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A GEOGRAPHICAL STUDY OF KARAJ :
A SATELLITE CITY IN THE URBAN REGION OF TEHRAN

by

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Graduate Society

A thesis submitted to the
Faculty of Social Science
for the degree of
Doctor of Philosophy (Geography)

University of Durham

September 1978

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ABSTRACT

The main object of this study is to analyse the socio-economic situation of Karaj city - a medium-sized Iranian city which has grown rapidly as a result of being located in the neighbourhood of the Capital city of Tehran. Its particular geographical location has been mainly responsible for the city experiencing the most rapid rate of population growth of any Iranian city during the 1966-76 intercensal period. The population of Karaj, having increased annually 12.1% between 1966-76, has grown more than 3-fold over this period to a total of 138,774 persons. The acute housing shortages, difficulties with domestic water supply, and the congested traffic conditions, which are currently the main problems of the city, are mainly the result of this population explosion.

The proximity of Karaj to Tehran and the pressures this creates has recently caused the earlier functions of Karaj as an agricultural and tourist centre to be gradually subordinated to those of a major step-migration city for many people migrating to Tehran. Lower prices of land and accommodation as compared with Tehran are becoming the important factors also in turning Karaj into a growing residential satellite of the capital. The consequences of these two new functions are among the major issues to be pursued in this thesis.

ACKNOWLEDGMENTS

In the preparation of this thesis many people have been helpful and shown great interest. I wish to express my sincere gratitude to these individuals and institutions for their generous assistance in making this research possible.

I would first of all like to express my thanks and indebtedness to Professor W.B. Fisher, my supervisor, for not only his guidance and interest in my progress, but also for the great encouragement he offered me.

Thanks are also extended to other members of staff of the Department of Geography in Durham, especially Professor J.I. Clarke and Dr. A. Williams. The co-operation of friends and postgraduate fellows has also been very valuable among which I would like to thank particularly Mr. K. Thorpe and Dr. A.K. Ali.

Grateful acknowledgement must also be made to the staff of the Middle East Documentation Centre, Computer Unit and Science Library of the University of Durham.

In Iran, I wish to thank both the National University of Iran and the General Department of Scholarships, the Ministry of Science and High Education for providing me with grants and financial support.

My special indebtedness goes to Professor I. Djazoni, the Vice Chancellor of the National University of Iran for his continuous encouragement and interest in my work. My colleagues in the Department of Geography, the National University of Iran, have also contributed in many ways and I would like to thank all of them especially Dr. A. Shemirani.

The help of students of the Department of Geography in Tehran must also be acknowledged in collecting some of the necessary data in the field, and for which I express my gratitude.

The National Geographical Organization, the National Cartographic Centre, the Municipality of Karaj, the Land Registration Office and the Tehran Water Organization and its branch in Karaj have all been sources of great help and co-operation and to all of them I extend my grateful thanks.

Finally I acknowledge my extreme indebtedness to my wife and my two children for their continued forbearance and unfailing co-operation.

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INTRODUCTION

The urbanization process in developing countries is a cumulative result of several basic trends, such as the demographic "explosion", rural over-population, the weakening of traditional allegiance to customs, increased mobility, and the rise in personal aspirations and expectations. The problem confronting almost every developing country is whether this inevitable urbanization process will focus on a few urban poles of "primate cities" or whether a more articulated and dispersed pattern of urban centres will emerge. In the first case a split into two societies and economies, one urban and modernized, the other rural and traditional, may be anticipated.

It seems that in most of the developing countries, the first alternative, that of polarized urbanization in a few primate or largest cities, is the dominant situation.

The economic achievements of Iran on an international scale during the past decade have run parallel with a high degree of domestic improvement. The early 1970's witnessed an almost 6-fold increase in the income derived from oil and this in turn promoted a large number of development projects in the country. A further result of these economic processes has been the rapid increase in Iranian GNP and Per Capita Income. However, these economic improvements have not been evenly distributed throughout the whole country, but are confined mainly to a few large urban areas. Here, the huge investment of capital, mainly in service industries, has led to an influx of population from rural areas and small towns to the large cities. In fact the massive redistribution of population, accumulating in large urban units of considerable spatial extent, represents one of the most distinctive demographic features of contemporary Iran.

Tehran, as the capital city, has received the greatest share of this capital investment and subsequently has become the most important destination for migrants in Iran.

The city of Karaj is located 40 kilometres west of Tehran, where the Tehran-Karaj highway, having passed Karaj, divides into the northern and north-west/western routes. Both the geographical location and proximity of Karaj to Tehran are among the major reasons why Karaj is experiencing a very rapid and unplanned expansion, so much so that its population grew by nearly 10 times (from 14,526 to 138,774) between 1956-1976.

Historically the development of Karaj as an urban unit has been a fairly recent phenomenon, and it has been closely linked to the development of Tehran. Indeed, it was just before the outbreak of the Second World War, owing to its natural advantages and international prestige, that the settlement of Karaj was chosen to host a series of Agro-Industrial projects and, considered as a "new town", was named the "Industrial Model Town of Karaj."

Description of Data and the Significance of the Case Study Area

Studies dealing with geographical and socio-economic aspects of Iranian cities produced by both Iranian and foreign scholars are relatively few and often regard the city itself as a part of the region surrounding that city. However, some of these studies have contributed considerably to the existing literature and have been regarded as a valuable reference and basic information source for further studies. A selected bibliography of these works presented at the end of the present thesis may provide some idea as to the extent and variety of such studies. Furthermore, Master Plans which have been prepared for about 80 Iranian cities by different Engineering Consultants working through the Plan and Budget Organization of Iran, are also among the

other principal source materials dealing with modern Iranian cities.

However these latter sources generally have a planning approach and tend to follow a similar framework in their production.

The major significance of the present research is that it investigates a middle-sized Iranian city which is experiencing a faster rate of population growth than any other Iranian city as a result of being in the neighbourhood of the large and rapidly expanding capital city of Tehran, a unique situation in Iran which might occur on a more limited scale in other parts of Iran in the near future.

Throughout the thesis, emphasis has been placed on the fact that the geographical location and nearness of Karaj in relation to Tehran, has been one of the major reasons for many people who wish to live in Tehran as the capital city, but because of its environmental disadvantages or the higher cost of accommodation and overall expenditure, have preferred to live in Karaj.

The present study is a result of two periods of intensive field investigation carried out by the author. The major part of this fieldwork was conducted during the summer and autumn of 1975 through which those parts of the study dealing with commercial and industrial establishments of the city (Chapters 5 and 6) as well as the surrounding satellite settlements, together with a survey on the pattern of traffic flow on the Karaj-Tehran Autobahn (Chapter 8) were studied. The second period of field work was held in summer 1977, during which residential quarters of the city, especially the squatter settlements of Mahalleh-e-Zurabad, were studied, together with an inquiry on the existing public utilities (Chapter 4). As a result of these field investigations about 1500 questionnaires consisting of four different categories of questionnaires were completed. The English versions of these questionnaires can be found at the end of the thesis.

Analysis of the results of these questionnaires was facilitated by

the use of the computer; and attending some computer courses proved to be a very useful and necessary part of the exercise.

Apart from the general complexities involved in the investigation of urban geography, limitations imposed by inadequate and incomparable data, together with difficulties deriving from investigation in the field, especially in the case of squatter dwellings of the city, proved also to be problematic. As an example of the inadequacy of data, mention can be made of the fact that to produce a full list of the building permits issued during 1967-76 period by the Municipality of Karaj, involved a full week's work in the Municipal offices. This was because no figure was available for the annual total of the building permits and yet other information for such things as the extension of an already issued permit and permission for wall construction are also mixed with current building permits data. In spite of these problems, being a staff member of a university provided an opportunity through which the author was able to receive the full attention and co-operation of most of the city's authorities. Access to different sets of aerial photographs demonstrating the morphological change and spatial development of the city of Karaj is just one example of such opportunities and it is hoped that they have been well chosen to indicate the evolution of the land use pattern.

Where Persian geographical names have been transliterated in the text an attempt has been made as far as possible to follow the instructions provided by the Iranian National Geographical Organization.

