679	0.71819628	0.1445783	0.1196007	0.1320895
203	3674.582	254.683	254.683	0.1679	0.616962318	0.1058848	0.0956117	0.1007483
204	3207.778	213.373	213.373	0.1679	0.538585926	0.0763161	0.0770392	0.0766776

Table 4.10 (cont'd)
 Transportation Cost Matrix For 5M Migros Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial C	Total Cost
205	3792.44	265.243	265.243	0.1679	0.636750676	0.1134434	0.1003009	0.1068721
206	4872.364	357.781	357.781	0.1679	0.818069916	0.17968	0.1432673	0.1614736
207	5581.798	425.129	425.129	0.1679	0.937183884	0.2278861	0.1714932	0.1996896
208	4911.129	342.705	342.705	0.1679	0.824578559	0.1688889	0.1448096	0.1568493
209	7308.331	563.882	563.882	0.1679	1.227068775	0.3272022	0.2401859	0.2836941
210	3951.472	256.526	256.526	0.1679	0.663452149	0.107204	0.1066282	0.1069161
211	3520.74	205.372	205.372	0.1679	0.591132246	0.0705892	0.0894909	0.08004
212	3992.403	260.806	260.806	0.1679	0.670324464	0.1102675	0.1082567	0.1092621
213	7237.059	522.916	522.916	0.1679	1.215102206	0.2978797	0.2373503	0.267615
214	8340.459	622.494	622.494	0.1679	1.400363066	0.3691553	0.2812507	0.325203
215	8012.72	591.4	591.4	0.1679	1.345335688	0.346899	0.2682111	0.307555
216	8679.896	651.119	651.119	0.1679	1.457354538	0.3896444	0.2947557	0.3422001
217	8351.003	623.349	623.349	0.1679	1.402133404	0.3697673	0.2816702	0.3257188
218	8641.923	648.36	648.36	0.1679	1.450978872	0.3876696	0.2932449	0.3404573
219	7079.678	508.162	508.162	0.1679	1.188677936	0.2873192	0.2310886	0.2592039
220	7486.91	575.315	575.315	0.1679	1.257052189	0.3353857	0.247291	0.2913383
221	5120.782	365.997	365.997	0.1679	0.859779298	0.1855608	0.153151	0.1693559
222	6996.318	531.779	531.779	0.1679	1.174681792	0.3042237	0.227772	0.2659978
223	8642.725	682.402	682.402	0.1679	1.451113528	0.4120361	0.2932768	0.3526565
224	9102.467	689.879	689.879	0.1679	1.528304209	0.4173879	0.3115684	0.3644781
225	7540.701	551.208	551.208	0.1679	1.266083698	0.3181305	0.2494311	0.2837808
226	8335.341	623.734	623.734	0.1679	1.399503754	0.3700429	0.2810471	0.325545
227	9345.444	714.375	714.375	0.1679	1.569100048	0.4349216	0.3212356	0.3780786
228	9284.279	706.353	706.353	0.1679	1.558830444	0.4291796	0.318802	0.3739908
229	9340.892	715.119	715.119	0.1679	1.568335767	0.4354541	0.3210545	0.3782543
230	8341.959	612.704	612.704	0.1679	1.400614916	0.3621479	0.2813104	0.3217291
231	10276.42	784.274	784.274	0.1679	1.725410918	0.4849537	0.3582759	0.4216148
232	8593.38	575.235	575.235	0.1679	1.442828502	0.3353284	0.2913136	0.313321
233	7417.282	457.395	457.395	0.1679	1.245361648	0.2509813	0.2445207	0.247751
234	6831.273	421.64	421.64	0.1679	1.146970737	0.2253887	0.2212055	0.2232971
235	7330.818	421.729	421.729	0.1679	1.230844342	0.2254524	0.2410806	0.2332665
236	7337.774	398.045	398.045	0.1679	1.232012255	0.2085	0.2413574	0.2249287
237	7915.92	423.288	423.288	0.1679	1.329082968	0.2265683	0.2643598	0.2454641
238	7736.127	463.582	463.582	0.1679	1.298895723	0.2554098	0.2572065	0.2563081
239	9163.294	622.835	622.835	0.1679	1.538517063	0.3693994	0.3139885	0.3416939
240	8927.223	569.564	569.564	0.1679	1.498880742	0.3312693	0.304596	0.3179326
241	8739.928	536.786	536.786	0.1679	1.467433911	0.3078075	0.2971442	0.3024759
242	11980.363	852.863	852.863	0.1679	2.011502948	0.5340481	0.4260698	0.4800589
243	12465.162	895.742	895.742	0.1679	2.0929007	0.5647398	0.4453583	0.5050491
244	12991.74	942.041	942.041	0.1679	2.181313146	0.5978796	0.466309	0.5320943
245	13443.463	984.119	984.119	0.1679	2.257157438	0.627998	0.4842815	0.5561398
246	14323.169	1065.119	1065.119	0.1679	2.404860075	0.6859759	0.5192819	0.6026289
247	13545.537	995.966	995.966	0.1679	2.274295662	0.6364778	0.4883427	0.5624103
248	14607.392	1089.305	1089.305	0.1679	2.452581117	0.7032877	0.5305902	0.6169389
249	15230.199	1147.013	1147.013	0.1679	2.557150412	0.7445937	0.5553695	0.6499816
250	15922.54	1208.204	1208.204	0.1679	2.673394466	0.7883928	0.5829153	0.6856541
251	10274.45	669.883	669.883	0.1679	1.725080155	0.4030753	0.3581975	0.3806364
252	11275.939	759.902	759.902	0.1679	1.893230158	0.4675088	0.3980433	0.432776
253	9070.184	499.65	499.65	0.1679	1.522883894	0.2812265	0.3102839	0.2957552
254	8057.369	550.169	550.169	0.1679	1.352832255	0.3173868	0.2699876	0.2936872
255	8665.345	607.174	607.174	0.1679	1.454911426	0.3581896	0.2941768	0.3261832
256	6735.51	406.106	406.106	0.1679	1.130892129	0.2142699	0.2173954	0.2158326

Table 4.10 (cont'd)
Transportation Cost Matrix For 5M Migros Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial C	Total Cost
257	6921.102	438.473	438.473	0.1679	1.162053026	0.2374374	0.2247794	0.2311084
258	7649.968	423.68	423.68	0.1679	1.284429627	0.2268489	0.2537785	0.2403137
259	8383.261	445.055	445.055	0.1679	1.407549522	0.2421486	0.2829537	0.2625512
260	11184.42	673.455	673.455	0.1679	1.877864118	0.405632	0.394402	0.400017
261	9686.028	631.415	631.415	0.1679	1.626284101	0.3755408	0.3347862	0.3551635
262	8068.746	475.669	475.669	0.1679	1.354742453	0.2640614	0.2704402	0.2672508
263	8755.398	536.367	536.367	0.1679	1.470031324	0.3075076	0.2977597	0.3026337
264	9571.502	610.113	610.113	0.1679	1.607055186	0.3602933	0.3302296	0.3452615
265	9943.156	642.849	642.849	0.1679	1.669455892	0.383725	0.3450165	0.3643707
266	10795.822	722.482	722.482	0.1679	1.812618514	0.4407244	0.3789411	0.4098327
267	9637.068	614.681	614.681	0.1679	1.618063717	0.363563	0.3328383	0.3482006
268	9549.153	618.77	618.77	0.1679	1.603302789	0.3664898	0.3293405	0.3479151
269	8306.545	503.513	503.513	0.1679	1.394668906	0.2839915	0.2799014	0.2819465
270	7669.794	436.023	436.023	0.1679	1.287758413	0.2356838	0.2545673	0.2451255
271	8027.032	469.899	469.899	0.1679	1.347738673	0.2599314	0.2687806	0.264356
272	8153.541	481.388	481.388	0.1679	1.368979534	0.268155	0.2738139	0.2709844
273	8731.361	527.044	527.044	0.1679	1.465995512	0.3008345	0.2968034	0.2988189
274	4579.237	300.163	300.163	0.1679	0.768853892	0.1384383	0.1316048	0.1350216
275	3592.08	262.119	262.119	0.1679	0.603110232	0.1112073	0.0923292	0.1017683
276	3858.365	225.817	225.817	0.1679	0.647819484	0.0852232	0.1029238	0.0940735
277	3591.566	195.693	195.693	0.1679	0.603023931	0.0636612	0.0923088	0.077985
278	11742.732	802.359	802.359	0.1679	1.971604703	0.4978985	0.4166153	0.4572569
279	10064.08	654.125	654.125	0.1679	1.689759032	0.3917961	0.3498276	0.3708118
280	9366.743	589.275	589.275	0.1679	1.57267615	0.3453779	0.322083	0.3337305
281	6232.071	378.119	378.119	0.1679	1.046364721	0.1942374	0.1973653	0.1958014
282	4602.428	324.715	324.715	0.1679	0.772747661	0.1560121	0.1325275	0.1442698
283	4940.212	316.749	316.749	0.1679	0.829461595	0.1503102	0.1459667	0.1481385
284	5432.257	366.015	366.015	0.1679	0.91207595	0.1855737	0.1655435	0.1755586
285	6672.812	444.54	444.54	0.1679	1.120365135	0.24178	0.2149008	0.2283404
286	8568.199	624.063	624.063	0.1679	1.438600612	0.3702784	0.2903117	0.330295
287	5183.864	390.691	390.691	0.1679	0.870370766	0.2032362	0.1556608	0.1794485
288	5815.046	446.467	446.467	0.1679	0.976346223	0.2431593	0.1807733	0.2119663
289	6078.365	466.841	466.841	0.1679	1.020557484	0.2577426	0.1912499	0.2244962
290	6839.051	536.985	536.985	0.1679	1.148276663	0.30795	0.2215149	0.2647325
291	7607.304	605.935	605.935	0.1679	1.277266342	0.3573028	0.252081	0.3046919
292	6334.33	494.049	494.049	0.1679	1.063534007	0.2772174	0.2014338	0.2393256
293	6093.792	471.592	471.592	0.1679	1.023147677	0.2611432	0.1918637	0.2265034
294	5566.074	425.741	425.741	0.1679	0.934543825	0.2283241	0.1708676	0.1995959
295	4920.156	366.407	366.407	0.1679	0.826094192	0.1858543	0.1451688	0.1655115
296	4950.461	367.972	367.972	0.1679	0.831182402	0.1869744	0.1463745	0.1666745
297	5328.187	403.856	403.856	0.1679	0.894602597	0.2126594	0.1614029	0.1870311
298	6152.686	477.98	477.98	0.1679	1.033035979	0.2657156	0.1942068	0.2299612
299	6703.543	526.405	526.405	0.1679	1.12552487	0.3003771	0.2161235	0.2582503
300	7083.356	551.02	551.02	0.1679	1.189295472	0.3179959	0.231235	0.2746154
301	10238.78	794.23	794.23	0.1679	1.719091162	0.4920799	0.3567783	0.4244291
302	8996.012	661.325	661.325	0.1679	1.510430415	0.3969496	0.3073329	0.3521413
303	8047.878	577.85	577.85	0.1679	1.351238716	0.3372002	0.2696099	0.3034051
304	11006.003	734.172	734.172	0.1679	1.847907904	0.4490918	0.3873034	0.4181976
305	13249.641	857.28	857.28	0.1679	2.224614724	0.5372096	0.47657	0.5068898
306	7775.999	487.119	487.119	0.1679	1.305590232	0.2722571	0.2587928	0.2655249
307	8712.153	507.545	507.545	0.1679	1.462770489	0.2868775	0.2960391	0.2914583
308	8961.597	559.896	559.896	0.1679	1.504652136	0.3243491	0.3059636	0.3151564

Table 4.10 (cont'd)
 Transportation Cost Matrix For 5M Migros Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial C	Total Cost
309	8901.451	604.969	604.969	0.1679	1.494553623	0.3566113	0.3035706	0.330091
310	10311.891	729.576	729.576	0.1679	1.731366499	0.4458021	0.3596871	0.4027446
311	7584.163	455.049	455.049	0.1679	1.273380968	0.2493021	0.2511603	0.2502312
312	5890.398	371.166	371.166	0.1679	0.988997824	0.1892606	0.1837713	0.186516
313	8516.697	526.876	526.876	0.1679	1.429953426	0.3007142	0.2882626	0.2944884
314	14857.265	904.119	904.119	0.1679	2.494534794	0.5707359	0.5405318	0.5556338
315	15545.211	960.937	960.937	0.1679	2.610040927	0.6114049	0.5679027	0.5896538
316	10707.224	658.182	658.182	0.1679	1.79774291	0.3947	0.3754161	0.385058
317	12424.732	970.353	970.353	0.1679	2.086112503	0.6181446	0.4437497	0.5309472
318	17334.426	921.711	921.711	0.1679	2.910450125	0.5833278	0.6390894	0.6112086
319	10498.038	607.006	607.006	0.1679	1.76262058	0.3580694	0.3670933	0.3625813
320	10581.581	729.389	729.389	0.1679	1.77664745	0.4456683	0.3704172	0.4080427
321	12315.45	853.31	853.31	0.1679	2.067764055	0.534368	0.4394018	0.4868849
322	18048.814	1042.053	1042.053	0.1679	3.030395871	0.6694658	0.6675124	0.6684891
323	16055.208	862.119	862.119	0.1679	2.695669423	0.5406733	0.5881937	0.5644335
324	18200.936	1056.135	1056.135	0.1679	3.055937154	0.6795454	0.6735648	0.6765551
325	18557.73	1089.119	1089.119	0.1679	3.115842867	0.7031546	0.6877604	0.6954575
326	19453.594	1169.566	1169.566	0.1679	3.266258433	0.7607366	0.7234037	0.7420702
327	20067.359	1223.324	1223.324	0.1679	3.369309576	0.7992154	0.7478233	0.7735193
328	21736.906	1285.894	1285.894	0.1679	3.649626517	0.8440015	0.8142487	0.8291251
329	21665.457	1230.958	1230.958	0.1679	3.63763023	0.8046796	0.811406	0.8080428
330	22658.811	1322.838	1322.838	0.1679	3.804414367	0.8704452	0.8509281	0.8606866
331	24179.795	1369.768	1369.768	0.1679	4.059787581	0.9040366	0.9114428	0.9077397
332	24508.566	1362.652	1362.652	0.1679	4.114988231	0.8989431	0.9245235	0.9117333
333	24003.406	1270.59	1270.59	0.1679	4.030171867	0.8330473	0.9044249	0.8687361
334	24014.148	1374.947	1374.947	0.1679	4.031975449	0.9077436	0.9048523	0.9062979
335	9627.19	692.789	692.789	0.1679	1.616405201	0.4194708	0.3324453	0.3759581
336	24529.367	1317.673	1317.673	0.1679	4.118480719	0.8667482	0.9253511	0.8960496
337	25323.459	1389.869	1389.869	0.1679	4.251808766	0.9184244	0.9569452	0.9376848
338	4595.181	322.255	322.255	0.1679	0.77153089	0.1542513	0.1322391	0.1432452
339	4172.281	289.982	289.982	0.1679	0.70052598	0.131151	0.1154134	0.1232822
340	5122.356	345.554	345.554	0.1679	0.860043572	0.1709282	0.1532136	0.1620709
341	11052.827	675.055	675.055	0.1679	1.855769653	0.4067773	0.3891664	0.3979718
342	11957.658	678.242	678.242	0.1679	2.007690778	0.4090584	0.4251665	0.4171125
343	9123.67	655.947	655.947	0.1679	1.531864193	0.3931002	0.312412	0.3527561
344	10391.28	751.377	751.377	0.1679	1.744695912	0.4614068	0.3628458	0.4121263
345	10251.738	750.573	750.573	0.1679	1.72126681	0.4608313	0.3572939	0.4090626
346	12799.719	924.07	924.07	0.1679	2.14907282	0.5850164	0.4586692	0.5218428
347	21939.541	1398.119	1398.119	0.1679	3.683648934	0.9243295	0.8223109	0.8733202
348	23134.113	1365.522	1365.522	0.1679	3.884217573	0.9009974	0.8698388	0.8854181
349	25321.748	1503.837	1503.837	0.1679	4.251521489	1	0.9568771	0.9784386
350	26405.604	1503.119	1503.119	0.1679	4.433500912	0.9994861	1	0.999743
351	25203.871	1395.119	1395.119	0.1679	4.231729941	0.9221822	0.9521872	0.9371847
352	15923.251	1205.904	1205.904	0.1679	2.673513843	0.7867465	0.5829436	0.6848451
353	12712.866	796.434	796.434	0.1679	2.134490201	0.4936575	0.4552136	0.4744355
354	8649.845	522.535	522.535	0.1679	1.452308976	0.297607	0.2935601	0.2955836
355	14917.697	885.345	885.345	0.1679	2.504681326	0.5572979	0.5429361	0.550117
356	17933.596	1079.36	1079.36	0.1679	3.011050768	0.6961693	0.6629283	0.6795488
357	9922.339	512.868	512.868	0.1679	1.665960718	0.2906876	0.3441882	0.3174379
358	19128.592	1138.677	1138.677	0.1679	3.211690597	0.738627	0.710473	0.72455
359	13462.179	994.119	994.119	0.1679	2.260299854	0.6351558	0.4850261	0.560091
360	7750.931	506.905	506.905	0.1679	1.301381315	0.2864194	0.2577955	0.2721074
361	7930.817	542.593	542.593	0.1679	1.331584174	0.3119641	0.2649525	0.2884583

Table 4.10 (cont'd)
 Transportation Cost Matrix For 5M Migros Shopping Center

Quarter	Distance (m)	seconds	timecost (time* k)	cost/km USD	Cost (length*usd)	Timecost	Financial C	Total Cost
362	3858.596	229.24	229.24	0.1679	0.647858268	0.0876733	0.102933	0.0953032
363	4414.967	243.502	243.502	0.1679	0.741272959	0.0978817	0.125069	0.1114754
364	12431.557	762.119	762.119	0.1679	2.08725842	0.4690956	0.4440213	0.4565585
365	10272.036	608.695	608.695	0.1679	1.724674844	0.3592783	0.3581015	0.3586899
366	8602.459	600.677	600.677	0.1679	1.444352866	0.3535392	0.2916748	0.322607
367	12431.56	762.12	762.12	0.1679	2.087258924	0.4690963	0.4440214	0.4565589
368	2907.603	198.937	198.937	0.1679	0.488186544	0.0659831	0.0650963	0.0655397
369	3651.705	265.119	265.119	0.1679	0.61312127	0.1133547	0.0947015	0.1040281
370	4635.779	355.29	355.29	0.1679	0.778347294	0.177897	0.1338544	0.1558757
371	7738.742	618.119	618.119	0.1679	1.299334782	0.3660238	0.2573105	0.3116671
372	8291.903	658.654	658.654	0.1679	1.392210514	0.3950378	0.2793188	0.3371783
373	7125.456	564.739	564.739	0.1679	1.196364062	0.3278157	0.23291	0.2803628
374	8425.205	682.159	682.159	0.1679	1.41459192	0.4118621	0.2846225	0.3482423
375	8082.808	636.054	636.054	0.1679	1.357103463	0.3788613	0.2709997	0.3249305
376	10187.87	556.19	556.19	0.1679	1.710543373	0.3216965	0.3547528	0.3382246
377	4067.465	240.298	240.298	0.1679	0.682927374	0.0955884	0.1112432	0.1034158
378	4441.333	272.821	272.821	0.1679	0.745699811	0.1188676	0.1261181	0.1224928
379	7593.244	430.954	430.954	0.1679	1.274905668	0.2320555	0.2515216	0.2417886
380	20861.441	1136.438	1136.438	0.1679	3.502635944	0.7370244	0.779417	0.7582207
381	19948.818	1244.119	1244.119	0.1679	3.349406542	0.8140999	0.7431069	0.7786034
382	17002.705	971.119	971.119	0.1679	2.85475417	0.6186929	0.6258914	0.6222921
383	19379.662	1161.266	1161.266	0.1679	3.25384525	0.7547957	0.7204622	0.737629
384	4033.93	277.001	277.001	0.1679	0.677296847	0.1218595	0.1099089	0.1158842
385	11117.371	853.815	853.815	0.1679	1.866606591	0.5347295	0.3917344	0.4632319
386	5264.4	331.689	331.689	0.1679	0.88389276	0.1610039	0.158865	0.1599345
387	9567.062	760.716	760.716	0.1679	1.60630971	0.4680914	0.330053	0.3990722
388	3441.468	247.275	247.275	0.1679	0.577822477	0.1005824	0.0863369	0.0934596
389	12639.97	881.849	881.849	0.1679	2.122250963	0.5547956	0.4523133	0.5035544
390	18147.109	1185.097	1185.097	0.1679	3.046899601	0.7718534	0.6714232	0.7216383
391	19995.73	1353.088	1353.088	0.1679	3.357283067	0.8920974	0.7449734	0.8185354
392	19345.771	1296.259	1296.259	0.1679	3.248154951	0.8514205	0.7191138	0.7852672
393	18843.797	1249.976	1249.976	0.1679	3.163873516	0.8182922	0.699142	0.7587171
394	19713.545	1325.459	1325.459	0.1679	3.309904206	0.8723212	0.7337463	0.8030337
MIN	1271.464	106.753	106.753	0.1679	0.213478806	0	0	0
MAX	26405.604	1503.837	1503.837	0.1679	4.433500912	1	1	1

Table 4.11
Attraction Power Calculations - Armada

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
1	0.53	93594	454534.15	0.21	131	0.25	199281	1299073.9	0.15
2	0.16	307339	1316301.40	0.23	132	0.26	189680	1218670.7	0.16
3	0.08	661617	1868047.54	0.35	133	0.23	219448	1493138.2	0.15
4	0.13	388695	1547206.61	0.25	134	0.23	221028	1483468.5	0.15
5	0.12	422587	1466330.42	0.29	135	0.22	231832	1611644.8	0.14
6	0.14	369967	1670727.55	0.22	136	0.22	223822	1440785	0.16
7	0.04	1176079	2330394.23	0.50	137	0.22	223382	1415700.9	0.16
8	0.17	289109	1256424.63	0.23	138	0.22	230616	1455167.6	0.16
9	0.17	293480	1494233.92	0.20	139	0.21	242509	1661127.7	0.15
10	0.18	280114	1388061.49	0.20	140	0.20	245839	1619191.8	0.15
11	0.18	276576	1488272.05	0.19	141	0.19	261429	1820583	0.14
12	0.15	331781	1181108.34	0.28	142	0.19	261428	1820599.9	0.14
13	0.18	280364	1040785.89	0.27	143	0.38	133271	687636.24	0.19
14	0.18	275695	1105678.05	0.25	144	0.37	133854	718630.33	0.19
15	0.20	248732	1056062.70	0.24	145	0.37	134335	767332.4	0.18
16	0.20	253342	961939.76	0.26	146	0.36	138013	824688.72	0.17
17	0.23	217985	920686.14	0.24	147	0.36	138478	940567.64	0.15
18	0.23	221716	874023.14	0.25	148	0.33	152398	1038364.1	0.15
19	0.24	210057	811338.43	0.26	149	0.34	148971	1090500.3	0.14
20	0.24	208062	804318.64	0.26	150	0.38	130449	851738.22	0.15
21	0.28	180913	708036.36	0.26	151	0.40	124711	788956.99	0.16
22	0.24	208847	852776.30	0.24	152	0.43	115412	697547.86	0.17
23	0.24	210154	997289.66	0.21	153	0.45	110550	653514.34	0.17
24	0.26	192409	916029.33	0.21	154	0.40	123519	776626.96	0.16
25	0.26	195106	857969.82	0.23	155	0.42	120010	741406.04	0.16
26	0.27	182174	878668.05	0.21	156	0.48	105165	607477.88	0.17
27	0.23	221582	1122173.30	0.20	157	0.47	106202	616113.19	0.17
28	0.23	213116	1072088.98	0.20	158	0.43	115208	695447.59	0.17
29	0.27	184982	900562.28	0.21	159	0.40	124849	790216.93	0.16
30	0.26	189755	947972.24	0.20	160	0.38	132011	868544.84	0.15
31	0.31	163283	802062.70	0.20	161	0.37	134350	896088.67	0.15
32	0.35	143943	695069.42	0.21	162	0.34	145556	1040764.3	0.14
33	0.37	135084	646368.23	0.21	163	0.31	161162	1292635.2	0.12
34	0.36	139282	669412.87	0.21	164	0.28	181756	1766033	0.10
35	0.40	124074	587266.45	0.21	165	0.22	223072	3401340.2	0.07
36	0.40	124833	591286.77	0.21	166	0.29	174537	1576168.7	0.11
37	0.31	162478	752000.90	0.22	167	0.31	158771	1248178.6	0.13
38	0.35	141644	669919.35	0.21	168	0.30	165220	1369341.4	0.12
39	0.36	139577	634750.56	0.22	169	0.31	159392	1258143.5	0.13
40	0.19	267503	978958.61	0.27	170	0.23	215609	3473451.8	0.06
41	0.20	255484	940445.85	0.27	171	0.21	236728	3104569.5	0.08
42	0.18	275480	860270.41	0.32	172	0.24	209778	1721252.9	0.12
43	0.20	250007	793520.72	0.32	173	0.21	233212	1650948.2	0.14
44	0.28	178344	631543.38	0.28	174	0.21	240214	1730688.9	0.14
45	0.23	219261	678131.42	0.32	175	0.19	267936	2213892.3	0.12

Table 4.11
Attraction Power Calculations - Armada (cont'd)

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
48	0.30	165145	548553.51	0.30	178	0.19	259726	4030196.6	0.06
					179	0.21	236213	6947702.4	0.03
49	0.27	183518	596007.67	0.31	180	0.20	248187	1349932.6	0.18
50	0.02	3246345	4142167.17	0.78	181	0.35	142882	905847.11	0.16
51	0.00	1	1.00	1.00	182	0.29	169529	1433755.5	0.12
52	0.04	1333563	2669782.70	0.50	183	0.28	178903	1104208.7	0.16
53	0.05	1099762	1891817.66	0.58	184	0.27	184846	1389767.9	0.13
54	0.04	1145674	2308152.75	0.50	185	0.25	196481	1718344.6	0.11
55	0.06	877800	1634339.99	0.54	186	0.24	208135	2018804.6	0.10
56	0.07	706482	1469737.17	0.48	187	0.25	200389	2032058.5	0.10
57	0.03	1759067	2590500.17	0.68	188	0.27	186431	1564472.9	0.12
58	0.07	761348	1464879.67	0.52	189	0.30	168311	1148576.7	0.15
59	0.09	566531	2386169.70	0.24	190	0.32	156446	1000016.6	0.16
60	0.14	361291	2400034.92	0.15	191	0.28	177860	1367361	0.13
61	0.15	324149	1843044.54	0.18	192	0.36	139742	962300.65	0.15
62	0.20	255747	1540625.66	0.17	193	0.39	127217	815279.8	0.16
63	0.16	305111	3924506.72	0.08	194	0.41	121515	756162.12	0.16
64	0.08	660546	3208783.26	0.21	195	0.40	124601	787138.11	0.16
65	0.20	251132	1239939.00	0.20	196	0.37	136216	918279.73	0.15
66	0.18	277148	1243720.41	0.22	197	0.21	240073	2943305.7	0.08
67	0.21	234239	1089833.88	0.21	198	0.24	210930	1928908	0.11
68	0.22	231906	1095490.16	0.21	199	0.24	207250	1832224.9	0.11
69	0.24	211046	1047593.44	0.20	200	0.28	177897	1300798.5	0.14
70	0.23	216957	1096758.23	0.20	201	0.30	167707	1156181.5	0.15
71	0.29	174236	898984.80	0.19	202	0.29	173972	1242095.2	0.14
72	0.30	166712	827930.94	0.20	203	0.26	194110	1558271.4	0.12
73	0.33	151380	737565.79	0.21	204	0.23	213054	1972161	0.11
74	0.32	154051	759268.09	0.20	205	0.26	189817	1478653.4	0.13
75	0.38	132756	633708.36	0.21	206	0.32	158536	1037610.4	0.15
76	0.44	112731	540935.71	0.21	207	0.35	142159	871088.06	0.16
77	0.43	115531	622218.70	0.19	208	0.34	146539	1044547.5	0.14
78	0.44	112997	545188.61	0.21	209	0.45	112191	637476.7	0.18
79	0.43	115420	597291.61	0.19	210	0.30	169163	1449271.8	0.12
80	0.44	112902	555994.78	0.20	211	0.24	209977	1897697.1	0.11
81	0.50	99262	485431.76	0.20	212	0.30	167898	1422239.5	0.12
82	0.49	102150	487989.81	0.21	213	0.45	111447	661311.39	0.17
83	0.47	107008	490681.93	0.22	214	0.50	99319	560312.91	0.18
84	0.44	114281	525246.40	0.22	215	0.49	102743	587558.86	0.17
85	0.53	94102	437466.21	0.22	216	0.52	96226	536498.59	0.18
86	0.57	88166	418281.43	0.21	217	0.50	99222	559556.66	0.18
87	0.57	87829	385188.93	0.23	218	0.52	96535	538842.33	0.18
88	0.55	91669	400627.18	0.23	219	0.44	113469	679488.91	0.17
89	0.48	104070	457317.07	0.23	220	0.47	106154	615428.06	0.17
90	0.40	124196	543910.51	0.23	221	0.35	140867	975989.38	0.14
91	0.45	110495	461729.10	0.24	222	0.45	111881	665708.15	0.17
92	0.51	98793	421119.76	0.23					

Table 4.11
Attraction Power Calculations - Armada (cont'd)