The thesis includes eight chapters whose contents will be reviewed briefly as follows:

Chapter 1 examines the general aspects of urbanization in Iran in which an attempt has been made to find out how Karaj compares with other Iranian cities in a hierarchical organization, function and role in the urban system. The second chapter pays closer attention to Karaj and investigates the physical characteristics of both city and region. The

past evolution and development of the Karaj city has been analysed in Chapter 3 in which Karaj has been regarded as one of the Iranian new towns established from a village during the Reza Shah period. Whilst population characteristics and housing patterns are analysed in Chapter 4.

The rapid growth rate of population of Karaj, caused mainly by rural migration, and the socio-economic and demographic problems this created, are studied and explained in some depth in this chapter. Chapters 5 and 6 deal with commercial and industrial function and activities of the city of which the commercial function shows a pattern of expansion due to the increase in population, whereas the industrial function is relatively static because of introduction of directives to control the industrial expansion in the 120 kilometres radius of Tehran. The fact that over 56 per cent of the retailing premises import their goods from Tehran is a good indicator of the dependency of Karaj as an satellite city on the Metropolis of Tehran. Chapter 7 undertakes an investigation on land use patterns in the city both the existing and projected and has tried to bring out reasons behind the contemporary land use situation in Karaj. Furthermore, emphasis is placed on finding out the role of directives and regulations imposed by the planning projects such as the Master Plan for Karaj. Finally Chapter 8 considers one of the recent phenomena emerging in the areas surrounding Karaj namely the development of residential satellite settlements through which Karaj has become closer to Tehran than ever before. The overall processes are reviewed and discussed in the general conclusion of the thesis together with some recommendations for improvement.

CHAPTER 1

ASPECTS OF URBANIZATION IN IRAN WITH REFERENCE TO

THE RELATIONSHIP BETWEEN KARAJ AND TEHRAN

Rapid increase in the population of Iran in this century has led both to the growth of old cities and the emergence of new cities. ⁽¹⁾

Urbanization of the rapidly growing Iranian population is one of the major features. The census of 1956 showed 31.4% of the total population to be urban with the remaining 68.6% in rural areas; within the years 1956-66, however, these percentages had changed to show 38.5% of the population as urban and 61.3% rural. A further dramatic increase in urbanization was shown by the 1976 census in which of the total national population of 33.6 million, 15.7 million or 46.8% were living in urban areas and 53.2% in rural areas. ⁽²⁾

The impact of this rapid urban growth at a national level and the extent to which Karaj has been subjected to this rapid change are among the major issues to be pursued in this chapter. The definition by which settlements in Iran are recognized to be urban places is first considered, whilst in the second place an attempt is made to explain the pattern of the city-size distribution in Iran. This will be followed in turn by a short examination of the growth and development of Iranian cities in which the rank order of Karaj is viewed in comparison to the other 74 largest cities in Iran during the intercensal periods of 1956-76. Finally, with special reference to the Tehran-Karaj city region, an examination is made of the general position of medium-sized towns in the neighbourhood of large cities in Iran.

1.1 Definition of the City in Iran

Views on what constitutes an urban settlement vary from country to country. Indeed, how towns are defined and how the consequence of this definition are measured, are problems for which no universal or unique answer can be given. When we come to the question of what is meant by 'urban' there are certain problems involved in its definition and delimitation. For example, for across-country comparisons, and even within particular countries, towns are not always areally delimited in a consistent fashion. Also, changes in town boundaries can further complicate urban studies when a time dimension is introduced. (3)

The two main criteria which are most often used for defining urban areas are, first of all, some critical level of population size and, secondly, some critical level of settlement density, or a combination of these measures, by which villages or non-urban settlements may be distinguished.

By analysing the past three Iranian censuses it seems that the first of these criteria (i.e. critical threshold of population) has been employed as the principal criteria for determining urban settlements in Iran.

The First National Population Census in 1956 defined a place as a town only if it had more than 5,000 population. On this basis, therefore, there were 186 towns of different sizes in Iran. By 1966, however, this minimum size of 5,000 was retained as one measure of urban status. Places with less than 5,000 population, but having some administrative function, such as being the centre of Shahrestan, were also defined as towns. Accordingly, in 1966, there were 272 urban places of which 23 had less than 5,000 population and 249 were above this limit. The preliminary results of the 1976 Population Census show that criteria similar to those employed in 1966 to define urban places have been retained. As a result, out of the 493 places recorded as towns in Iran, 132 had under 5,000 population. It is interesting to note that 45 of these settlements had no municipality.

However, for the purpose of drawing comparisons and giving a more accurate indication of status between the three censuses, the present study only considers those places which have over 5,000 population as urban settlements, ignoring the matter of function. Consequently, there were 186, 249 and 361 urban places above this 5,000 limit in 1956, 1966 and 1976 respectively.

1.2 City-size distribution in Iran

The frequency of occurrence of towns of different sizes in different countries does show some broad similarities. In general, the number of small towns exceeds the number of medium-sized towns, which in turn outnumber the large towns. When towns are arranged by order of size it is possible to postulate that an empirical relationship exists between the rank of a town and its population size. When the frequency distributions of towns are plotted for Developed countries on double logarithmic graph scale they exhibit a linear or long-Normal form, whereas for Developing Countries the relationship is biased much more towards primate (i.e. peaked) distribution. Indeed, where the degree of urban concentration in a country is centred on one major population centre, such as a National Capital, it also shows that there is an absence of other cities of comparable or an intermediate size. This condition of primacy can be summed by Jefferson's 'Law of the primate city' which holds that the population of the fourth largest city should equal one sixth of the population of the largest city.⁽⁴⁾

The significant growth of the capital cities of the Middle East attests to magnetic attraction they hold for internal migrants. An annual growth rate two to three times greater than that of national population growth often reflects the high rate of migration to these agglomerations.

In Iran, as elsewhere, urban growth does not advance at the same rate for all levels of urban hierarchy (Table 1.1). Of particular interest

Table 1.1 : The Number and Population of Iranian Towns by Size Class, 1956, 1966 and 1976

Size of Place	1956				1966				1976			
	No. of Urban Places	No. of Population	% of Total Population	Mean	No. of Urban Places	No. of Population	% of Total Population	Mean	No. of Urban Places	No. of Population	% of Total Population	Mean
1 5,000- 9,999	90	628,536	10.6	6,984	118	793,909	8.2	6,728	168	1,123,718	7.4	6,894
2 10,000- 24,999	56	876,915	14.7	15,659	72	1,103,673	11.4	15,329	108	1,603,459	10.5	14,847
3 25,000- 49,999	22	764,716	12.8	34,760	30	1,081,309	11.1	36,044	47	1,228,340	8.0	26,135
4 50,000- 99,999	9	632,953	10.6	70,328	15	1,067,906	11.0	71,194	21	1,523,748	10.0	72,559
5 100,000-249,999	6	993,757	16.7	165,626	8	1,167,381	12.1	145,923	14	2,031,397	13.3	145,100
6 250,000-499,999	2	544,704	9.2	272,352	5	1,779,901	18.3	355,980	4	1,332,356	8.7	333,089
7 500,000-999,999	-	-	-	-	-	-	-	-	3	1,940,581	12.7	646,860
8 1,000,000 +	1	1,512,082	25.4	1,512,082	1	2,719,730	28.0	2,719,730	1	4,496,159	29.4	4,496,159
TOTAL	186	5,953,663	100.0	32,010	249	9,713,809	100.0	39,011	361	15,279,758	100.0	42,326

Source: First, Second and Third National Census of Population and Housing

are those cities with a population of 100,000 and more, which exhibit an annual growth rate of over 4 per cent. They increased in number from 9 to 14 between 1956 and 1966, and 22 by 1976. In 1966 such cities accounted for about 70% of the total urban population; whilst the remaining 58 Iranian largest cities housed only 30% of it. One immediate result of this imbalance of urban growth is reflected in the hierarchical distribution of the city system in Iran. It is evident from Figure 1.1 that the distribution of cities in Iran is "primate" rather than "rank size."

Assuming an equal rate of natural increase in rural and urban population, the differential growth rate of cities is due largely to migration from rural areas and small towns. Approximately one fourth of the urban population of Iran in 1966 were in-migrants. When city size classes are considered the differential attractiveness of the big cities becomes evident. More than 38 per cent of the inhabitants of large cities (100,000 or over) are in-migrants, whereas less than 15 per cent of the population of smaller cities (25,000 - 99,999) are in-migrants.⁽⁵⁾ Furthermore, the differential population growth is also a reflection of the socio-economic, administrative and functions performed by these cities, all of which facilitate the growth process. Thus, the primary objectives of this section are to identify the dimensions in which urban centres in Iran show similarities and differences, and to study the relationships between these dimensions and urban in-migration as the main source of urban growth.