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
93	0.56	88537	378882.67	0.23	223	0.53	94459	523168.08	0.18
94	0.21	240284	1388732.70	0.17	224	0.54	92456	508389.83	0.18
95	0.21	233244	1249973.63	0.19	225	0.46	107755	629171.21	0.17
96	0.22	223048	1175655.52	0.19	226	0.50	99257	559819.87	0.18
98	0.24	209655	1206969.74	0.17	229	0.55	90272	492541.46	0.18
99	0.23	217380	1301654.63	0.17	230	0.50	99962	565411.66	0.18
101	0.22	228212	1312472.20	0.17	231	0.60	84001	448764.12	0.19
100	0.23	217380	1398562.41	0.16	232	0.49	101504	577998.64	0.18
102	0.23	216367	1291975.86	0.17	233	0.43	116624	706141.56	0.17
103	0.25	196162	1075225.71	0.18	234	0.38	131978	783606.57	0.17
104	0.27	187194	1028268.23	0.18	235	0.41	120508	743121.86	0.16
105	0.25	200280	1146802.20	0.17	236	0.41	122808	766294.05	0.16
106	0.25	198178	1128921.59	0.18	237	0.43	117136	711327.22	0.16
107	0.24	207783	1212627.35	0.17					
108	0.25	201924	1160925.83	0.17	238	0.44	114470	686019.81	0.17
109	0.25	203459	1174244.62	0.17	239	0.52	96226	536839.25	0.18
110	0.23	219586	1322956.16	0.17	240	0.50	100923	571185.3	0.18
111	0.23	219147	1338521.59	0.16	241	0.48	103987	595852.13	0.17
112	0.23	216767	1312203.74	0.17	242	0.58	86675	416636.14	0.21
113	0.25	203087	1171068.61	0.17	243	0.60	83243	398435.8	0.21
114	0.26	192756	1112305.83	0.17	244	0.63	79823	380510.23	0.21
115	0.27	186504	1057031.55	0.18	245	0.65	77012	365928.59	0.21
116	0.30	164533	1077611.11	0.15	246	0.69	72363	341207.83	0.21
117	0.25	201286	1183413.47	0.17	247	0.64	77606	364385.89	0.21
118	0.28	178508	1053965.04	0.17	248	0.70	71822	335535.43	0.21
119	0.29	170587	1087145.31	0.16	249	0.73	68720	320241.17	0.21
120	0.30	164818	1014767.05	0.16	250	0.76	65657	305253.09	0.22
121	0.30	165896	979631.68	0.17	251	0.56	90055	489771.87	0.18
122	0.30	164246	1041020.69	0.16	252	0.60	82669	438739.26	0.19
123	0.33	152120	918866.81	0.17	253	0.43	115708	622263.58	0.19
124	0.29	170226	1091307.53	0.16	254	0.29	170893	699351.9	0.24
125	0.31	162735	1080649.25	0.15	255	0.32	155290	636315.86	0.24
126	0.29	170067	1119566.36	0.15	256	0.19	257842	960644.94	0.27
127	0.29	171053	1194164.64	0.14	257	0.21	235702	895703.74	0.26
128	0.30	168786	1141245.47	0.15	258	0.21	234868	873424.02	0.27
129	0.31	163077	1087777.63	0.15	259	0.23	213367	802649.9	0.27
130	0.31	162704	1083294.62	0.15	260	0.31	163754	575559.42	0.28
131	0.25	199281	1299073.87	0.15	282	0.28	176077	1178902.6	0.15
132	0.26	189680	1218670.67	0.16	283	0.28	178930	1160058.6	0.15
133	0.23	219448	1493138.24	0.15	284	0.31	163029	1006195.7	0.16
134	0.23	221028	1483468.52	0.15	285	0.31	162304	851401.55	0.19
135	0.22	231832	1611644.81	0.14	286	0.41	123419	617704.58	0.20
136	0.22	223822	1440784.96	0.16	287	0.32	154043	973367.76	0.16
137	0.22	223382	1415700.92	0.16	288	0.36	140532	848264.23	0.17
138	0.22	230616	1455167.63	0.16	289	0.36	140206	820231.49	0.17
139	0.21	242509	1661127.72	0.15	290	0.38	130626	720749.93	0.18

Table 4.11
Attraction Power Calculations - Armada (cont'd)

Quarter	Total	Size/	Total	Attraction	Quarter	Total	Size/	Total	Attraction
140	0.20	245839	1619191.76	0.15	291	0.45	110713	616268.48	0.18
141	0.19	261429	1820582.99	0.14	292	0.39	128397	753737.04	0.17
142	0.19	261428	1820599.90	0.14	293	0.38	132547	790331.28	0.17
143	0.38	133271	687636.24	0.19	294	0.35	142200	879511.8	0.16
145	0.37	134335	767332.40	0.18	297	0.34	147203	930877.26	0.16
146	0.36	138013	824688.72	0.17	298	0.37	134019	788483.47	0.17
147	0.36	138478	940567.64	0.15	299	0.40	124315	717222.53	0.17
148	0.33	152398	1038364.11	0.15	300	0.43	117445	661198.58	0.18
149	0.34	148971	1090500.33	0.14	301	0.60	83637	446598.76	0.19
150	0.38	130449	851738.22	0.15	302	0.43	117430	583789.26	0.20
151	0.40	124711	788956.99	0.16	303	0.38	131783	665675.4	0.20
152	0.43	115412	697547.86	0.17	304	0.24	205383	616258.69	0.33
153	0.45	110550	653514.34	0.17	305	0.43	116402	445426.26	0.26
154	0.40	123519	776626.96	0.16	306	0.24	207572	790708.28	0.26
155	0.42	120010	741406.04	0.16	307	0.26	189525	725695.76	0.26
156	0.48	105165	607477.88	0.17	308	0.29	172936	672287.07	0.26
157	0.47	106202	616113.19	0.17	309	0.30	164479	643561.88	0.26
158	0.43	115208	695447.59	0.17	310	0.37	134362	534793.64	0.25
159	0.40	124849	790216.93	0.16	311	0.14	352296	987226.88	0.36
160	0.38	132011	868544.84	0.15	312	0.11	474006	1293975.9	0.37
161	0.37	134350	896088.67	0.15	313	0.18	281844	831635.78	0.34
162	0.34	145556	1040764.32	0.14	314	0.46	108839	413310.62	0.26
163	0.31	161162	1292635.24	0.12	315	0.46	108654	403126.09	0.27
164	0.28	181756	1766032.98	0.10	316	0.34	145159	563388.44	0.26
165	0.22	223072	3401340.23	0.07	317	0.60	83909	404085.28	0.21
166	0.29	174537	1576168.70	0.11	318	0.65	76959	363678.59	0.21
167	0.31	158771	1248178.60	0.13	319	0.41	122687	583579.11	0.21
168	0.30	165220	1369341.42	0.12	320	0.58	85992	461504.82	0.19
169	0.31	159392	1258143.46	0.13	321	0.66	76185	396415.84	0.19
170	0.23	215609	3473451.84	0.06	322	0.65	77347	356311.2	0.22
171	0.21	236728	3104569.46	0.08	323	0.58	86328	404625.15	0.21
172	0.24	209778	1721252.88	0.12	324	0.65	76440	352119.47	0.22
173	0.21	233212	1650948.19	0.14	325	0.67	74395	342671.99	0.22
174	0.21	240214	1730688.93	0.14	326	0.72	69791	321395.04	0.22
175	0.19	267936	2213892.32	0.12	327	0.75	66992	308466.12	0.22
176	0.23	215090	1926108.65	0.11	328	0.80	62512	286863.89	0.22
177	0.19	258729	#SAYI/0!	#SAYI/0!	329	0.80	62836	289270.67	0.22
178	0.19	259726	4030196.61	0.06	330	0.85	59117	272085.42	0.22
179	0.21	236213	6947702.41	0.03	331	0.89	56108	258076.29	0.22
180	0.20	248187	1349932.61	0.18	332	0.90	55854	256862.49	0.22
181	0.35	142882	905847.11	0.16	333	0.86	57848	267589.04	0.22
182	0.29	169529	1433755.49	0.12	334	0.93	53591	251272.43	0.21
183	0.28	178903	1104208.73	0.16	335	0.36	140602	565563.96	0.25
184	0.27	184846	1389767.87	0.13	336	0.92	54209	255320.83	0.21
185	0.25	196481	1718344.60	0.11	337	0.96	51977	244513.11	0.21
186	0.24	208135	2018804.56	0.10	338	0.30	164392	1143416.5	0.14
187	0.25	200389	2032058.52	0.10	339	0.29	170037	1293513.5	0.13
188	0.27	186431	1564472.94	0.12	340	0.33	153718	1026827.7	0.15
189	0.30	168311	1148576.69	0.15	341	0.46	109732	529964	0.21

Table 4.11
Attraction Power Calculations - Armada (cont'd)

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
192	0.36	139742	962300.65	0.15	344	0.41	122454	511442.84	0.24
193	0.39	127217	815279.80	0.16	345	0.40	124744	516899.84	0.24
194	0.41	121515	756162.12	0.16	346	0.49	102755	419044.02	0.25
195	0.40	124601	787138.11	0.16	347	0.90	55542	260144.89	0.21
196	0.37	136216	918279.73	0.15	348	0.87	57517	264694.53	0.22
197	0.21	240073	2943305.75	0.08	349	0.96	52182	240000.57	0.22
198	0.24	210930	1928908.02	0.11	350	0.98	51066	234756.39	0.22
199	0.24	207250	1832224.87	0.11	351	0.92	54371	249989.41	0.22
200	0.28	177897	1300798.50	0.14	352	0.64	77923	324541.97	0.24
201	0.30	167707	1156181.53	0.15	353	0.30	168603	#SAYI/0!	#SAYI/0!
202	0.29	173972	1242095.24	0.14	354	0.13	394326	962398.24	0.41
203	0.26	194110	1558271.44	0.12	355	0.37	135398	533614.42	0.25
204	0.23	213054	1972161.04	0.11	356	0.49	101434	421477.53	0.24
205	0.26	189817	1478653.40	0.13	357	0.15	339178	962589.45	0.35
206	0.32	158536	1037610.36	0.15	358	0.59	84560	362374.89	0.23
207	0.35	142159	871088.06	0.16	359	0.62	80119	384571.35	0.21
208	0.34	146539	1044547.53	0.14	360	0.25	200074	770033.25	0.26
209	0.45	112191	637476.70	0.18	361	0.27	186010	726229.66	0.26
210	0.30	169163	1449271.82	0.12	362	0.11	458052	1926436	0.24
211	0.24	209977	1897697.06	0.11	363	0.14	362165	1628865.3	0.22
212	0.30	167898	1422239.47	0.12	364	0.34	146123	514293.08	0.28
213	0.45	111447	661311.39	0.17	365	0.52	97064	520415.51	0.19
214	0.50	99319	560312.91	0.18	366	0.50	99748	563926.05	0.18
215	0.49	102743	587558.86	0.17	367	0.34	146124	514293.33	0.28
216	0.52	96226	536498.59	0.18	368	0.23	215581	2254707.3	0.10
217	0.50	99222	559556.66	0.18	369	0.25	200077	1521545.5	0.13
218	0.52	96535	538842.33	0.18	370	0.31	161757	1068416.6	0.15
219	0.44	113469	679488.91	0.17	371	0.46	109110	596640.85	0.18
220	0.47	106154	615428.06	0.17	372	0.42	117649	599277.2	0.20
221	0.35	140867	975989.38	0.14	373	0.43	116740	667730.88	0.17
222	0.45	111881	665708.15	0.17	374	0.47	107116	566720.13	0.19
					375	0.48	105188	573176.43	0.18
223	0.53	94459	523168.08	0.18	376	0.17	299292	1077801.3	0.28
224	0.54	92456	508389.83	0.18	377	0.20	243939	1581795.5	0.15
225	0.46	107755	629171.21	0.17	378	0.22	224089	1367450.9	0.16
226	0.50	99257	559819.87	0.18	379	0.17	294421	939624.21	0.31
227	0.55	90298	492732.16	0.18	380	0.79	63272	299282.47	0.21
228	0.55	90934	497321.52	0.18	381	0.81	61732	290005.57	0.21
229	0.55	90272	492541.46	0.18	382	0.66	75790	358051.34	0.21
230	0.50	99962	565411.66	0.18	383	0.70	71162	327220.49	0.22
231	0.60	84001	448764.12	0.19	384	0.26	196046	1422124.9	0.14
232	0.49	101504	577998.64	0.18	385	0.53	94081	457105.13	0.21
233	0.43	116624	706141.56	0.17	386	0.35	144385	1024461	0.14
234	0.38	131978	783606.57	0.17	387	0.56	89967	476102.86	0.19
235	0.41	120508	743121.86	0.16	388	0.26	193559	1650703.6	0.12
236	0.41	122808	766294.05	0.16	389	0.67	74387	385052.17	0.19

Table 4.11
Attraction Power Calculations - Armada (cont'd)

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
237	0.43	117136	711327.22	0.16	390	0.53	93739	350755.75	0.27
					391	0.63	79928	309106.25	0.26
238	0.44	114470	686019.81	0.17	392	0.59	84188	322549.88	0.26
239	0.52	96226	536839.25	0.18	393	0.57	87927	333059.58	0.26
240	0.50	100923	571185.30	0.18	394	0.61	81855	321340.89	0.25
241	0.48	103987	595852.13	0.17	274	0.24	208714	1252878.8	0.17
242	0.58	86675	416636.14	0.21	275	0.24	208516	1558915	0.13
243	0.60	83243	398435.80	0.21	276	0.20	251568	1712307.6	0.15
244	0.63	79823	380510.23	0.21	277	0.19	267985	2008979.9	0.13
245	0.65	77012	365928.59	0.21	278	0.28	178194	556344.22	0.32
246	0.69	72363	341207.83	0.21	279	0.20	252096	711223.85	0.35
247	0.64	77606	364385.89	0.21	280	0.16	306609	812758.82	0.38
248	0.70	71822	335535.43	0.21	281	0.29	174482	961009.88	0.18
249	0.73	68720	320241.17	0.21	264	0.17	287310	775964.23	0.37
250	0.76	65657	305253.09	0.22	265	0.19	260130	725641.38	0.36
251	0.56	90055	489771.87	0.18	266	0.24	212367	629979.16	0.34
252	0.60	82669	438739.26	0.19	267	0.18	282753	768132.98	0.37
253	0.43	115708	622263.58	0.19	268	0.18	283316	769338.27	0.37
254	0.29	170893	699351.90	0.24	269	0.11	439575	1029543.1	0.43
255	0.32	155290	636315.86	0.24	270	0.08	634634	1317341.9	0.48
256	0.19	257842	960644.94	0.27	271	0.10	515100	1138290.9	0.45
257	0.21	235702	895703.74	0.26	272	0.10	483682	1092731.4	0.44
258	0.21	234868	873424.02	0.27	273	0.13	374894	930913.91	0.40
259	0.23	213367	802649.90	0.27	262	0.14	349483	952333.43	0.37
260	0.31	163754	575559.42	0.28	263	0.13	374597	925244.78	0.40
261	0.19	256866	730318.11	0.35					

Table 4.12

Attraction Power Calculations - Bilkent

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
1	0.60	89277	454534.15	0.20	262	0.42	129138	952333.427	0.14
2	0.44	123890	1316301.40	0.09	263	0.41	132320	925244.778	0.14
3	0.36	152077	1868047.54	0.08	264	0.44	121975	775964.229	0.16
4	0.40	133837	1547206.61	0.09	265	0.46	118063	725641.378	0.16
5	0.39	136939	1466330.42	0.09	266	0.50	108706	629979.161	0.17
6	0.41	131695	1670727.55	0.08	267	0.44	121797	768132.98	0.16
7	0.32	166436	2330394.23	0.07	268	0.44	122140	769338.271	0.16
8	0.45	121291	1256424.63	0.10	269	0.38	140946	1029543.14	0.14
9	0.44	122153	1494233.92	0.08	270	0.32	166238	1317341.88	0.13
10	0.45	119735	1388061.49	0.09	271	0.37	144291	1138290.9	0.13
11	0.45	119663	1488272.05	0.08	272	0.38	141864	1092731.38	0.13
12	0.42	127074	1181108.34	0.11	273	0.41	132352	930913.913	0.14
13	0.45	119942	1040785.89	0.12	274	0.51	106537	1252878.8	0.09
14	0.45	119223	1105678.05	0.11	275	0.51	106396	1558915	0.07
15	0.47	114668	1056062.70	0.11	276	0.47	114983	1712307.6	0.07
16	0.47	115486	961939.76	0.12	277	0.46	117605	2008979.91	0.06
17	0.50	108689	920686.14	0.12	278	0.53	101282	556344.222	0.18
18	0.49	109481	874023.14	0.13	279	0.46	117714	711223.853	0.17
19	0.50	106981	811338.43	0.13	280	0.43	126802	812758.818	0.16
20	0.51	106540	804318.64	0.13	281	0.39	139954	961009.883	0.15
21	0.54	100051	708036.36	0.14	282	0.43	125303	1178902.61	0.11
22	0.51	106733	852776.30	0.13	283	0.43	126522	1160058.64	0.11
23	0.51	106876	997289.66	0.11	284	0.44	122040	1006195.7	0.12
24	0.53	102795	916029.33	0.11	285	0.40	134662	851401.547	0.16
25	0.52	103577	857969.82	0.12	286	0.49	110992	617704.583	0.18
26	0.54	100205	878668.05	0.11	287	0.47	113829	973367.756	0.12
27	0.49	109199	1122173.30	0.10	288	0.49	110467	848264.227	0.13
28	0.50	107398	1072088.98	0.10	289	0.47	116096	820231.488	0.14
29	0.54	100855	900562.28	0.11	290	0.48	111905	720749.933	0.16
30	0.53	102044	947972.24	0.11	291	0.60	90054	616268.481	0.15
31	0.57	95045	802062.70	0.12	292	0.56	96354	753737.038	0.13
32	0.61	89151	695069.42	0.13	293	0.55	98853	790331.285	0.13
33	0.63	86196	646368.23	0.13	294	0.52	103030	879511.805	0.12
34	0.62	87620	669412.87	0.13	295	0.53	102483	1024026.5	0.10
35	0.66	82252	587266.45	0.14	296	0.49	110460	1026121.57	0.11
36	0.65	82531	591286.77	0.14	297	0.51	106781	930877.257	0.11
37	0.57	94915	752000.90	0.13	298	0.52	103937	788483.475	0.13
38	0.61	88437	669919.35	0.13	299	0.53	102685	717222.525	0.14
39	0.61	87835	634750.56	0.14	300	0.65	82745	661198.577	0.13
40	0.46	117784	978958.61	0.12	301	0.83	64678	446598.763	0.14
41	0.47	115606	940445.85	0.12	302	0.51	106845	583789.263	0.18
42	0.45	118756	860270.41	0.14	303	0.46	116628	665675.397	0.18
43	0.47	114506	793520.72	0.14	304	0.50	108148	616258.694	0.18
44	0.54	99211	631543.38	0.16	305	0.68	79266	445426.259	0.18
45	0.49	109328	678131.42	0.16	306	0.51	106345	790708.281	0.13

Table 4.12
Attraction Power Calculations - Bilkent (cont'd)

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
48	0.56	96724	548553.51	0.18	307	0.53	101804	725695.761	0.14
					308	0.55	97646	672287.069	0.15
49	0.53	101377	596007.67	0.17	309	0.57	95553	643561.883	0.15
50	0.30	180765	4142167.17	0.04	310	0.63	86088	534793.644	0.16
51	0.28	189711	967916.54	0.20	311	0.42	128998	987226.878	0.13
52	0.32	169136	2669782.70	0.06	312	0.38	141207	1293975.93	0.11
53	0.28	193385	1891817.66	0.10	313	0.45	119894	831635.784	0.14
54	0.30	180059	2308152.75	0.08	314	0.70	76624	413310.622	0.19
55	0.28	189606	1634339.99	0.12	315	0.68	79770	403126.088	0.20
56	0.23	231121	1469737.17	0.16	316	0.60	89448	563388.438	0.16
57	0.31	173528	2590500.17	0.07	317	0.66	81735	404085.28	0.20
58	0.35	156494	1464879.67	0.11	318	0.68	79589	363678.595	0.22
59	0.37	147455	2386169.70	0.06	319	0.48	111729	583579.109	0.19
60	0.41	130730	2400034.92	0.05	320	0.83	65252	461504.822	0.14
61	0.43	126215	1843044.54	0.07	321	0.90	60210	396415.838	0.15
62	0.47	115959	1540625.66	0.08	322	0.60	89582	356311.202	0.25
63	0.44	123263	3924506.72	0.03	323	0.57	94001	404625.148	0.23
64	0.36	151751	3208783.26	0.05	324	0.61	88555	352119.47	0.25
65	0.47	114935	1239939.00	0.09	325	0.63	86238	342671.994	0.25
66	0.45	119420	1243720.41	0.10	326	0.67	81001	321395.045	0.25
67	0.48	111812	1089833.88	0.10	327	0.69	77807	308466.123	0.25
68	0.48	111356	1095490.16	0.10	328	0.75	71660	286863.892	0.25
69	0.50	107028	1047593.44	0.10	329	0.77	69759	289270.671	0.24
70	0.50	108211	1096758.23	0.10	330	0.82	65877	272085.417	0.24
71	0.55	98078	898984.80	0.11	331	0.86	62501	258076.293	0.24
72	0.56	96008	827930.94	0.12	332	0.87	62152	256862.495	0.24
73	0.59	91498	737565.79	0.12	333	0.84	64013	267589.042	0.24
74	0.58	92323	759268.09	0.12	334	0.93	57992	251272.428	0.23
75	0.63	85390	633708.36	0.13	335	0.61	88222	565563.959	0.16
76	0.69	77865	540935.71	0.14	336	0.90	59825	255320.828	0.23
77	0.69	78728	622218.70	0.13	337	0.94	57522	244513.112	0.24
78	0.69	77978	545188.61	0.14	338	0.57	95225	1143416.5	0.08
79	0.69	78653	597291.61	0.13	339	0.56	96564	1293513.54	0.07
80	0.69	77936	555994.78	0.14	340	0.59	91971	1026827.75	0.09
81	0.75	72156	485431.76	0.15	341	0.53	102119	529963.998	0.19
82	0.73	73549	487989.81	0.15	342	0.54	100597	511998.617	0.20
83	0.71	75634	490681.93	0.15	343	0.61	88236	587728.208	0.15
84	0.69	78632	525246.40	0.15	344	0.66	81802	511442.839	0.16
85	0.77	69911	437466.21	0.16	345	0.65	82667	516899.843	0.16
86	0.81	67072	418281.43	0.16	346	0.73	73687	419044.023	0.18
87	0.81	66910	385188.93	0.17	347	0.91	59639	260144.886	0.23
88	0.79	68766	400627.18	0.17	348	0.84	64194	264694.529	0.24
89	0.73	74384	457317.07	0.16	349	0.92	58429	240000.571	0.24
90	0.73	74384	457317.07	0.16	350	0.95	57057	234756.386	0.24
91	0.65	82458	543910.51	0.15	351	0.89	60533	249989.405	0.24
92	0.70	77099	461729.10	0.17	352	0.87	61759	324541.97	0.19

Table 4.12
Attraction Power Calculations - Bilkent (cont'd)

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
93	0.56	88537	378882.67	0.23	138	0.22	230616	1455167.63	0.16
94	0.21	240284	1388732.70	0.17	139	0.21	242509	1661127.72	0.15
95	0.21	233244	1249973.63	0.19	353	0.00	#####	#SAYI/0!	#SAYI/0!
96	0.22	223048	1175655.52	0.19	354	0.39	139767	962398.237	0.15
98	0.24	209655	1206969.74	0.17	355	0.32	168084	533614.422	0.31
99	0.23	217380	1301654.63	0.17	356	0.40	133743	421477.531	0.32
101	0.22	228212	1312472.20	0.17	357	0.24	224594	962589.448	0.23
100	0.23	217380	1398562.41	0.16	358	0.52	103085	362374.886	0.28
102	0.23	216367	1291975.86	0.17	359	0.69	78418	384571.349	0.20
103	0.25	196162	1075225.71	0.18	360	0.52	104702	770033.25	0.14
104	0.27	187194	1028268.23	0.18	361	0.53	101335	726229.656	0.14
105	0.25	200280	1146802.20	0.17	362	0.39	139991	1926436	0.07
106	0.25	198178	1128921.59	0.18	363	0.41	131024	1628865.28	0.08
107	0.24	207783	1212627.35	0.17	364	0.59	90878	514293.081	0.18
108	0.25	201924	1160925.83	0.17	365	0.77	70401	520415.505	0.14
109	0.25	203459	1174244.62	0.17	366	0.75	71750	563926.046	0.13
110	0.23	219586	1322956.16	0.17	367	0.59	90878	514293.332	0.18
111	0.23	219147	1338521.59	0.16	368	0.50	107473	2254707.33	0.05
112	0.23	216767	1312203.74	0.17	369	0.52	104489	1521545.51	0.07
113	0.25	203087	1171068.61	0.17	370	0.57	94474	1068416.64	0.09
114	0.26	192756	1112305.83	0.17	371	0.66	81328	596640.853	0.14
115	0.27	186504	1057031.55	0.18	372	0.51	106159	599277.195	0.18
116	0.30	164533	1077611.11	0.15	373	0.54	99433	667730.882	0.15
117	0.25	201286	1183413.47	0.17	374	0.56	96064	566720.128	0.17
118	0.28	178508	1053965.04	0.17	375	0.69	78367	573176.434	0.14
119	0.29	170587	1087145.31	0.16	376	0.13	404202	1077801.31	0.38
120	0.30	164818	1014767.05	0.16	377	0.48	113672	1581795.46	0.07
121	0.30	165896	979631.68	0.17	378	0.49	109832	1367450.87	0.08
122	0.30	164246	1041020.69	0.16	379	0.44	121606	939624.209	0.13
123	0.33	152120	918866.81	0.17	380	0.78	69041	299282.467	0.23
124	0.29	170226	1091307.53	0.16	381	0.82	65675	290005.572	0.23
125	0.31	162735	1080649.25	0.15	382	0.69	78820	358051.342	0.22
126	0.29	170067	1119566.36	0.15	383	0.64	84427	327220.493	0.26
127	0.29	171053	1194164.64	0.14	384	0.40	133609	1422124.92	0.09
128	0.30	168786	1141245.47	0.15	385	0.60	89727	457105.127	0.20
129	0.31	163077	1087777.63	0.15	386	0.61	88502	1024461.03	0.09
130	0.31	162704	1083294.62	0.15	387	0.78	68900	476102.864	0.14
131	0.25	199281	1299073.87	0.15	388	0.53	102549	1650703.58	0.06
132	0.26	189680	1218670.67	0.16	389	0.91	59252	385052.171	0.15
133	0.23	219448	1493138.24	0.15	390	0.66	81583	350755.747	0.23
134	0.23	221028	1483468.52	0.15	391	0.72	74512	309106.249	0.24
135	0.22	231832	1611644.81	0.14	392	0.70	77142	322549.879	0.24
136	0.22	223822	1440784.96	0.16	393	0.69	78272	333059.579	0.24
137	0.22	223382	1415700.92	0.16	394	0.66	81833	321340.887	0.25

Table 4.12
Attraction Power Calculations - Bilkent (cont'd)

Quarter	Total	Size/	Total	Attraction	Quarter	Total	Size/	Total	Attraction
140	0.47	113984	1619191.76	0.07	188	0.27	186431	1564472.94	0.12
141	0.46	116700	1820582.99	0.06	189	0.30	168311	1148576.69	0.15
142	0.46	116700	1820599.90	0.06	192	0.62	87070	962300.653	0.09
143	0.63	85577	687636.24	0.12	193	0.65	82775	815279.798	0.10
145	0.63	85794	718630.33	0.12	194	0.67	80692	756162.118	0.11
146	0.63	85775	767332.40	0.11	195	0.66	81959	787138.106	0.10
147	0.62	86833	824688.72	0.11	196	0.63	85890	918279.726	0.09
148	0.63	86271	940567.64	0.09	197	0.48	112215	2943305.75	0.04
149	0.59	91261	1038364.11	0.09	198	0.45	118718	1928908.02	0.06
150	0.60	89887	1090500.33	0.08	199	0.49	110283	1832224.87	0.06
151	0.65	83707	851738.22	0.10	200	0.48	113503	1300798.5	0.09
152	0.66	81820	788956.99	0.10	201	0.46	117619	1156181.53	0.10
153	0.69	78291	697547.86	0.11	202	0.49	109682	1242095.24	0.09
154	0.71	76387	653514.34	0.12	203	0.50	107564	1558271.44	0.07
155	0.66	81384	776626.96	0.10	204	0.50	108039	1972161.04	0.05
156	0.67	80080	741406.04	0.11	205	0.52	104243	1478653.4	0.07
157	0.73	74177	607477.88	0.12	206	0.57	95046	1037610.36	0.09
158	0.72	74618	616113.19	0.12	207	0.57	94945	871088.06	0.11
159	0.69	78284	695447.59	0.11	208	0.59	90864	1044547.53	0.09
160	0.66	81916	790216.93	0.10	209	0.68	79031	637476.701	0.12
161	0.64	84461	868544.84	0.10	210	0.56	96003	1449271.82	0.07
162	0.63	85211	896088.67	0.10	211	0.51	106012	1897697.06	0.06
163	0.61	88873	1040764.32	0.09	212	0.56	95660	1422239.47	0.07
164	0.58	93495	1292635.24	0.07	213	0.70	76797	661311.395	0.12
165	0.54	99187	1766032.98	0.06	214	0.75	71699	560312.912	0.13
166	0.50	108926	3401340.23	0.03	215	0.74	73182	587558.858	0.12
167	0.56	97208	1576168.70	0.06	216	0.77	70314	536498.592	0.13
168	0.58	92931	1248178.60	0.07	217	0.75	71656	559556.664	0.13
169	0.57	94757	1369341.42	0.07	218	0.77	70455	538842.334	0.13
170	0.58	93217	1258143.46	0.07	219	0.70	77601	679488.91	0.11
171	0.50	107256	3473451.84	0.03	220	0.72	74728	615428.057	0.12
172	0.48	111758	3104569.46	0.04	221	0.62	87584	975989.379	0.09
173	0.51	106661	1721252.88	0.06	222	0.69	77883	665708.151	0.12
174	0.48	111484	1650948.19	0.07	223	0.77	69719	523168.079	0.13
175	0.48	112828	1730688.93	0.07	224	0.79	68588	508389.834	0.13
176	0.46	117646	2213892.32	0.05	225	0.72	75298	629171.205	0.12
177	0.50	107607	1926108.65	0.06	226	0.75	71676	559819.874	0.13
178	0.47	115837	#SAYI/0!	#SAYI/0!	227	0.80	67583	492732.164	0.14
179	0.47	115960	4030196.61	0.03	228	0.80	67876	497321.515	0.14
180	0.48	111613	6947702.41	0.02	229	0.80	67574	492541.456	0.14
181	0.39	137899	1349932.61	0.10	230	0.75	71951	565411.662	0.13
182	0.61	88352	905847.11	0.10	231	0.84	64489	448764.123	0.14
183	0.56	95861	1433755.49	0.07	232	0.75	72436	577998.644	0.13
184	0.54	99292	1104208.73	0.09	233	0.69	78521	706141.556	0.11
185	0.54	100653	1389767.87	0.07	234	0.64	84671	783606.57	0.11
186	0.52	103245	1718344.60	0.06	235	0.68	79887	743121.865	0.11
187	0.51	105877	2018804.56	0.05	236	0.67	80641	766294.05	0.11