In 1976, 15.7 million Iranians, (i.e. 46.8 per cent of the total population), were distributed amongst the 361 towns having more than 5,000 inhabitants. Tehran alone accounted for 29 per cent of this figure; half were to be found in the 8 largest cities (Tehran, Esfahan, Mashhad, Tabriz, Shiraz, Abadan and Kermanshah), and about 72 per cent in the 42 towns of more than 50,000 inhabitants (Table 1.2).

The preliminary results of the 1976 Census indicate an absolute increase of about 7.8 million in the total National population over the

Table 1.2: Populations of the 42 Largest Cities of Iran in 1966 and 1976

	1966	1976	Per Cent Annual Growth Rate	Rank Order of Percentage of Growth Rate	
1	Tehran	2,980,041	4,496,159	4.2	26
2	Esfahan	424,045	671,825	4.7	21
3	Mashhad	409,616	670,180	5.1	15
4	Tabriz	403,413	598,576	3.9	28
5	Shiraz	269,865	416,408	4.4	25
6	Ahvaz	206,375	329,006	4.8	19
7	Abadan	272,962	296,081	0.8	42
8	Kermanshah	187,930	290,861	4.5	24
9	Qom	134,292	246,831	6.3	5
10	Rasht	143,557	187,203	2.7	36
11	Rezaizyeh	110,749	163,991	4.0	27
12	Hamadan	124,167	155,846	2.3	39
13	Ardebil	83,596	147,404	5.8	7
14	Khorramshahr	88,536	146,709	5.2	14
15	Kerman	85,404	140,309	5.1	16
16	Karaj	44,243	138,774	12.1	1
17	Qazvin	88,106	138,527	4.6	23
18	Yazd	93,241	135,978	3.8	31
19	Arak	71,925	114,507	4.7	22
20	Dezful	84,499	110,287	2.7	37
21	Khorramabad	59,578	104,928	5.8	8
22	Borujerdi	71,486	100,103	3.4	33
23	Zanjan	58,714	99,967	5.5	13
24	Sanandaj	54,578	95,834	5.8	9
25	Zahedan	39,732	92,628	8.9	4
26	Bandar-e-Abbas	34,627	89,103	9.9	2
27	Gorgan	51,181	88,348	5.6	11
28	Kashan	58,468	84,545	3.8	32
29	Masjed Soleyman	64,488	77,161	1.8	40
30	Najafabad	43,384	76,236	5.8	10
31	Sari	44,547	70,936	4.8	20
32	Khoy	47,647	70,040	3.9	29
33	Sabzevar	42,415	69,174	5.0	17
34	Amol	40,076	68,782	5.6	12
35	Babol	49,973	67,790	3.1	34
36	Shahi	38,898	63,289	5.0	18
37	Maragheh	54,106	60,820	1.2	4
38	Gonbad-e-Kavous	40,667	59,868	3.9	30
39	Neyshabur	33,482	59,101	5.9	6
40	Bandar-e-Bushehr	23,547	57,681	9.3	3
41	Bandar-e-Pahlavi	41,785	55,978	3.0	35
42	Kazerun	39,758	51,309	2.6	38

Source: Second and Third National Census of Population and Housing, 1966 and 1976.

previous population census of 1966. The urban population accounted for the major part of this increase, so much so that during the intercensal period, urban areas gained 5.9 million in population, whereas only 1.8 million people were added to the populations of rural settlements.

Consequently, the percentage of the total population in urban areas has increased considerably as we noted, from 38% to 46.8% of the total. Such an increase in the rate of urbanization is determined partly by the overall increase in the number of towns in Iran (i.e. 112, from 249 to 361) as a result of the upgradation of agglomerations previously below the 5000 limit but now falling within definition of the urban population.

Figure 1.1 shows the city size distribution for 1956, 1966 and 1976 plotted on a logarithmic scale. For the towns ranked 4th to 361st, the distribution appears fairly regular and reflects no particular organization effort on the part of the government. Apart from Tehran, which clearly departs from the distribution, there does not in 1976 appear to be any plateau which might correspond to a multi-level urban hierarchy. The two towns ranking after Tehran (Esfahan and Mashhad) are in fact appreciably below the level predicted by the rank size rule. This tremendous dominance by Tehran is an important matter, although not directly within the scope of the present study.

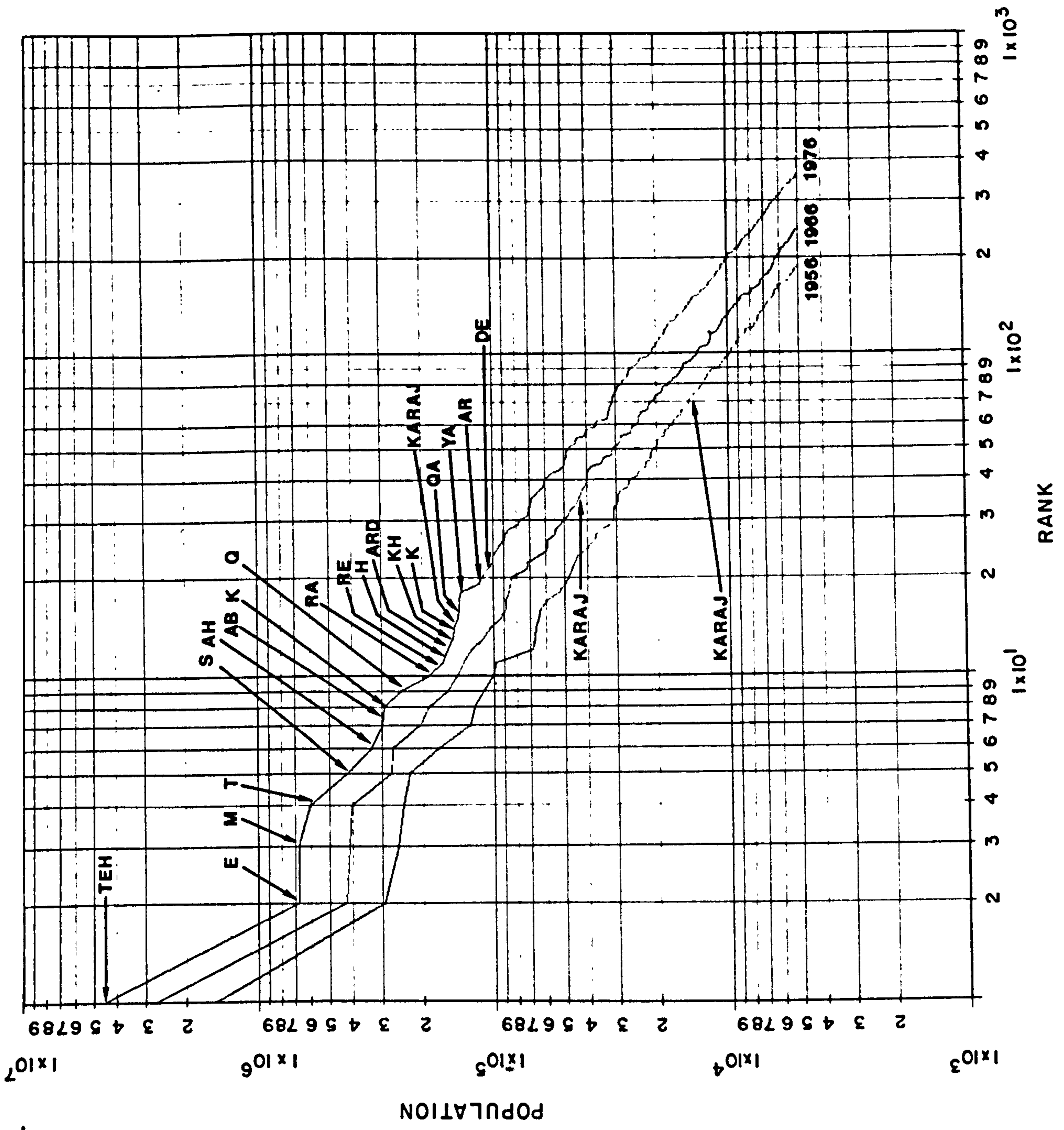
1.3 Growth and development of Iranian cities

As already mentioned, rapid growth in urbanization is one of the most important phenomena of contemporary Iran. The overall urban growth rate of 5.1% for the 1956-66 intercensal period has shown an even faster trend, reaching 6% per annum over the 1966-76 decade.