Table 4.12
Attraction Power Calculations - Bilkent (cont'd)

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
237	0.69	78433	711327.22	0.11	249	0.95	56747	320241.17	0.18
238	0.70	77613	686019.81	0.11	250	0.98	54955	305253.09	0.18
239	0.77	70106	536839.25	0.13	251	0.80	67116	489771.87	0.14
240	0.75	72065	571185.30	0.13	252	0.85	63540	438739.26	0.14
241	0.74	73319	595852.13	0.12	253	0.69	78499	622263.58	0.13
242	0.82	66244	416636.14	0.16	254	0.55	97388	699351.90	0.14
243	0.84	64524	398435.80	0.16	255	0.58	92900	636315.86	0.15
244	0.86	62759	380510.23	0.16	256	0.46	116237	960644.94	0.12
245	0.88	61276	365928.59	0.17	257	0.48	112207	895703.74	0.13
246	0.92	58765	341207.83	0.17	258	0.48	111745	873424.02	0.13
247	0.88	61677	364385.89	0.17	259	0.50	107091	802649.90	0.13
248	0.92	58507	335535.43	0.17	260	0.57	95319	575559.42	0.17
					261	0.46	116996	730318.11	0.16

Table 4.13

Attraction Power Calculations - 5M Migros

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
1	0.47	271663	454534.15	0.60	46	0.39	328082	641101.092	0.51
2	0.14	885072	1316301.40	0.67	47	0.44	285509	568140.126	0.50
3	0.12	1054354	1868047.54	0.56	48	0.44	286685	548553.511	0.52
4	0.12	1024675	1547206.61	0.66	49	0.41	311113	596007.67	0.52
5	0.14	906804	1466330.42	0.62	50	0.18	715057	4142167.17	0.17
6	0.11	1169066	1670727.55	0.70	51	0.16	778205	967916.536	0.80
7	0.13	987880	2330394.23	0.42	52	0.11	1167084	2669782.7	0.44
8	0.15	846024	1256424.63	0.67	53	0.21	598671	1891817.66	0.32
9	0.12	1078601	1494233.92	0.72	54	0.13	982420	2308152.75	0.43
10	0.13	988213	1388061.49	0.71	55	0.22	566934	1634339.99	0.35
11	0.12	1092033	1488272.05	0.73	56	0.24	532134	1469737.17	0.36
12	0.18	722253	1181108.34	0.61	57	0.19	657905	2590500.17	0.25
13	0.20	640480	1040785.89	0.62	58	0.23	547038	1464879.67	0.37
14	0.18	710760	1105678.05	0.64	59	0.08	1672184	2386169.7	0.70
15	0.18	692663	1056062.70	0.66	60	0.07	1908014	2400034.92	0.79
16	0.21	593112	961939.76	0.62	61	0.09	1392681	1843044.54	0.76
17	0.21	594012	920686.14	0.65	62	0.11	1168919	1540625.66	0.76
18	0.23	542826	874023.14	0.62	63	0.04	3496133	3924506.72	0.89
19	0.26	494301	811338.43	0.61	64	0.05	2396487	3208783.26	0.75
20	0.26	489717	804318.64	0.61	65	0.14	873872	1239939	0.70
21	0.30	427072	708036.36	0.60	66	0.15	847153	1243720.41	0.68
22	0.24	537197	852776.30	0.63	67	0.17	743783	1089833.88	0.68
23	0.19	680260	997289.66	0.68	68	0.17	752228	1095490.16	0.69
24	0.20	620826	916029.33	0.68	69	0.17	729519	1047593.44	0.70
25	0.23	559286	857969.82	0.65	70	0.16	771590	1096758.23	0.70
26	0.21	596289	878668.05	0.68	71	0.20	626670	898984.803	0.70
27	0.16	791392	1122173.30	0.71	72	0.22	565210	827930.936	0.68
28	0.17	751575	1072088.98	0.70	73	0.26	494688	737565.795	0.67
29	0.21	614726	900562.28	0.68	74	0.25	512894	759268.093	0.68
30	0.19	656173	947972.24	0.69	75	0.30	415563	633708.357	0.66
31	0.23	543734	802062.70	0.68	76	0.36	350339	540935.713	0.65
32	0.27	461976	695069.42	0.66	77	0.30	427960	622218.705	0.69
33	0.30	425088	646368.23	0.66	78	0.36	354214	545188.608	0.65
34	0.29	442511	669412.87	0.66	79	0.31	403219	597291.61	0.68
35	0.33	380941	587266.45	0.65	80	0.35	365156	555994.78	0.66
36	0.33	383923	591286.77	0.65	81	0.40	314014	485431.759	0.65
37	0.26	494607	752000.90	0.66	82	0.41	312292	487989.813	0.64
38	0.29	439838	669919.35	0.66	83	0.41	308039	490681.933	0.63
39	0.31	407338	634750.56	0.64	84	0.38	332333	525246.404	0.63
40	0.21	593672	978958.61	0.61	85	0.46	273453	437466.207	0.63
41	0.22	569356	940445.85	0.61	86	0.48	263043	418281.43	0.63
42	0.27	466034	860270.41	0.54	87	0.55	230450	385188.933	0.60
43	0.30	429007	793520.72	0.54	88	0.53	240192	400627.182	0.60
44	0.36	353988	631543.38	0.56	89	0.45	278863	457317.071	0.61
45	0.36	349543	678131.42	0.52	90	0.38	337257	543910.506	0.62

Table 4.13 (cont'd)
Attraction Power Calculations - 5M Migros

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
91	0.46	274135	461729.10	0.59	137	0.12	1082661	1415700.92	0.76
92	0.51	250268	421119.76	0.59	138	0.11	1113451	1455167.63	0.77
93	0.57	223088	378882.67	0.59	139	0.10	1305435	1661127.72	0.79
94	0.12	1035278	1388732.70	0.75	140	0.10	1259369	1619191.76	0.78
95	0.14	905240	1249973.63	0.72	141	0.09	1442454	1820582.99	0.79
96	0.15	843139	1175655.52	0.72	142	0.09	1442472	1820599.9	0.79
97	0.14	878404	1213613.35	0.72	143	0.27	468788	687636.24	0.68
98	0.14	890594	1206969.74	0.74	144	0.25	498982	718630.325	0.69
99	0.13	975823	1301654.63	0.75	145	0.23	547222	767332.396	0.71
100	0.13	975809	1312472.20	0.74	146	0.21	599842	824688.717	0.73
101	0.12	1070516	1398562.41	0.77	147	0.18	715819	940567.645	0.76
102	0.13	967370	1291975.86	0.75	148	0.16	794706	1038364.11	0.77
103	0.16	775482	1075225.71	0.72	149	0.15	851642	1090500.33	0.78
104	0.17	739573	1028268.23	0.72	150	0.20	637582	851738.221	0.75
105	0.15	841836	1146802.20	0.73	151	0.22	582426	788956.995	0.74
106	0.15	826546	1128921.59	0.73	152	0.25	503845	697547.862	0.72
107	0.14	898462	1212627.35	0.74	153	0.27	466577	653514.343	0.71
108	0.15	853932	1160925.83	0.74	154	0.22	571724	776626.96	0.74
109	0.15	865362	1174244.62	0.74	155	0.23	541316	741406.045	0.73
110	0.13	994461	1322956.16	0.75	156	0.30	428135	607477.88	0.70
111	0.13	1010557	1338521.59	0.75	157	0.29	435293	616113.188	0.71
112	0.13	987118	1312203.74	0.75	158	0.25	501955	695447.585	0.72
113	0.15	862653	1171068.61	0.74	159	0.22	583452	790216.93	0.74
114	0.16	816626	1112305.83	0.73	160	0.19	652072	868544.836	0.75
115	0.16	769133	1057031.55	0.73	161	0.19	676528	896088.668	0.75
116	0.15	817772	1077611.11	0.76	162	0.16	806335	1040764.32	0.77
117	0.14	877262	1183413.47	0.74	163	0.12	1037979	1292635.24	0.80
118	0.16	776194	1053965.04	0.74	164	0.09	1485090	1766032.98	0.84
119	0.15	819353	1087145.31	0.75	165	0.04	3069342	3401340.23	0.90
120	0.17	754351	1014767.05	0.74	166	0.10	1304423	1576168.7	0.83
121	0.18	717884	979631.68	0.73	167	0.13	996477	1248178.6	0.80
122	0.16	781332	1041020.69	0.75	168	0.11	1109364	1369341.42	0.81
123	0.19	674914	918866.81	0.73	169	0.13	1005535	1258143.46	0.80
124	0.15	823968	1091307.53	0.76	170	0.04	3150587	3473451.84	0.91
125	0.15	823093	1080649.25	0.76	171	0.05	2756084	3104569.46	0.89
126	0.15	852545	1119566.36	0.76	172	0.09	1404814	1721252.88	0.82
127	0.14	926074	1194164.64	0.78	173	0.10	1306252	1650948.19	0.79
128	0.14	876017	1141245.47	0.77	174	0.09	1377647	1730688.93	0.80
129	0.15	829925	1087777.63	0.76	175	0.07	1828310	2213892.32	0.83
130	0.15	825921	1083294.62	0.76	176	0.08	1603412	1926108.65	0.83
131	0.13	995499	1299073.87	0.77	177	0.00	#SAYI/0!	#SAYI/0!	#SAYI/0!
132	0.14	926981	1218670.67	0.76	178	0.03	3654511	4030196.61	0.91
133	0.11	1164977	1493138.24	0.78	179	0.02	6599877	6947702.41	0.95
134	0.11	1153384	1483468.52	0.78	180	0.13	963846	1349932.61	0.71
135	0.10	1268593	1611644.81	0.79	181	0.19	674613	905847.106	0.74
136	0.11	1107236	1440784.96	0.77	182	0.11	1168366	1433755.49	0.81

Table 4.13 (cont'd)
Attraction Power Calculations - 5M Migros

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
183	0.15	826014	1104208.73	0.75	227	0.38	334851	492732.16	0.68
184	0.11	1104270	1389767.87	0.79	228	0.37	338511	497321.52	0.68
185	0.09	1418619	1718344.60	0.83	229	0.38	334695	492541.456	0.68
186	0.07	1704793	2018804.56	0.84	230	0.32	393499	565411.662	0.70
187	0.07	1727526	2032058.52	0.85	231	0.42	300274	448764.123	0.67
188	0.10	1277218	1564472.94	0.82	232	0.31	404058	577998.644	0.70
189	0.14	883943	1148576.69	0.77	233	0.25	510997	706141.556	0.72
190	0.17	750547	1000016.57	0.75	234	0.22	566958	783606.57	0.72
191	0.12	1090823	1367360.98	0.80	235	0.23	542727	743121.865	0.73
192	0.17	735489	962300.65	0.76	236	0.22	562845	766294.05	0.73
193	0.21	605288	815279.80	0.74	237	0.25	515758	711327.223	0.73
194	0.23	553955	756162.12	0.73	238	0.26	493937	686019.814	0.72
195	0.22	580578	787138.11	0.74	239	0.34	370507	536839.25	0.69
196	0.18	696174	918279.73	0.76	240	0.32	398198	571185.3	0.70
197	0.05	2591017	2943305.75	0.88	241	0.30	418546	595852.129	0.70
198	0.08	1599260	1928908.02	0.83	242	0.48	263718	416636.142	0.63
199	0.08	1514692	1832224.87	0.83	243	0.51	250669	398435.798	0.63
200	0.13	1009398	1300798.50	0.78	244	0.53	237928	380510.232	0.63
201	0.15	870856	1156181.53	0.75	245	0.56	227641	365928.586	0.62
202	0.13	958441	1242095.24	0.77	246	0.60	210080	341207.833	0.62
203	0.10	1256597	1558271.44	0.81	247	0.56	225103	364385.894	0.62
204	0.08	1651068	1972161.04	0.84	248	0.62	205207	335535.43	0.61
205	0.11	1184593	1478653.40	0.80	249	0.65	194775	320241.168	0.61
206	0.16	784029	1037610.36	0.76	250	0.69	184641	305253.094	0.60
207	0.20	633984	871088.06	0.73	251	0.38	332601	489771.867	0.68
208	0.16	807144	1044547.53	0.77	252	0.43	292530	438739.26	0.67
209	0.28	446255	637476.70	0.70	253	0.30	428057	622263.578	0.69
210	0.11	1184106	1449271.82	0.82	254	0.29	431071	699351.9	0.62
211	0.08	1581709	1897697.06	0.83	255	0.33	388125	636315.865	0.61
212	0.11	1158682	1422239.47	0.81	256	0.22	586566	960644.937	0.61
213	0.27	473068	661311.39	0.72	257	0.23	547795	895703.744	0.61
214	0.33	389295	560312.91	0.69	258	0.24	526811	873424.02	0.60
215	0.31	411634	587558.86	0.70	259	0.26	482192	802649.901	0.60
216	0.34	369959	536498.59	0.69	260	0.40	316487	575559.418	0.55
217	0.33	388679	559556.66	0.69	261	0.36	356456	730318.113	0.49
218	0.34	371853	538842.33	0.69	262	0.27	473712	952333.427	0.50
219	0.26	488419	679488.91	0.72	263	0.30	418328	925244.778	0.45
220	0.29	434546	615428.06	0.71	264	0.35	366679	775964.229	0.47
221	0.17	747538	975989.38	0.77	265	0.36	347448	725641.378	0.48
222	0.27	475944	665708.15	0.71	266	0.41	308907	629979.161	0.49
223	0.35	358990	523168.08	0.69	267	0.35	363583	768132.98	0.47
224	0.36	347346	508389.83	0.68	268	0.35	363882	769338.271	0.47
225	0.28	446119	629171.21	0.71	269	0.28	449021	1029543.14	0.44
226	0.33	388886	559819.87	0.69	270	0.25	516470	1317341.88	0.39