This rapid expansion in the urban population seems to have started only since the Second World war and has increased by more than 4-fold since 1945. Rural emigration which presently accounts for almost half of the growth of Iranian towns, only began to develop on any scale at this time.

Fig. 1.1 RANK-SIZE CURVES OF IRANIAN CITIES IN 1956, 1966 and 1976 (Rank order of 20 largest cities is shown for 1976)

- 1 TEH - TEHRAN
- 2 E - ESFAHAN
- 3 M - MASHHAD
- 4 T - TABRIZ
- 5 S - SHIRAZ
- 6 AH - AHVAZ
- 7 AB - ABADAN
- 8 K - KERMANSHAH
- 9 Q - QOM
- 10 RA - RASHT
- 11 RE - REZAIYEH
- 12 H - HAMADAN
- 13 ARD - ARDEBIL
- 14 KH - KHORRAMSHAHR
- 15 KE - KERMAN
- 16 KARAJ
- 17 QA - QAZVIN
- 18 YA - YAZD
- 19 AR - ARAK
- 20 DE - DEZFUL



The spatial and hierarchical organization of the traditional urban network was fairly simple and can be explained as follows:-

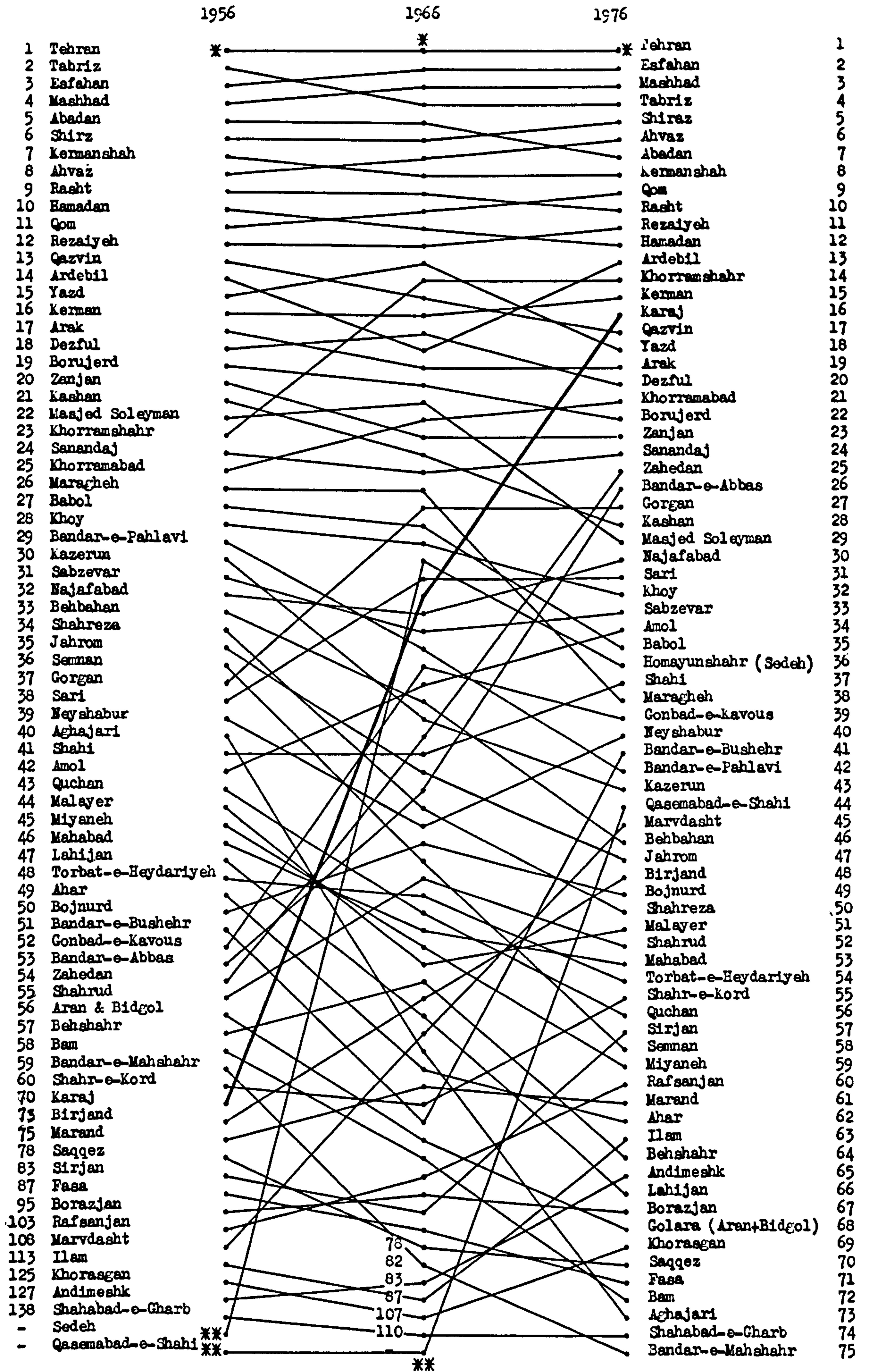
Towns could be grouped by function in the following categories:

- (a) rural service and craft centres closely tied to the rural sector,
- (b) medium-size towns (small in number) which drew their dynamism from their favoured geographical location on major trade and communication routes whose importance derived from being stopping places for caravans on the edge of the desert.
- (c) a few large towns, religious centres or successive former capitals associated with the exercise of political power. All of these large traditional towns were and are situated in the centre of rich and densely populated agricultural plains. They have all developed at the expense of the surrounding gardens and orchards.

Apart from the study of city size distributions, another important approach to urban growth and change has been the study of shifts in the rank of cities over time. Such a study of changes in the rank ordering of towns can reveal, albeit tangentially, something of the nature of urban growth and can certainly, as Carter (1969) suggests, point in a rather aggregate fashion to periods of marked change in the distribution of individual city growth rates. Other studies which have looked at individual city rank-orders, have pointed to the tendency for shifts in rank to be small at the upper end of the size array, but to be very considerable as one moves to progressively smaller cities.

Figure 1.2, for example, demonstrates the rank order of certain Iranian cities over the period 1956-76. The cities which are included are the 75 largest urban places in 1976 and their ranks are shown at each successive date. Tehran, the largest city in 1956, has retained its rank throughout the whole period. Tabriz starting as the second largest city in 1956, had fallen to 4th place in both the 1966 and 1976 censuses,

Fig. 1.2 Change in population rank-order of 75 Iranian Cities, 1956, 1966 and 1976.



* Including Shemiran and Rey.
 ** According to the 1956 and 1966 census definition these settlements were classified as village.

Source : First, Second and Third Iranian National Census of Population, 1956, 1966 and 1976.

below Esfahan and Mashhad, which had moved up from third and fourth place respectively. Abadan dropped from fifth to seventh position by the end of the period and was surpassed by Shiraz and Ahvaz, showing the recent increase in centralization on these two latter provincial cities. All of the other large places indeed show relatively little change in their rank orders over the whole period. On the other hand, at lower levels of their hierarchy there is a tendency for increasingly large fluctuations to occur with smaller sized cities. Some places moved rapidly up the rank hierarchy: Karaj, as the best example, was 70th in 1956, but moved to 34th place by 1966 and again with an enormous jump reached 16th place in 1976. There are other places such as Zahedan and Bandar-e-Abbas whose growth has been encouraged deliberately by the government. It is also interesting to note that some of the small towns located close to large cities have gained substantially in population and consequently have experienced shifts in their rank order from very low level to much higher levels in the hierarchy. For instance Marvdasht to the north of Shiraz (from 108th in 1956 to 45th in 1976), Homayounshahr (Sedeh) to the west of Esfahan from a village in 1956 to 36th in 1976, or again Qasemabad-e-Shahi as a village in the south west of Tehran up to 44th place in 1976.

Furthermore, some places moved very rapidly down the hierarchy: such as oil field cities of Aghajari, beginning at 40th position in 1956, and falling to 73rd position by 1976. Other places show more fluctuating fortunes: Bandar-e-Bushehr, which began in 51st position, had fallen to 62nd by 1966, but climbed to 41st by 1976.