Table 4.13 (cont'd)
Attraction Power Calculations - 5M Migros

Quarter	Total	Size/	Total	Attractio	Quarter	Total	Size/ Cost	Total	Attraction
271	0.26	478900	1138290.90	0.42	318	0.61	207131	363678.59	0.57
272	0.27	467186	1092731.38	0.43	319	0.36	349163	583579.11	0.60
273	0.30	423668	930913.91	0.46	320	0.41	310262	461504.822	0.67
274	0.14	937628	1252878.80	0.75	321	0.49	260020	396415.838	0.66
275	0.10	1244002	1558915.00	0.80	322	0.67	189382	356311.202	0.53
276	0.09	1345756	1712307.60	0.79	323	0.56	224296	404625.148	0.55
277	0.08	1623390	2008979.91	0.81	324	0.68	187124	352119.47	0.53
278	0.46	276868	556344.22	0.50	325	0.70	182038	342671.994	0.53
279	0.37	341413	711223.85	0.48	326	0.74	170604	321395.045	0.53
280	0.33	379348	812758.82	0.47	327	0.77	163668	308466.123	0.53
281	0.20	646574	961009.88	0.67	328	0.83	152691	286863.892	0.53
282	0.14	877523	1178902.61	0.74	329	0.81	156675	289270.671	0.54
283	0.15	854606	1160058.64	0.74	330	0.86	147092	272085.417	0.54
284	0.18	721127	1006195.70	0.72	331	0.91	139467	258076.293	0.54
285	0.23	554435	851401.55	0.65	332	0.91	138856	256862.495	0.54
286	0.33	383294	617704.58	0.62	333	0.87	145729	267589.042	0.54
287	0.18	705495	973367.76	0.72	334	0.91	139689	251272.428	0.56
288	0.21	597265	848264.23	0.70	335	0.38	336740	565563.959	0.60
289	0.22	563929	820231.49	0.69	336	0.90	141287	255320.828	0.55
290	0.26	478219	720749.93	0.66	337	0.94	135013	244513.112	0.55
291	0.30	415502	616268.48	0.67	338	0.14	883799	1143416.5	0.77
292	0.24	528986	753737.04	0.70	339	0.12	1026912	1293513.54	0.79
293	0.23	558932	790331.28	0.71	340	0.16	781140	1026827.75	0.76
294	0.20	634282	879511.80	0.72	341	0.40	318113	529963.998	0.60
295	0.17	764902	1024026.50	0.75	342	0.42	303515	511998.617	0.59
296	0.17	759564	1026121.57	0.74	343	0.35	358888	587728.208	0.61
297	0.19	676893	930877.26	0.73	344	0.41	307187	511442.839	0.60
298	0.23	550528	788483.47	0.70	345	0.41	309488	516899.843	0.60
299	0.26	490222	717222.53	0.68	346	0.52	242602	419044.023	0.58
300	0.27	461008	661198.58	0.70	347	0.87	144964	260144.886	0.56
301	0.42	298283	446598.76	0.67	348	0.89	142983	264694.529	0.54
302	0.35	359515	583789.26	0.62	349	0.98	129390	240000.571	0.54
303	0.30	417264	665675.40	0.63	350	1.00	126633	234756.386	0.54
304	0.42	302728	616258.69	0.49	351	0.94	135085	249989.405	0.54
305	0.51	249758	445426.26	0.56	352	0.68	184859	324541.97	0.57
306	0.27	476791	790708.28	0.60	353	0.47	266843	#SAYI/0!	#SAYI/0!
307	0.29	434367	725695.76	0.60	354	0.30	428305	962398.237	0.45
308	0.32	401705	672287.07	0.60	355	0.55	230133	533614.422	0.43
309	0.33	383531	643561.88	0.60	356	0.68	186300	421477.531	0.44
310	0.40	314343	534793.64	0.59	357	0.32	398818	962589.448	0.41
311	0.25	505932	987226.88	0.51	358	0.72	174729	362374.886	0.48
312	0.19	678762	1293975.93	0.52	359	0.56	226035	384571.349	0.59
313	0.29	429898	831635.78	0.52	360	0.27	465257	770033.25	0.60
314	0.56	227848	413310.62	0.55	361	0.29	438885	726229.656	0.60
315	0.59	214702	403126.09	0.53	362	0.10	1328393	1926436	0.69
316	0.39	328782	563388.44	0.58	363	0.11	1135677	1628865.28	0.70
317	0.53	238442	404085.28	0.59	364	0.46	277292	514293.081	0.54

Table 4.13 (cont'd)
Attraction Power Calculations - 5M Migros

Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power	Quarter	Total Cost	Size/ Cost	Total Size/Total Cost	Attraction Power
365	0.36	352951	520415.51	0.68	380	0.76	166970	299282.47	0.56
366	0.32	392428	563926.05	0.70	381	0.78	162599	290005.57	0.56
367	0.46	277292	514293.33	0.54	382	0.62	203441	358051.34	0.57
368	0.07	1931653	2254707.33	0.86	383	0.74	171631	327220.49	0.52
369	0.10	1216979	1521545.51	0.80	384	0.12	1092470	1422124.92	0.77
370	0.16	812186	1068416.64	0.76	385	0.46	273297	457105.13	0.60
371	0.31	406203	596640.85	0.68	386	0.16	791574	1024461.03	0.77
372	0.34	375469	599277.20	0.63	387	0.40	317236	476102.86	0.67
373	0.28	451558	667730.88	0.68	388	0.09	1354596	1650703.58	0.82
374	0.35	363540	566720.13	0.64	389	0.50	251413	385052.17	0.65
375	0.32	389622	573176.43	0.68	390	0.72	175434	350755.75	0.50
376	0.34	374307	1077801.31	0.35	391	0.82	154666	309106.25	0.50
377	0.10	1224185	1581795.46	0.77	392	0.79	161219	322549.88	0.50
378	0.12	1033530	1367450.87	0.76	393	0.759	166861	333059.6	0.50099
379	0.24	523598	939624.21	0.56	394	0.803	157652	321340.9	0.49061

Table 4.14
Calibration of Model

α	β	Calibrated Population Share of Shopping Center			Original Population Share of Shopping Centers			Population Differences Between Original Data and			Sum of 2nd power of differences
		Armada	Bilkent	Migros	Armada	Bilkent	Migros	Armada	Bilkent	Migros	
0.2	0.2	988085	918681	1230847	680000	710000	1,125,000	-308,085	-208,681	-105,847	149,667,714,395
0.2	0.4	999333	841142	1297138	680000	710000	1,125,000	-319,333	-131,142	-172,138	148,803,280,097
0.2	0.6	1007086	769426	1361101	680000	710000	1,125,000	-327,086	-59,426	-236,101	166,260,383,073
0.2	0.8	1011631	704099	1421884	680000	710000	1,125,000	-331,631	5,901	-296,884	198,154,051,418
0.2	1	1013334	645308	1478971	680000	710000	1,125,000	-333,334	64,692	-353,971	240,592,079,261
0.2	1.2	1012612	592893	1532108	680000	710000	1,125,000	-332,612	117,107	-407,108	290,081,715,657
0.4	0.2	911240	861118	1365254	680000	710000	1,125,000	-231,240	-151,118	-240,254	134,030,572,040
0.4	0.4	918908	786190	1432515	680000	710000	1,125,000	-238,908	-76,190	-307,515	157,447,423,789
0.4	0.6	923934	717479	1496200	680000	710000	1,125,000	-243,934	-7,479	-371,200	197,349,171,797
0.4	0.8	926640	655370	1555604	680000	710000	1,125,000	-246,640	54,630	-430,604	249,235,531,316
0.4	1	927347	599859	1610408	680000	710000	1,125,000	-247,347	110,141	-485,408	308,932,504,754
0.4	1.2	926379	550671	1660563	680000	710000	1,125,000	-246,379	159,329	-535,563	372,916,068,851
0.6	0.2	833935	801122	1502557	680000	710000	1,125,000	-153,935	-91,122	-377,557	174,548,491,358
0.6	0.4	838506	729369	1569738	680000	710000	1,125,000	-158,506	-19,369	-444,738	223,291,198,841
0.6	0.6	841293	664163	1632157	680000	710000	1,125,000	-161,293	45,837	-507,157	285,324,685,067
0.6	0.8	842621	605688	1689304	680000	710000	1,125,000	-162,621	104,312	-564,304	355,765,587,401
0.6	1	842748	553787	1741077	680000	710000	1,125,000	-162,748	156,213	-616,077	422,791,482,802
0.6	1.2	841896	508078	1787639	680000	710000	1,125,000	-161,896	201,922	-662,639	506,073,253,221
0.8	0.2	757281	735689	1640643	680000	710000	1,125,000	-77,281	-25,689	-515,643	272,519,981,131
0.8	0.4	759277	671631	1706705	680000	710000	1,125,000	-79,277	38,369	-581,705	346,137,729,915
0.8	0.6	760306	610357	1766950	680000	710000	1,125,000	-80,306	99,643	-641,950	428,477,583,585
0.8	0.8	760676	555850	1821088	680000	710000	1,125,000	-80,676	154,150	-696,088	514,809,343,220
0.8	1	760570	507802	1869241	680000	710000	1,125,000	-80,570	202,198	-744,241	601,270,222,185
0.8	1.2	760107	465736	1911770	680000	710000	1,125,000	-80,107	244,264	-786,770	685,089,066,045
1	0.2	682382	677875	1777356	680000	710000	1,125,000	-2,382	32,125	-652,356	426,606,040,285
1	0.4	682328	613953	1841332	680000	710000	1,125,000	-2,328	96,047	-716,332	522,361,980,017
1	0.6	682048	556945	1898620	680000	710000	1,125,000	-2,048	153,055	-773,620	621,917,931,729
1	0.8	681817	506635	1949161	680000	710000	1,125,000	-1,817	203,365	-824,161	720,601,978,635
1	1	681743	462587	1993284	680000	710000	1,125,000	-1,743	247,413	-868,284	815,133,335,274
1	1.2	681851	424240	2031523	680000	710000	1,125,000	-1,851	285,760	-906,523	903,446,153,330
1.2	0.2	610265	616725	1910623	680000	710000	1,125,000	69,735	93,275	-785,623	630,766,693,979
1.2	0.4	608661	557280	1971672	680000	710000	1,125,000	71,339	152,720	-846,672	745,266,126,905
1.2	0.6	607469	504759	2025385	680000	710000	1,125,000	72,531	205,241	-900,385	858,077,762,267
1.2	0.8	606921	458770	2071923	680000	710000	1,125,000	73,079	251,230	-946,923	965,120,221,070
1.2	1	607060	418764	2111789	680000	710000	1,125,000	72,940	291,236	-986,789	1,063,891,181,817
1.2	1.2	607830	384126	2145657	680000	710000	1,125,000	72,170	325,874	-1,020,657	1,153,143,084,425
0.5	0.4	878632	757955	1501026	680000	710000	1,125,000	-198,632	-47,955	-376,026	183,149,906,125
0.5	0.5	879787	740583	1517243	680000	710000	1,125,000	-199,787	-30,583	-392,243	194,704,736,307
0.5	0.4	877339	775729	1484547	680000	710000	1,125,000	-197,339	-65,729	-359,547	172,537,027,571
0.5	0.3	875903	793895	1467815	680000	710000	1,125,000	-195,903	-83,895	-342,815	162,938,480,659
0.5	0.5	880810	723620	1533184	680000	710000	1,125,000	-200,810	-13,620	-408,184	207,124,338,356
0.5	0.9	884805	602919	1649889	680000	710000	1,125,000	-204,805	107,081	-524,889	328,919,890,907
1	1.5	682323	376089	2079000	680000	710000	1,125,000	-2,323	333,911	-954,000	1,021,617,952,250
3	3	246560	888898	2082155	680000	710000	1,125,000	433,440	-178,898	-957,155	1,136,020,422,029

Table 4.15
Market and Population Share

Quarters	Market Area	Attraction Power Armada	Armada Market Share	Armada Pop. Share	Attraction Power Bilkent	Bilkent Market Share	Bilkent Pop. Share	Attraction Power Migros	Migros Market Share	Migros Pop. Share
1	696960	0.286	199376	8307	0.288	200565	8357	0.426	297019	12376
2	73088	0.300	21921	343	0.254	18562	290	0.446	32605.1	509
3	394405	0.325	128129	2330	0.246	96967	1763	0.429	169309	3078
4	360896	0.305	109968	1718	0.250	90228	1410	0.445	160700	2511
5	185955	0.311	57876	503	0.252	46914	408	0.436	81165.3	706
6	291985	0.299	87388	760	0.247	72180	628	0.454	132417	1151
7	1219904	0.351	428131	6690	0.241	294052	4595	0.408	497721	7777
8	139150	0.299	41590	362	0.255	35500	309	0.446	62059.8	540
9	24725	0.293	7242	63	0.250	6172	54	0.457	11310.7	98
10	119424	0.294	35065	548	0.252	30042	469	0.455	54316.6	849
11	94760	0.290	27521	239	0.249	23636	206	0.460	43602.2	379
12	581632	0.308	179261	2801	0.258	150249	2348	0.433	252121	3939
13	291392	0.305	88921	1389	0.261	76197	1191	0.433	126274	1973
14	416735	0.302	125765	2287	0.259	108002	1964	0.439	182968	3327
15	588800	0.299	175905	2749	0.260	153004	2391	0.441	259891	4061
16	231296	0.303	70198	1097	0.263	60922	952	0.433	100176	1565
17	139580	0.298	41608	1189	0.263	36764	1050	0.439	61208.2	1749
18	79440	0.301	23915	996	0.265	21090	879	0.433	34435.2	1435
19	123240	0.302	37167	1549	0.268	32979	1374	0.431	53093.9	2212
20	319235	0.301	96246	2750	0.268	85493	2443	0.431	137496	3928
21	172900	0.300	51899	1483	0.271	46816	1338	0.429	74185.5	2120
22	78552	0.299	23504	979	0.266	20870	870	0.435	34178.6	1424
23	111405	0.293	32673	934	0.260	28983	828	0.447	49748.3	1421
24	51120	0.293	14958	623	0.262	13401	558	0.445	22761	948
25	130560	0.296	38619	1609	0.265	34553	1440	0.440	57388.6	2391
26	73325	0.292	21396	611	0.263	19279	551	0.445	32649.7	933
27	420915	0.291	122561	2228	0.257	108037	1964	0.452	190317	3460
28	432192	0.291	125844	1966	0.258	111428	1741	0.451	194921	3046
29	472010	0.292	137608	2502	0.262	123778	2251	0.446	210625	3830
30	409530	0.291	119054	2165	0.261	106794	1942	0.449	183681	3340
31	545685	0.290	158510	4529	0.265	144457	4127	0.445	242718	6935
32	421855	0.290	122536	3501	0.268	113066	3230	0.442	186253	5322
33	130152	0.291	37810	1575	0.270	35097	1462	0.440	57245.1	2385
34	184765	0.290	53671	1533	0.269	49679	1419	0.441	81415	2326
35	108220	0.291	31442	898	0.272	29409	840	0.438	47369.2	1353
36	326375	0.291	94823	2709	0.272	88645	2533	0.438	142907	4083
37	215976	0.293	63225	2634	0.267	57661	2403	0.440	95090.3	3962
38	205200	0.291	59752	2490	0.269	55223	2301	0.440	90224.7	3759
39	311080	0.293	91038	1655	0.271	84271	1532	0.436	135771	2469
40	467456	0.305	142789	2231	0.263	123064	1923	0.431	201602	3150
41	417472	0.305	127292	1989	0.264	110309	1724	0.431	179871	2810
42	1468435	0.313	459533	3996	0.269	394379	3429	0.418	614522	5344
43	389760	0.312	121429	1897	0.271	105483	1648	0.418	162848	2544
44	415415	0.305	126503	3614	0.275	114248	3264	0.420	174664	4990
45	370440	0.312	115580	3302	0.276	102122	2918	0.412	152738	4364
46	475035	0.311	147917	2689	0.277	131715	2395	0.411	195403	3553
47	444885	0.310	138087	3945	0.280	124786	3565	0.409	182013	5200
48	97224	0.307	29854	1244	0.280	27241	1135	0.413	40129.5	1672
49	228360	0.309	70488	1282	0.278	63570	1156	0.413	94301.7	1715
50	113112	0.407	45991	1916	0.232	26212	1092	0.362	40908.9	1705
51	378785	1.000	378785	6887	0.000	38	0	0.000	37.8785	0
52	1680768	0.352	590975	9234	0.236	397098	6205	0.412	692695	10823
53	221980	0.359	79756	1450	0.258	57210	1040	0.383	85014.7	1546
54	568865	0.349	198298	3605	0.244	139083	2529	0.407	231484	4209
55	184485	0.351	64721	1849	0.262	48375	1382	0.387	71388.7	2040