Analysis of such changes in rank order can reveal much about the demographic trends of individual Iranian cities and can also throw light on the ways in which growth occurs within an urban system. The aggregate patterns which are exemplified in Figure 1.2, suggest stability at the upper end of the size array of place, but greater fluctuations in size at the lower end.

1.4 A discussion of the Medium-sized satellite towns of large cities of Iran, with special reference to the Tehran-Karaj city region

As a general rule, it is becoming common throughout the world for the commuter zone around major cities to be slowly pushed outwards as people increasingly leave the noise, lack of recreational space and high cost of housing in the city for the country. As we shall see, it is argued in a number of instances in this thesis that such a process has already taken place in Tehran and has, in fact, been exacerbated by the proposals of Tehran's Master Plan which imposed limitations on the city's growth.

The continuous expansion and development of Tehran has meant that the majority of its growing population consists of immigrants of working age. Some studies of the places of origin of these immigrants in 1973⁽⁷⁾ showed that 50% of them were originally from Gilan, Eastern and Western Azarbaijan, Hamadan and Zanzan or the Central Ostan. This means that if they took the direct route to Tehran, they must necessarily have passed through Karaj which is situated along the highways that connect Tehran with the northern, north western and western ostan of the country.

Internal movements of population in Iran generally take one of the four following forms: Rural-rural, Rural-urban, small township areas to larger cities, and Urban-rural. It should be noted that the majority of immigrants from smaller towns to larger cities are those who have primarily migrated from villages. These immigrants usually start from a village and move temporarily to a small township. Later on they move from this first destination to a major city for permanent settlement. It is for this reason that small towns on routes to major cities have a high rate of population growth, Karaj can be used as an excellent example which supports of this observation, since it has shown a steady annual population growth of 11.8 per cent during 1956-66 and 12.1 per cent during the 1966-76 intercensal periods.

Table 1.3, and Figure 1.3, compare the population changes of the urban settlements of Ostan-e-Markazi (Central Ostan), according to the results of the past three Iranian National Census. As shown in 1966 for example, with the exception of Rey, which is sited immediately next to Tehran's Southern boundary and since 1968 has been included in Tehran as one of the 12 districts of the city, Karaj has had the highest percentage of population growth of any city in the country. Its population rose from 14,526 to 44,243 in 1956-66 and experienced a further three-fold increase to 138,774 or a growth of 213% during 1966-76.

When considering the relationship between Tehran and Karaj, it must also be noted that a new kind of movement, a reverse migration, is taking place as many Tehranis have recently transferred their residence from Tehran to Karaj. This factor will be discussed in detail later.

The overall dominance of Tehran over its surrounding areas including Karaj is a major theme which has been emphasised throughout the study. Such dominance can also be shown by the inclusion of suburban settlements, for example, such as Shemiran and Rey in the urban boundary of Tehran. As is shown by Figure 1.3, the development of other new urban settlements such as Qasemabad-e-Shahi, Qaleh-Hassankhan, indicates a growing tendency for the infilling of existing gaps between the built-up areas of Tehran and Karaj.

In 1976, as a measure towards the policy of administrative decentralization, the government introduced a new administrative boundary for the Central Ostan which reduced its area substantially. As a result, the eastern part of the Central Ostan, including three Shahrestans of Varamin, Garmsar and Damavand were separated from this Ostan and were included within the boundary of the Semnan Ostan. (See Figure 1.3).

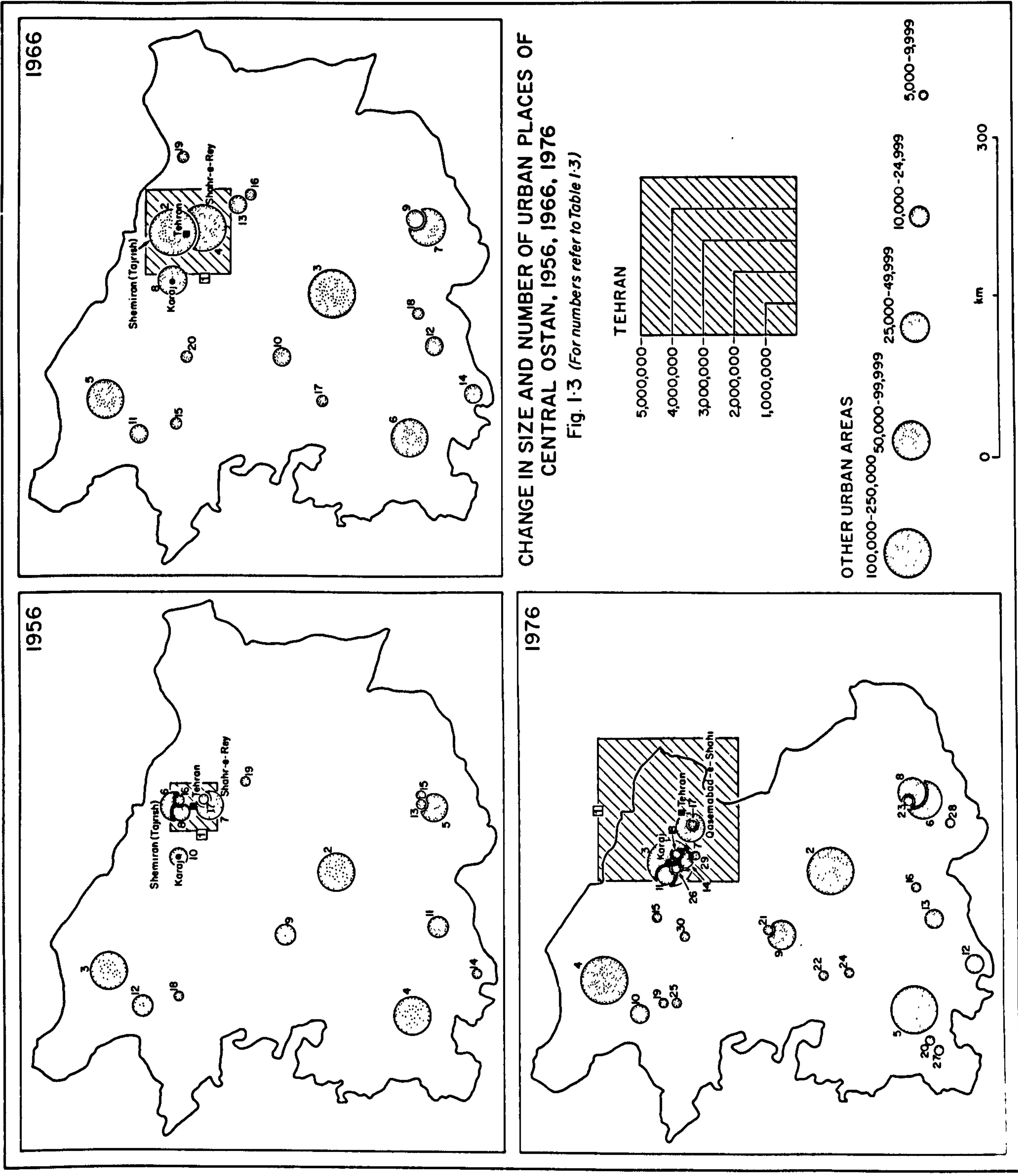


Table 1.3: Change in Number and Population Size of Urban Places in Central Ostan for 1956, 1966 and 1976