Table 4.15 (cont'd)
Market and Population Share

Quarters	Market Area	Attraction Power Armada	Armada Market Share	Armada Pop. Share	Attraction Power Bilkent	Bilkent Market Share	Bilkent Pop. Share	Attraction Power Migros	Migros Market Share	Migros Pop. Share
56	121896	0.339	41326	1722	0.275	33563	1398	0.386	47007.2	1959
57	227568	0.381	86598	3608	0.243	55337	2306	0.376	85633.1	3568
58	81240	0.349	28338	1181	0.258	20972	874	0.393	31930.6	1330
59	1011648	0.306	309317	4833	0.237	239980	3750	0.457	462351	7224
60	351780	0.285	100283	1823	0.236	83103	1511	0.479	168394	3062
61	78848	0.290	22840	357	0.244	19207	300	0.467	36801.7	575
62	71040	0.286	20307	317	0.248	17605	275	0.466	33128.2	518
63	3840	0.263	1008	42	0.222	854	36	0.515	1977.19	82
64	395010	0.302	119179	2167	0.228	90184	1640	0.470	185647	3375
65	146856	0.293	43024	1793	0.254	37369	1557	0.453	66462.9	2769
66	289664	0.297	86123	1346	0.255	73905	1155	0.448	129636	2026
67	158270	0.295	46651	1333	0.258	40861	1167	0.447	70757.7	2022
68	328240	0.294	96537	1755	0.258	84656	1539	0.448	147047	2674
69	65345	0.292	19055	544	0.259	16893	483	0.450	29396.5	840
70	0	0.291	0	0	0.257	0	0	0.452	0	0
71	444885	0.289	128569	3673	0.262	116388	3325	0.449	199928	5712
72	427490	0.290	124049	3544	0.264	112809	3223	0.446	190632	5447
73	342335	0.290	99409	2840	0.267	91280	2608	0.443	151646	4333
74	294175	0.290	85321	2438	0.266	78211	2235	0.444	130643	3733
75	153475	0.291	44587	1274	0.270	41454	1184	0.439	67434.3	1927
76	120000	0.290	34749	1448	0.273	32771	1365	0.437	52479.6	2187
77	109056	0.285	31117	1297	0.268	29266	1219	0.446	48673.2	2028
78	212520	0.289	61498	1757	0.273	57986	1657	0.438	93036.4	2658
79	257145	0.287	73754	2107	0.270	69368	1982	0.443	114023	3258
80	166845	0.289	48147	1376	0.272	45401	1297	0.439	73296.6	2094
81	385560	0.288	111165	3176	0.275	105913	3026	0.437	168483	4814
82	196035	0.289	56719	1621	0.275	53937	1541	0.436	85379.1	2439
83	193235	0.291	56260	1607	0.276	53302	1523	0.433	83673.8	2391
84	292495	0.291	85210	2435	0.275	80297	2294	0.434	126988	3628
85	121176	0.290	35154	1465	0.278	33639	1402	0.432	52382.6	2183
86	125015	0.289	36138	657	0.278	34745	632	0.433	54132.6	984
87	190320	0.292	55621	2318	0.281	53493	2229	0.427	81205.5	3384
88	261528	0.293	76507	3188	0.280	73353	3056	0.427	111667	4653
89	178968	0.293	52396	2183	0.278	49753	2073	0.429	76819.1	3201
90	401520	0.294	117898	3368	0.275	110310	3152	0.432	173313	4952
91	297885	0.295	87905	2512	0.279	83070	2373	0.426	126910	3626
92	174864	0.294	51383	2141	0.280	48989	2041	0.426	74492.2	3104
93	9648	0.293	2830	118	0.282	2720	113	0.425	4098.15	171
94	62675	0.287	17980	156	0.251	15707	137	0.463	28988.1	252
95	24064	0.289	6965	109	0.254	6102	95	0.457	10996.8	172
96	45120	0.290	13073	204	0.255	11514	180	0.455	20532.3	321
97	119845	0.289	34636	630	0.254	30471	554	0.457	54737.1	995
98	50120	0.286	14341	410	0.254	12724	364	0.460	23055.3	659
99	54945	0.285	15658	285	0.252	13836	252	0.463	25451.3	463
101	19200	0.287	5510	230	0.251	4821	201	0.462	8869.01	370
102	31255	0.285	8909	255	0.252	7877	225	0.463	14469.5	413
103	116985	0.287	33631	611	0.257	30058	547	0.456	53295.5	969
104	122290	0.287	35110	1003	0.258	31547	901	0.455	55632.6	1590
105	16335	0.286	4672	85	0.255	4167	76	0.459	7495.44	136
106	28050	0.286	8026	146	0.256	7167	130	0.458	12856.3	234
107	38940	0.286	11121	202	0.254	9878	180	0.461	17941.6	326
108	25896	0.286	7404	309	0.255	6598	275	0.459	11893.1	496
109	20195	0.286	5773	165	0.255	5140	147	0.460	9282.6	265
110	4864	0.285	1385	22	0.251	1223	19	0.464	2255.88	35
111	432	0.284	123	5	0.251	108	5	0.465	200.734	8

Table 4.15 (cont'd)
Market and Population Share

Quarters	Market Area	Attraction Power Armada	Armada Market Share	Armada Pop. Share	Attraction Power Bilkent	Bilkent Market Share	Bilkent Pop. Share	Attraction Power Migros	Migros Market Share	Migros Pop. Share
112	13776	0.285	3920	163	0.252	3465	144	0.464	6390.55	266
113	68040	0.286	19450	556	0.255	17321	495	0.460	31268.6	893
114	42192	0.286	12046	502	0.256	10790	450	0.459	19355.6	806
115	47250	0.286	13511	386	0.257	12146	347	0.457	21592.7	617
116	27888	0.280	7813	326	0.255	7113	296	0.465	12961.5	540
117	4224	0.285	1204	50	0.254	1074	45	0.461	1946.14	81
118	51552	0.284	14653	611	0.257	13232	551	0.459	23666.9	986
119	39490	0.281	11108	202	0.255	10080	183	0.463	18301.9	333
120	49980	0.282	14109	403	0.257	12849	367	0.461	23022.6	658
121	38544	0.284	10939	456	0.258	9954	415	0.458	17651	735
122	87168	0.281	24516	1022	0.256	22335	931	0.463	40316.3	1680
123	100555	0.283	28408	812	0.259	26079	745	0.458	46068.6	1316
124	52500	0.281	14756	422	0.255	13394	383	0.464	24350.1	696
125	49840	0.280	13936	398	0.255	12703	363	0.465	23200.4	663
126	29496	0.280	8264	344	0.254	7500	312	0.466	13732.5	572
127	46536	0.278	12947	539	0.252	11739	489	0.470	21849.6	910
128	86590	0.279	24178	691	0.254	21953	627	0.467	40458.9	1156
129	46480	0.279	12991	371	0.255	11836	338	0.466	21653.5	619
130	25728	0.280	7192	300	0.255	6554	273	0.466	11981.8	499
131	80704	0.281	22716	355	0.251	20266	317	0.467	37722.2	589
132	32305	0.282	9099	260	0.253	8162	233	0.466	15043.9	430
133	1128	0.281	317	13	0.248	279	12	0.472	532.111	22
134	25472	0.281	7161	112	0.248	6314	99	0.471	11996.5	187
135	14835	0.280	4158	36	0.246	3646	32	0.474	7031.63	61
136	16310	0.283	4610	132	0.249	4059	116	0.468	7640.54	218
137	3840	0.283	1087	45	0.249	958	40	0.467	1794.84	75
138	24610	0.284	6978	61	0.249	6123	53	0.468	11509	100
139	11328	0.281	3184	50	0.245	2776	43	0.474	5367.34	84
140	23695	0.283	6694	191	0.246	5829	167	0.471	11172.1	319
141	2592	0.281	728	30	0.243	630	26	0.476	1233.99	51
142	21890	0.281	6152	112	0.243	5317	97	0.476	10421.3	189
143	146930	0.288	42251	1207	0.267	39269	1122	0.445	65409.9	1869
144	164616	0.286	47097	1962	0.266	43756	1823	0.448	73762.8	3073
145	127365	0.284	36157	1033	0.264	33567	959	0.453	57641.9	1647
146	134976	0.282	38122	1588	0.261	35287	1470	0.456	61567.5	2565
147	4560	0.278	1268	53	0.257	1172	49	0.465	2120.35	88
148	237615	0.278	66161	1890	0.255	60638	1733	0.466	110816	3166
149	404965	0.276	111747	2032	0.253	102575	1865	0.471	190644	3466
150	273175	0.279	76249	2179	0.259	70857	2024	0.461	126069	3602
151	125496	0.280	35135	1464	0.261	32796	1366	0.459	57565.5	2399
152	251352	0.281	70681	2945	0.264	66417	2767	0.455	114253	4761
153	190575	0.282	53703	1534	0.266	50649	1447	0.452	86223.2	2464
154	186648	0.280	52287	2179	0.262	48847	2035	0.458	85514.2	3563
155	100848	0.281	28299	1179	0.263	26505	1104	0.457	46044.3	1919
156	57856	0.282	16339	255	0.267	15473	242	0.450	26044.3	407
157	111888	0.282	31585	1316	0.267	29888	1245	0.451	50415.1	2101
158	152088	0.281	42772	1782	0.264	40205	1675	0.454	69111.3	2880
159	533190	0.280	149267	4265	0.261	139330	3981	0.459	244593	6988
160	590695	0.279	164740	4707	0.259	153000	4371	0.462	272955	7799
161	308280	0.279	85862	2453	0.258	79605	2274	0.463	142813	4080
162	276485	0.277	76474	1390	0.254	70363	1279	0.469	129648	2357
163	489445	0.273	133804	2433	0.249	121859	2216	0.478	233782	4251
164	831490	0.268	222800	4051	0.241	200444	3644	0.491	408247	7423
165	480205	0.256	122704	2231	0.225	107964	1963	0.520	249537	4537
166	879450	0.270	237478	4318	0.244	214522	3900	0.486	427450	7772
167	380976	0.274	104362	4348	0.250	95215	3967	0.476	181399	7558
168	471310	0.272	128407	3669	0.248	116676	3334	0.480	226227	6464

Table 4.15 (cont'd)
Market and Population Share

Quarters	Market Area	Attraction Power Armada	Armada Market Share	Armada Pop. Share	Attraction Power Bilkent	Bilkent Market Share	Bilkent Pop. Share	Attraction Power Migros	Migros Market Share	Migros Pop. Share
169	532490	0.274	145801	4166	0.250	133000	3800	0.476	253689	7248
171	4344	0.260	1131	47	0.228	988	41	0.512	2224.51	93
172	88715	0.274	24320	442	0.243	21572	392	0.483	42823.5	779
173	23595	0.280	6600	120	0.245	5782	105	0.475	11213.2	204
174	22008	0.279	6147	256	0.244	5367	224	0.477	10493.9	437
175	18095	0.276	4986	91	0.237	4295	78	0.487	8813.44	160
176	4464	0.272	1212	50	0.240	1072	45	0.488	2180.42	91
177	101010	0.000	0	0	0.000	0	0	1.000	0	0
178	15505	0.256	3968	113	0.221	3430	98	0.523	8106.7	232
179	402535	0.237	95449	2727	0.207	83433	2384	0.556	223653	6390
180	158640	0.287	45560	1898	0.259	41137	1714	0.453	71943	2998
181	104664	0.281	29364	1223	0.259	27086	1129	0.461	48214.7	2009
182	600810	0.272	163393	4668	0.246	148046	4230	0.482	289371	8268
183	52965	0.283	14973	272	0.255	13516	246	0.462	24475.9	445
184	19128	0.276	5283	220	0.248	4751	198	0.475	9093.36	379
185	100050	0.272	27184	236	0.243	24272	211	0.486	48593.7	423
186	23208	0.269	6238	260	0.238	5534	231	0.493	11436	477
187	86765	0.267	23180	662	0.238	20652	590	0.495	42932.7	1227
188	49910	0.273	13611	389	0.245	12223	349	0.482	24076.2	688
189	36816	0.279	10268	428	0.253	9326	389	0.468	17222.4	718
190	44660	0.281	12536	358	0.257	11474	328	0.462	20650.2	590
191	73780	0.275	20309	580	0.248	18332	524	0.476	35138.7	1004
192	648340	0.278	180000	5143	0.256	166290	4751	0.466	302050	8630
193	1489180	0.280	416392	7571	0.261	388024	7055	0.460	684764	12450
194	939070	0.280	263326	4788	0.262	246387	4480	0.457	429357	7806
195	1507165	0.280	421991	7673	0.261	394097	7165	0.459	691077	12565
196	410480	0.278	114205	3263	0.258	105757	3022	0.464	190518	5443
197	471185	0.263	123689	2249	0.229	107884	1962	0.509	239613	4357
198	943800	0.270	254368	4625	0.244	230262	4187	0.487	459170	8349
199	228525	0.271	61980	1127	0.243	55481	1009	0.486	111064	2019
200	125640	0.275	34595	1441	0.256	32112	1338	0.469	58932.3	2456
201	174570	0.276	48231	877	0.261	45624	830	0.462	80715.5	1468
202	376475	0.276	104014	1891	0.256	96318	1751	0.468	176143	3203
203	146825	0.274	40211	1149	0.247	36287	1037	0.479	70327.6	2009
204	125580	0.270	33944	970	0.240	30093	860	0.490	61542.6	1758
205	307650	0.275	84589	2417	0.248	76197	2177	0.477	146864	4196
206	1127315	0.280	315419	9012	0.257	289157	8262	0.464	522739	14935
207	280070	0.281	78669	2248	0.263	73693	2106	0.456	127708	3649
208	2037145	0.277	563320	10242	0.255	519909	9453	0.468	953916	17344
209	502565	0.283	142231	4064	0.268	134663	3848	0.449	225671	6448
210	1661055	0.271	450973	8200	0.246	408914	7435	0.482	801168	14567
211	153230	0.271	41542	1187	0.240	36797	1051	0.489	74891.5	2140
212	541835	0.272	147280	4208	0.247	133649	3819	0.482	260906	7454
213	752045	0.282	211841	6053	0.266	199688	5705	0.453	340516	9729
214	170660	0.283	48299	1380	0.269	45953	1313	0.448	76408.2	2183
215	384965	0.283	108814	3109	0.268	103252	2950	0.449	172899	4940
216	62184	0.283	17618	734	0.270	16803	700	0.446	27763.6	1157
217	253995	0.283	71886	2054	0.269	68400	1954	0.448	113709	3249
218	175805	0.283	49803	1423	0.270	47488	1357	0.447	78514.1	2243
219	1692240	0.281	476271	8659	0.265	448267	8150	0.454	767702	13958
220	556465	0.282	157085	4488	0.267	148706	4249	0.450	250674	7162
221	966105	0.277	268046	7658	0.256	247524	7072	0.466	450536	12872
222	627165	0.281	176534	5044	0.266	166745	4764	0.453	283886	8111
223	485870	0.283	137721	3935	0.271	131616	3760	0.446	216533	6187