No.	Place Name	Population in 1956	No.	Place Name	Population in 1966	No.	Place Name	Population in 1976	No.	Place Name	Population in 1976
1	Tehran	1,512,082	1	Tehran	2,719,730	1	Tehran	4,496,159	26	Shahdasht	5,603
2	Qom	96,499	2	Shemiran	157,486	2	Qom	246,831	27	Astaneh	5,559
3	Qazvin	66,420	3	Qom	134,292	3	Karaj	138,774	28	Joshaqan-e-Qali	5,080
4	Arak	58,998	4	Shahr-e-Rey	102,825	4	Qazvin	138,527	29	Robat Karim	5,011
5	Kashan	45,955	5	Qazvin	88,106	5	Arak	114,507	30	Eshtehard	5,010
6	Tajrish	26,526	6	Arak	71,925	6	Kashan	84,545			
7	Shahr-e-Rey	22,327	7	Kashan	58,468	7	Qasemabad-e-Shahi	49,938			
8	Qulhak & Zargandeh	16,793	8	Karaj	44,243	8	Golara (Aran & Bidgol)	31,280			
9	Saveh	14,537	9	Aran & Bidgol	23,265	9	Saveh	25,692			
10	Karaj	14,526	10	Saveh	17,565	10	Takestan	19,978			
11	Mahallat	10,575	11	Takestan	13,485	11	Hesarak	16,415			
12	Takestan	10,534	12	Mahallat	12,324	12	Khomeyn	16,145			
13	Aran	9,460	13	Varamin	11,183	13	Mahallat	14,173			
14	Khomeyn	8,397	14	Khomeyn	10,587	14	Shahriyar	11,634			
15	Bidgol	7,185	15	Shal	6,454	15	Nazarabad-e-Bozorg	9,988			
16	Rostamabad	6,712	16	Pishva	6,332	16	Delijan	9,548			
17	Kuy-e-Siman	6,633	17	Tafresh	6,323	17	Hassanabad-e-Loqmani	8,780			
18	Shal	5,546	18	Delijan	6,114	18	Qaleh Hassan Khan	7,797			
19	Varamin	5,205	19	Damavand	5,391	19	Shal	7,728			
			20	Eshtehard	5,149	20	Shahzand	7,236			
						21	Zarand	6,852			
						22	Tafresh	6,657			
						23	Nooshabad	6,085			
						24	Ashtiyan	5,727			
						25	Asfarvarin	5,686			

Source: First, Second and Third National Census of Population and Housing 1956, 1966 and 1976.

Such a decision seems to be very important in the context of the relationship between Tehran and Karaj because it means that those easterly Shahrestans that previously looked to Tehran, now have an easterly orientation towards Semnan, as the Provincial Centre for their administrative affairs. Consequently Tehran might be expected to expand even more towards the west in future and have more connection with Karaj city, a process which is likely to occur anyway, owing to the physical boundaries to the east of Tehran.

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CHAPTER 2

THE PHYSICAL CHARACTERISTICS OF THE KARAJ REGION

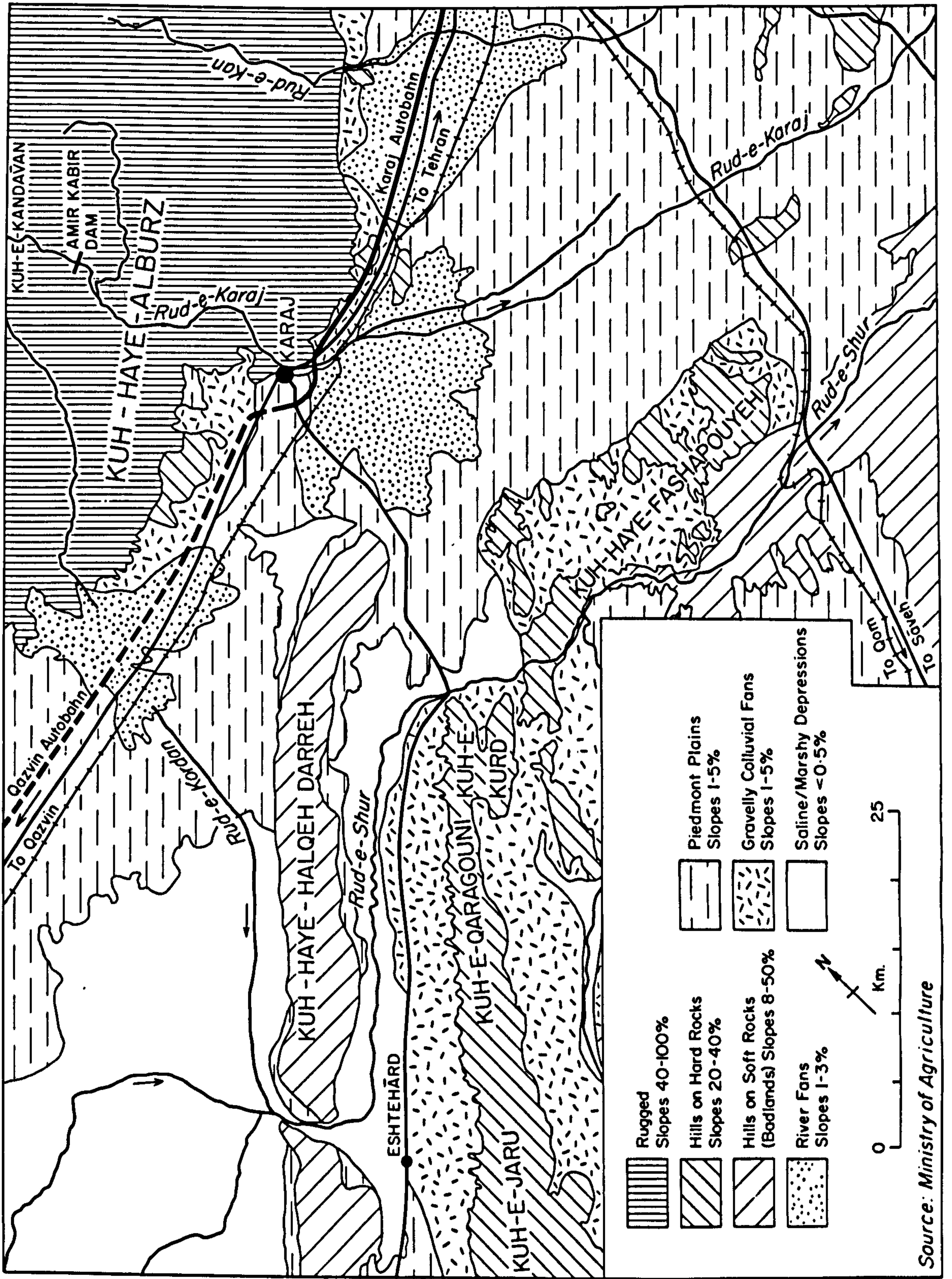
The relevant physical characteristics of the Karaj region will be discussed in this chapter, in order to present a fuller account of the present geographical problems of the Karaj city. Moreover the agricultural importance of the Karaj region within the Central Ostan necessitates such examination, owing to the universal interrelationship between agriculture and physical conditions. Furthermore, this discussion will hopefully illustrate the more tenuous interrelationships between the urban life of the city of Karaj and the influences traceable to circumstances of the physical environment.

2.1 The Location of Karaj

To facilitate the discussion on the physical characteristics of Karaj it is necessary to delimit convenient boundaries for this region. The Karaj region has an approximate size of 5,500 sq. km. and can be taken as being bordered by the rivers Kan (east), Kordan-Rud-e-Shur (salt river) (west). The southern part of The Alburz main mountain system (including the Kandavan in the north) and the outliers Fashapouyeh and Kharaqan ranges (including Kuh-e-Jaru, Kuh-e-Qaragouni and Kuh-e-Kurd) in the south, can be held to be the other boundaries of the arbitrarily-defined region. The boundaries of the above delimited region are almost conformable with those of the Karaj Shahrestan with the exception of the eastern boundaries. The Karaj Shahrestan boundary is approximately 20 kilometres west of the river Kan (Figure 2.1).

The physiography of the Karaj region can be divided into two broad areas: (1) high mountains to the north, and (2) a large and extended

Fig. 2-1 PHYSIOGRAPHY OF THE KARAJ REGION



Source: Ministry of Agriculture

alluvial plain in the south. The latter subdivision, including some minor heights is more important in both physical and human context and therefore more attention has been paid to it throughout this chapter. In the case of the northern mountainous area, emphasis will be focussed mainly on the Karaj River Valley and the adjacent heights because they contribute a major effect in the shaping of the Karaj plain.

The physical difference of the two subdivisions and their subsequent effects, is the major theme of this chapter which will be discussed and analysed in some detail.

2.2 Geology and Geomorphology

Geological studies in Karaj region have considered mainly the local stratigraphic layers called formations. These formations which, are recognized according to material, thickness and age, are named usually according to the geographical location where they are principally found. The Karaj Formation, Upper Red Formation, Hezar Darreh Formation, Kahrizak Formation and Tehran Formation are the most important sequences of the Karaj region.