Table 4.15 (cont'd)
Market and Population Share

Quarters	Market Area	Attraction Power Armada	Armada Market Share	Armada Pop. Share	Attraction Power Bilkent	Bilkent Market Share	Bilkent Pop. Share	Attraction Power Migros	Migros Market Share	Migros Pop. Share
224	122760	0.284	34823	1451	0.271	33313	1388	0.445	54624.3	2276
225	1822535	0.282	514162	9348	0.267	486020	8837	0.451	822353	14952
226	366765	0.283	103801	2966	0.269	98766	2822	0.448	164198	4691
227	304780	0.284	86514	2472	0.272	82910	2369	0.444	135356	3867
228	268590	0.284	76227	2178	0.272	73011	2086	0.444	119352	3410
229	139265	0.284	39532	1129	0.272	37886	1082	0.444	61847.4	1767
230	201216	0.283	56933	2372	0.269	54137	2256	0.448	90145.7	3756
231	437928	0.284	124541	5189	0.274	119960	4998	0.442	193426	8059
232	631715	0.283	178645	5104	0.268	169579	4845	0.449	283491	8100
233	342615	0.281	96351	2753	0.264	90403	2583	0.455	155861	4453
234	184632	0.282	52149	2173	0.262	48459	2019	0.455	84024.7	3501
235	374080	0.281	105022	3001	0.263	98233	2807	0.457	170824	4881
236	66648	0.280	18691	779	0.262	17449	727	0.458	30508	1271
237	16752	0.281	4710	196	0.264	4415	184	0.455	7627.04	318
238	438655	0.282	123486	3528	0.265	116025	3315	0.454	199145	5690
239	497112	0.283	140843	5868	0.270	134249	5594	0.447	222020	9251
240	318115	0.283	90030	2572	0.269	85471	2442	0.448	142614	4075
241	222768	0.283	62976	2624	0.268	59636	2485	0.450	100157	4173
242	62376	0.288	17995	750	0.278	17318	722	0.434	27062.5	1128
243	136992	0.289	39527	1647	0.278	38146	1589	0.433	59319.3	2472
244	264504	0.289	76325	3180	0.279	73869	3078	0.432	114310	4763
245	239995	0.289	69256	1979	0.280	67188	1920	0.431	103551	2959
246	240030	0.289	69295	1980	0.281	67500	1929	0.430	103235	2950
247	239592	0.289	69257	2886	0.280	67173	2799	0.431	103162	4298
248	433055	0.289	125169	3576	0.282	122003	3486	0.429	185883	5311
249	300160	0.289	86750	2479	0.282	84787	2422	0.429	128623	3675
250	94200	0.289	27223	1134	0.283	26678	1112	0.428	40299	1679
251	264005	0.284	74984	2142	0.272	71799	2051	0.444	117222	3349
252	358645	0.285	102079	2917	0.274	98347	2810	0.441	158219	4521
253	97195	0.285	27742	793	0.268	26069	745	0.446	43383.6	1240
254	325605	0.298	97022	2772	0.270	88046	2516	0.432	140537	4015
255	84035	0.297	24994	714	0.273	22903	654	0.430	36137.6	1033
256	204105	0.304	62136	1130	0.264	53805	978	0.432	88163.8	1603
257	231605	0.303	70175	1276	0.265	61433	1117	0.432	99997.4	1818
258	579370	0.304	176089	1531	0.266	154134	1340	0.430	249147	2166
259	1252350	0.303	379300	3298	0.268	335577	2918	0.429	537473	4674
260	119945	0.304	36516	1043	0.277	33279	951	0.418	50150.2	1433
261	160560	0.317	50922	2122	0.275	44186	1841	0.408	65451.9	2727
262	1338370	0.321	430141	7821	0.267	357949	6508	0.411	550280	10005
263	286650	0.327	93818	2681	0.270	77372	2211	0.403	115460	3299
264	389840	0.321	124965	2272	0.274	106920	1944	0.405	157955	2872
265	156450	0.318	49783	1422	0.276	43167	1233	0.406	63500.3	1814
266	140420	0.314	44078	1259	0.279	39151	1119	0.407	57190.9	1634
267	184695	0.320	59122	1689	0.275	50732	1449	0.405	74841.6	2138
268	343416	0.320	109935	4581	0.275	94349	3931	0.405	139132	5797
269	248325	0.331	82286	2351	0.268	66560	1902	0.401	99478.5	2842
270	499632	0.341	170404	7100	0.265	132375	5516	0.394	196852	8202
271	73080	0.336	24575	1024	0.265	19349	806	0.399	29155.9	1215
272	204384	0.334	68354	2848	0.266	54314	2263	0.400	81715.8	3405
273	258936	0.327	84669	3528	0.270	69819	2909	0.403	104448	4352
274	54075	0.285	15391	440	0.253	13663	390	0.463	25021.5	715
275	12960	0.277	3592	150	0.246	3188	133	0.477	6180.08	258
276	24610	0.282	6929	60	0.244	6016	52	0.474	11664.8	101
277	5832	0.279	1626	68	0.240	1400	58	0.481	2805.95	117
278	378805	0.310	117578	3359	0.282	106645	3047	0.408	154582	4417
279	102270	0.317	32455	927	0.277	28302	809	0.406	41512.7	1186

Table 4.15 (cont'd)
Market and Population Share

Quarters	Market Area	Attraction Power Armada	Armada Market Share	Armada Pop. Share	Attraction Power Bilkent	Bilkent Market Share	Bilkent Pop. Share	Attraction Power Migros	Migros Market Share	Migros Pop. Share
280	103728	0.322	33382	1391	0.274	28412	1184	0.404	41933.5	1747
281	327635	0.283	92656	2647	0.275	90034	2572	0.442	144945	4141
282	1504030	0.277	416795	7578	0.263	395420	7189	0.460	691814	12578
283	719005	0.278	200097	5717	0.264	189593	5417	0.458	329315	9409
284	1162385	0.279	324772	9279	0.268	311251	8893	0.453	526361	15039
285	259070	0.284	73655	2104	0.278	72056	2059	0.438	113360	3239
286	174744	0.285	49867	2078	0.284	49577	2066	0.431	75300.4	3138
287	718080	0.279	200139	3639	0.266	191310	3478	0.455	326631	5939
288	426440	0.280	119264	3408	0.271	115422	3298	0.450	191754	5479
289	317625	0.280	89018	2543	0.274	87051	2487	0.446	141555	4044
290	221130	0.282	62376	1782	0.278	61414	1755	0.440	97340.2	2781
291	316645	0.282	89379	2554	0.275	87093	2488	0.443	140173	4005
292	119064	0.281	33476	1395	0.270	32098	1337	0.449	53489.5	2229
293	140064	0.281	39311	1638	0.269	37647	1569	0.451	63106.1	2629
294	156696	0.280	43824	1826	0.266	41726	1739	0.454	71145.3	2964
295	870485	0.279	242747	4414	0.260	226458	4117	0.461	401281	7296
296	291690	0.278	81035	2315	0.263	76792	2194	0.459	133863	3825
297	125496	0.279	34999	1458	0.266	33332	1389	0.456	57165.3	2382
298	129120	0.281	36249	1510	0.271	34986	1458	0.448	57885.3	2412
299	169344	0.281	47551	1981	0.274	46477	1937	0.445	75316	3138
300	206472	0.283	58503	2438	0.268	55391	2308	0.448	92577.8	3857
301	259632	0.284	73822	3076	0.274	71210	2967	0.441	114600	4775
302	526176	0.286	150241	6260	0.285	149716	6238	0.430	226220	9426
303	92330	0.285	26328	752	0.283	26091	745	0.432	39910.5	1140
304	274065	0.313	85801	1560	0.280	76642	1393	0.407	111621	2029
305	634795	0.299	189900	5426	0.281	178581	5102	0.420	266314	7609
306	454976	0.302	137455	2148	0.268	122111	1908	0.429	195410	3053
307	722545	0.301	217777	1894	0.270	195306	1698	0.428	309461	2691
308	1064555	0.300	319626	2779	0.272	289521	2518	0.428	455409	3960
309	46608	0.300	13967	582	0.273	12724	530	0.427	19916.4	830
310	217320	0.298	64758	2698	0.277	60161	2507	0.425	92400.9	3850
311	1313600	0.320	420375	6568	0.266	349186	5456	0.414	544038	8501
312	806795	0.324	261056	4746	0.258	208081	3783	0.419	337657	6139
313	711590	0.316	224774	4087	0.270	192392	3498	0.414	294424	5353
314	534655	0.299	159973	2909	0.283	151442	2753	0.418	223241	4059
315	1288000	0.300	386309	3359	0.286	368789	3207	0.414	532903	4634
316	1229470	0.299	368167	6694	0.276	339372	6170	0.425	521931	9490
317	520872	0.286	149092	6212	0.289	150612	6275	0.425	221169	9215
318	330768	0.287	94782	3949	0.293	96901	4038	0.420	139085	5795
319	201576	0.287	57915	2413	0.286	57723	2405	0.426	85938.8	3581
320	444624	0.284	126422	5268	0.273	121489	5062	0.442	196713	8196
321	329448	0.285	93923	3913	0.276	90995	3791	0.439	144529	6022
322	552192	0.287	158417	2475	0.300	165669	2589	0.413	228106	3564
323	104064	0.287	29817	1242	0.296	30800	1283	0.418	43446.8	1810
324	424095	0.287	121668	3476	0.300	127244	3636	0.413	175183	5005
325	330435	0.287	94798	2709	0.300	99155	2833	0.413	136482	3899
326	202055	0.287	57967	1656	0.300	60647	1733	0.413	83440.8	2384
327	293930	0.287	84326	2409	0.300	88236	2521	0.413	121368	3468
328	513472	0.287	147429	2304	0.300	153862	2404	0.413	212182	3315
329	892010	0.287	256169	7319	0.298	265638	7590	0.415	370203	10577
330	2746485	0.287	788702	22534	0.298	818468	23385	0.415	1139315	32552
331	1380555	0.287	396492	7209	0.298	411426	7480	0.415	572637	10412
332	306072	0.287	87908	3663	0.298	91199	3800	0.415	126965	5290
333	877140	0.287	251732	4577	0.297	260867	4743	0.416	364541	6628
334	463848	0.287	132919	5538	0.296	137128	5714	0.418	193801	8075
335	42456	0.298	12641	527	0.275	11694	487	0.427	18121.1	755

Table 4.15 (cont'd)
Market and Population Share

Quarters	Market Area	Attraction Power Armada	Armada Market Share	Armada Pop. Share	Attraction Power Bilkent	Bilkent Market Share	Bilkent Pop. Share	Attraction Power Migros	Migros Market Share	Migros Pop. Share
336	614320	0.286	175834	5024	0.296	182117	5203	0.417	256369	7325
337	1114680	0.286	319087	9117	0.297	330673	9448	0.417	464919	13283
338	114310	0.278	31791	908	0.253	28944	827	0.469	53574.3	1531
339	57240	0.275	15761	657	0.250	14293	596	0.475	27185.7	1133
340	151760	0.279	42359	1210	0.256	38817	1109	0.465	70583.9	2017
341	483336	0.287	138476	5770	0.287	138616	5776	0.427	206243	8593
342	600600	0.287	172494	4928	0.288	172735	4935	0.425	255371	7296
343	184224	0.296	54551	2273	0.274	50468	2103	0.430	79204.7	3300
344	416832	0.296	123188	5133	0.277	115402	4808	0.428	178242	7427
345	3960	0.296	1172	49	0.277	1096	46	0.427	1691.95	70
346	13992	0.296	4140	173	0.281	3934	164	0.423	5918.11	247
347	927355	0.287	265832	4833	0.295	273826	4979	0.418	387696	7049
348	1564850	0.287	449366	12839	0.298	466471	13328	0.415	649013	18543
349	461020	0.287	132390	3783	0.298	137519	3929	0.415	191111	5460
350	116808	0.287	33548	1398	0.298	34832	1451	0.415	48428.2	2018
351	480260	0.287	137940	2508	0.298	143119	2602	0.415	199201	3622
352	93380	0.294	27463	239	0.285	26622	231	0.421	39295.1	342
353	474240	0.000	0	0	1.000	0	19760	0.000	0	0
354	451430	0.328	148052	4230	0.271	122182	3491	0.401	181196	5177
355	210504	0.294	61932	2581	0.312	65673	2736	0.394	82898.6	3454
356	414260	0.291	120681	2194	0.313	129521	2355	0.396	164059	2983
357	965885	0.315	303873	2642	0.294	284165	2471	0.391	377848	3286
358	1867025	0.290	541416	4708	0.306	572034	4974	0.404	753575	6553
359	408672	0.286	117015	4876	0.290	118322	4930	0.424	173335	7222
360	245465	0.301	73996	1345	0.269	66015	1200	0.430	105454	1917
361	128376	0.300	38567	1607	0.270	34685	1445	0.429	55123.4	2297
362	703936	0.304	213920	3342	0.243	171385	2678	0.453	318631	4979
363	78976	0.299	23634	369	0.248	19585	306	0.453	35757.3	559
364	695860	0.304	211389	3843	0.281	195216	3549	0.416	289255	5259
365	146370	0.285	41692	1191	0.271	39704	1134	0.444	64973.7	1856
366	73272	0.283	20734	864	0.269	19713	821	0.448	32825.2	1368
367	160230	0.304	48675	1391	0.281	44951	1284	0.416	66604.4	1903
368	22925	0.267	6113	175	0.236	5401	154	0.498	11410.3	326
369	81288	0.276	22461	936	0.246	20030	835	0.477	38797	1617
370	35880	0.280	10038	418	0.255	9155	381	0.465	16687	695
371	484645	0.284	137553	3930	0.272	131714	3763	0.444	215378	6154
372	174744	0.285	49740	2073	0.283	49484	2062	0.432	75519.7	3147
373	153216	0.281	43023	1793	0.276	42311	1763	0.443	67882.3	2828
374	55580	0.283	15742	450	0.281	15642	447	0.435	24196.5	691
375	293232	0.284	83265	3469	0.272	79723	3322	0.444	130244	5427
376	342208	0.300	102541	1602	0.323	110581	1728	0.377	129086	2017
377	3840	0.283	1087	45	0.247	947	39	0.470	1806.15	75
378	72	0.285	20	1	0.251	18	1	0.465	33.4782	1
379	1306400	0.312	408044	3548	0.266	347207	3019	0.422	551148	4793
380	279624	0.286	80006	3334	0.296	82677	3445	0.418	116940	4873
381	223632	0.287	64092	2670	0.295	65897	2746	0.419	93643.6	3902
382	30576	0.287	8761	365	0.293	8967	374	0.420	12848.7	535
383	153960	0.287	44160	1840	0.301	46405	1934	0.412	63395.1	2641
384	420915	0.275	115704	2104	0.259	108825	1979	0.467	196387	3571
385	433992	0.286	124142	5173	0.288	124879	5203	0.426	184971	7707
386	84312	0.277	23338	972	0.255	21490	895	0.468	39483.6	1645
387	69720	0.285	19854	827	0.274	19114	796	0.441	30751.4	1281

Table 4.15 (cont'd)
Market and Population Share

Quarters	Market Area	Attraction Power Armada	Armada Market Share	Armada Pop. Share	Attraction Power Bilkent	Bilkent Market Share	Bilkent Pop. Share	Attraction Power Migros	Migros Market Share	Migros Pop. Share
388	35910	0.272	9783	280	0.244	8749	250	0.484	17378.3	497
389	219450	0.285	62590	1788	0.277	60734	1735	0.438	96125.7	2746
390	126192	0.298	37644	1568	0.295	37180	1549	0.407	51367.6	2140
391	184848	0.296	54769	2282	0.297	54843	2285	0.407	75236.2	3135
392	222696	0.297	66106	2754	0.296	65968	2749	0.407	90621.4	3776
393	209136	0.298	62233	2593	0.295	61745	2573	0.407	85157.6	3548
394	94656	0.295	27940	1164	0.300	28372	1182	0.405	38344.8	1598

APPENDIX B

Figure 3.6
Statue Income Map of Ankara 1990