The Karaj Formation which is the oldest of the region, coincides with the mountains of the northern Karaj region. This formation which was first named by Dedual,⁽¹⁾ the Swiss geologist, consists mainly of sediments of Middle Eocene and include all of the southern Alburz Mountains which overlook Tehran and Karaj. It also includes the mountains which are adjacent to the Amir Kabir Dam, (Figure 2.1). The Karaj Formation is 3000 to 4000 metres in depth and generally has a greenish colour produced by green tuffs. These green tuffs form the most important and abundant source of stone for building activities in the Karaj and Tehran areas. Apart from tuffs, there are other rocks namely as calcareous shales, Diabases, Diorite, Andesites and Monzonite. Due to the

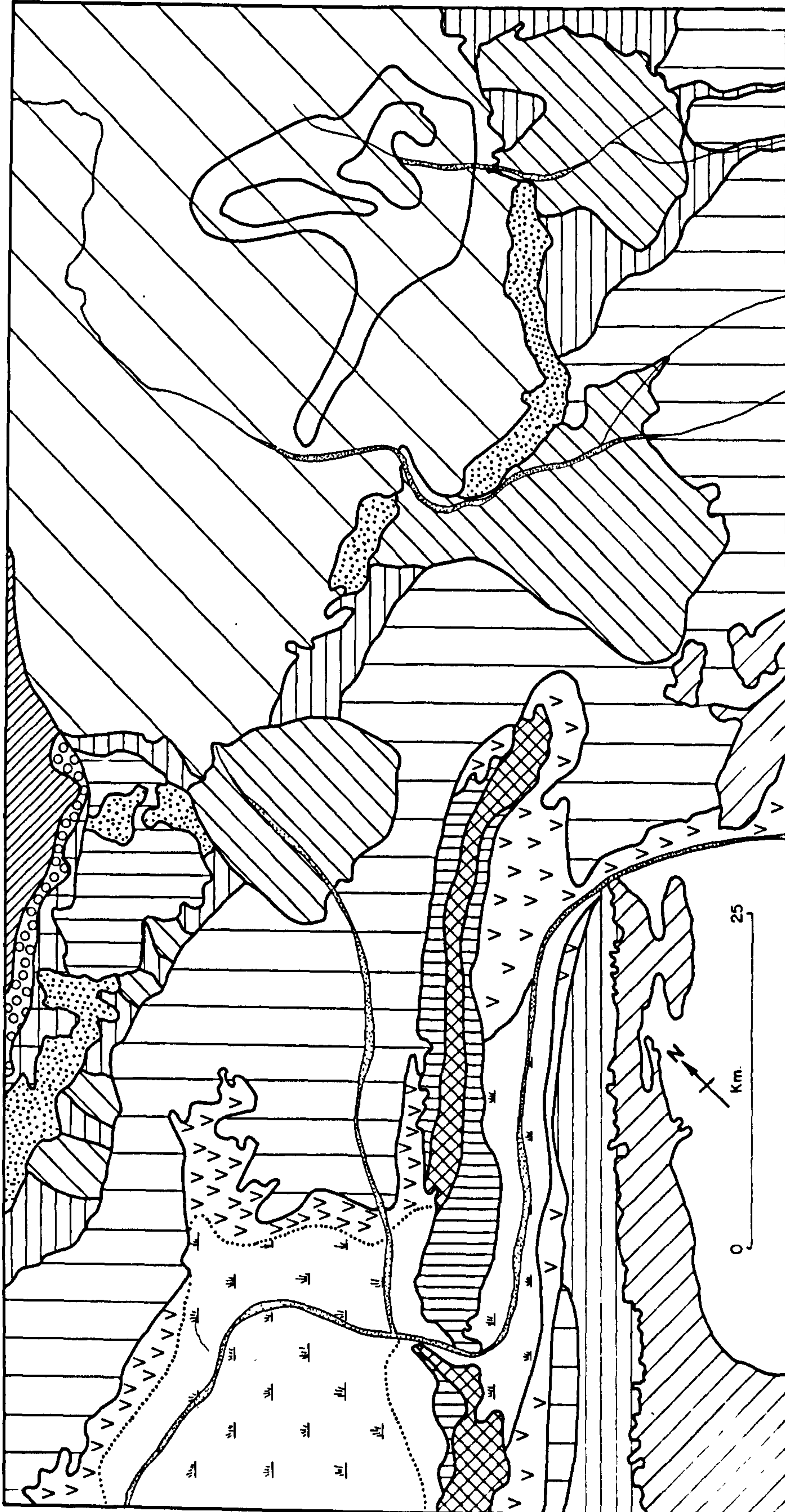
different lithologies of these rocks, they are used for a wide range of purposes such as road making and dam construction (see Figure 2.2).

The Upper Red Formation which is the next important formation, is of Miocene Age and outcrops in the southern part of the Karaj plain. This formation attains a maximum depth of 2200 metres and acts as a major source of calcareous and salt minerals for the Karaj Region. The Upper Red Formation is particularly marked in the Kuh-e-Kurd (1798 m), Kuh-e-Jaru (2050 m) and the Kuh-e-Qaragouni (1925 m) in the south west of the Karaj region. This formation is important in a later context, in that it greatly affects the soil texture and the hydrography of the southern part of the Karaj region.

Over the Miocene sediments of the Upper Red Formation there is a very thick continental sediment which consists mainly of conglomerate materials. These sediments which date from the Palaeocene and Quaternary eras are covered by alluvium deposited by streams eroding the southerly mountains of the Southern Alburz range. These conglomerate materials form the plains of Tehran, Karaj and Qazvin. H. Rieben⁽²⁾ has recognized three different series in the sedimentary sequence, namely the Hezar Darreh, Kahrizak and Tehran, and has distinguished them as A, B, C Series respectively.

The Hezar Darreh Formation (Series A) attains a depth of 100 to 1200 metres in places between Tehran and Karaj and dates from Plio-Pleistocene. It is folded and consists of conglomerate of irregular composition. Tuffs and Andesites derived from the Karaj Formation make up the bulk of the conglomerate materials. From the line which separates the Southern Alburz Mountains from the plains of Karaj and Tehran, the Karaj Formation has been strongly thrust over the Hezar Darreh Formation. The Hezar Darreh Formation forms all of the piedmont hills between Tehran, Karaj to near Qazvin.

Fig.22 GEOLOGICAL MAP OF THE KARAJ REGION



- | | | | | | | | | | |
|--|----------------------------------|--|---|--|------------------------------------|--|--------------------------------------|--|---|
| | ALLUVIAL FAN | | ALLUVIAL CLAY LOAM SANDSTONE AND SALT LANDS | | COARSE GRAINED ALLUVIUM (Series B) | | SCREE | | CARBONACEOUS (COALY SCHIST) |
| | ALLUVIAL LOAM | | MARSH | | GREY GYPSIFEROUS MARL | | SANDY LIMESTONE | | PRE CAMBRIAN SEDIMENTARY ROCKS, METAMORPHIC SCHISTS |
| | GREEN TUFFS, ANDESITE AND SCHIST | | VOLCANIC ROCKS | | SANDSTONE | | OLD ALLUVIUM (Series A) CONGLOMERATE | | |

Source Ministry of Water and Power

The Kahrizak Formation (Series B) is a second conglomerate, composed of material derived from the Hezar Darreh Formation. The maximum depth of Kahrizak Formation is only 60 metres which is very much shallower in comparison with the Hezar Darreh. The age of this formation is Middle Quaternary and it can be seen immediately after piedmonts hills of Southern Alburz Mountains. It extends over a large area including the plains of Karaj and Tehran.

The Tehran Formation (Series C) consists of Holocene alluvium. This alluvium attains a maximum depth of 35 metres and can be considered as the most recent geological formation within the Karaj region.

Over the above mentioned formations, the present alluvium produced by the rivers of the region are deposited. These deposits are occasionally referred to as Series D, have a variable texture according to their source and their place of deposition.

Geomorphology

The present geomorphology of the Karaj region is a result of the interaction of two principal factors, namely the rock material and the land structure.

The Tehran-Karaj Thrust directed towards the hard rocks of the Karaj Formation has created the main northern mountains of the Karaj region. In turn the softness of the cement forming the conglomerates of the Hezar Darreh, Kahrizak and Tehran Formations have resulted in the appearance of the vast and generally sloping plain of Karaj.

In the mountain area, there are great altitudinal differences between the mountain peaks and the adjacent valleys. The steep slopes (40 to 100 per cent) facilitate the crumbling and slip erosion of rocks, and scree movement. The valleys are generally youthful and the lower slopes are covered by materials weathered from above. Weathering occurs

particularly on the exposed tuffs which accumulate in the river valley and on lower slopes. The considerable erosion taking place in this region is illustrated by the figure of approximately 255,000 m³ of sediment which accumulate behind the Amir Kabir Dam each year.⁽³⁾ The life of the dam is being considerably reduced by this process.

Bordering the fan and the comparatively narrow valley of the Karaj to the north-west and north-east are the two dissimilar relief areas of the southern edge of Alburz. In the north-east is the Kuh-e-Dashteh with its northerly extension along the Karaj river and easterly extension parallel with Karaj-Tehran road. A steep and cliff-like slope of Kuh-e-Dashteh is only 500 metres away from the main city square. Tappeh-e-Moradab to the north west of Karaj is entirely different from Kuh-e-Dashteh being lower and less precipitous and craggy. Tappeh-e-Moradab is less resistant than the siliceous tuff of Kuh-e-Dashteh because it consists mainly of alluvium. Separating the two relief areas is the Karaj River flowing on a flood-plain covered with alluvium. Where the river meets the plain it becomes considerably broader. A feature which is well over one kilometre wide in places.

Karaj city is situated on a gently sloping alluvial fan formed by the Karaj river. To the north the fan consists of coarse material, including green tuffs, volcanic rocks and loess. It covers an approximate total area of 210 sq. kms and is over 300 metres thick in places. The Karaj fan is the largest fan situated to the south of the Alburz mountains. Furthermore, the fan contains considerable ground-water which is rather difficult to utilize at the northern part of the Karaj city, owing to its great depth. This problem becomes less serious towards the edge of the fan. Here, the geomorphological influences at a micro scale can be appreciated where the irregular relief slopes of the Tappeh-e-Moradab, unsuitable for the development of a normal housing project, have been

occupied by a squatter residential quarter. To the south of the city the gentle slope of alluvium has facilitated the passage of the Tehran-Qazvin Autobahn.

In general, the geomorphology of the Karaj region especially in a north-southerly direction, conforms closely with the suggested model by P. Beaumont⁽⁴⁾ in which four zones of upland, alluvial fan, alluvial plain and salt desert are recognised.

2.3 Climate and Water Resources

The purpose of this section is to elucidate the climatic characteristics of Karaj. Precipitation, temperature changes, humidity, wind directions and other pertinent factors, influencing life in Karaj, will be discussed.

The quantity of climatological information concerning Karaj city is greater than for its surrounding area; for this reason attention has been principally focussed on Karaj city. The main sources of this data are the Iranian Meteorological organization, the Ministry of Agriculture and the Ministry of Water and Power. Information derived from the Agricultural College (Daneshkadeh-e-Keshavarzi) in Karaj and several individual studies and personal observation, has also been employed. Karaj city, in comparison with other Iranian cities, has had a relatively long and continuous record of climatological data. This data set, beginning in 1941 has been mainly a result of the work of the Karaj Agricultural College. Data were produced during the war, but owing to their unreliability, this information will not be employed. The 1946-75 meteorological data studied here, have been collected at the site of the College of Agriculture situated almost in the centre of the city, at a height of 1321 metres.

Karaj city has climatic characteristics which are similar to those

of the other southern Central Alburz cities. Table 2.1 illustrates the semi-arid climate of Karaj which is characterised by a fairly hot and dry summer and cold and humid winters. 39.1 per cent of the average annual precipitation of 265.7 mm falls in winter, 31.4 per cent in spring and 27.9 per cent in autumn. Only 1.6 per cent of the total precipitation falls in Karaj during summer. Sometimes there is no summer rainfall (see Figure 2.3A). Approximately 70 per cent of the precipitation falls in winter and spring. Study of the monthly precipitation totals helps clarify the nature of this precipitation pattern. In March and April 33.8 per cent of the total precipitation occurs. This high amount of rainfall is produced by the rising temperatures of these months and the consequent increase of atmospheric instability.

Table 2.1: Average Percentage of Seasonal Distribution of Precipitation in Karaj City (1946-1975)

Winter	Spring	Summer	Autumn
39.1	31.4	1.6	27.9

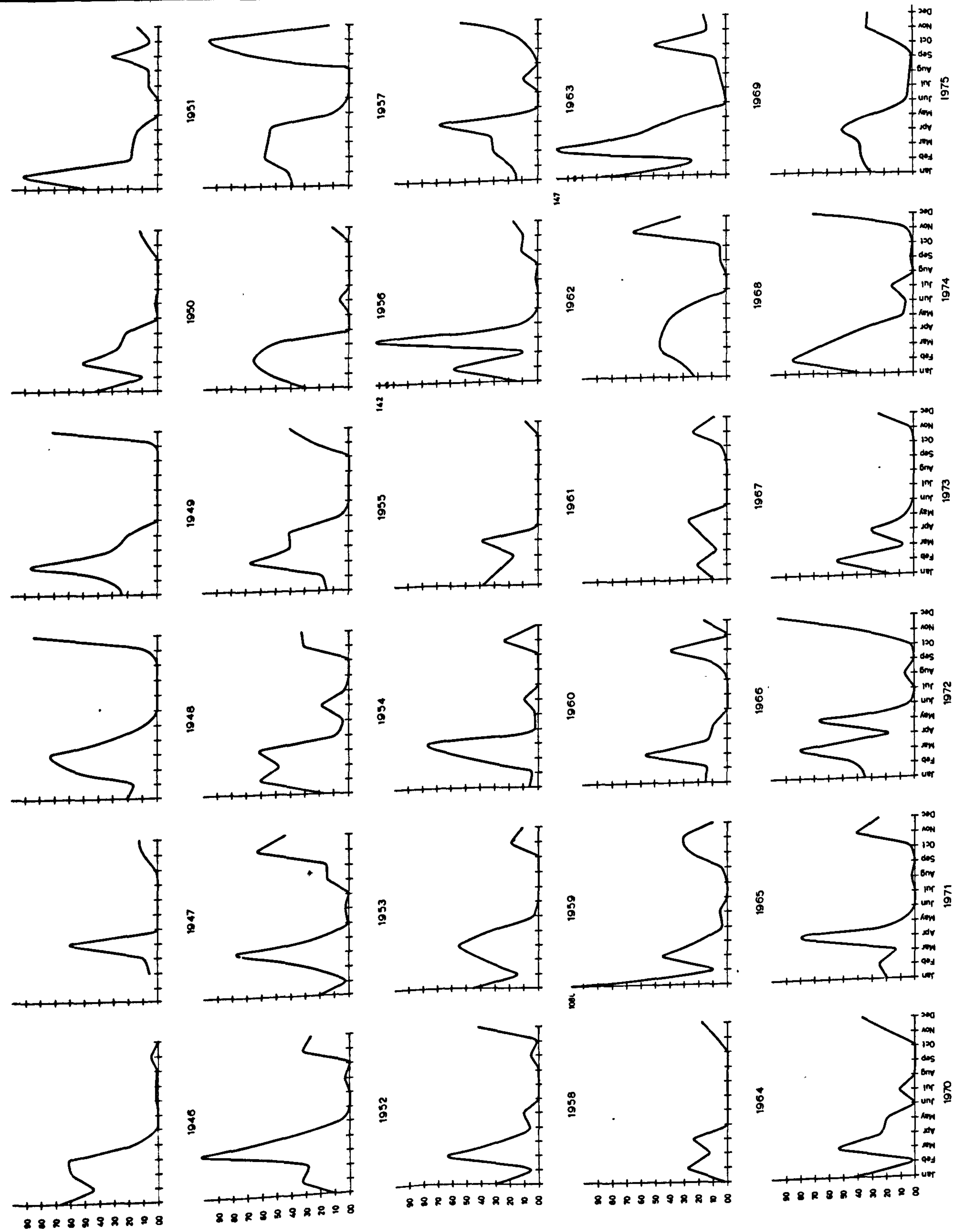
Source: Iranian Meteorological Organization

The annual pattern of rainfall for Karaj city for the entire 30 year period is interesting, (see Figure 2.3B), because the amounts of surface water and ground-water in the Karaj region have been visibly affected by an increase in rainfall since the early 1970's. On the other hand two years, 1949 and 1964, are remarkable because the annual precipitation totals were considerably less than usual (similar deficiencies were recorded during the same years in other parts of Iran).

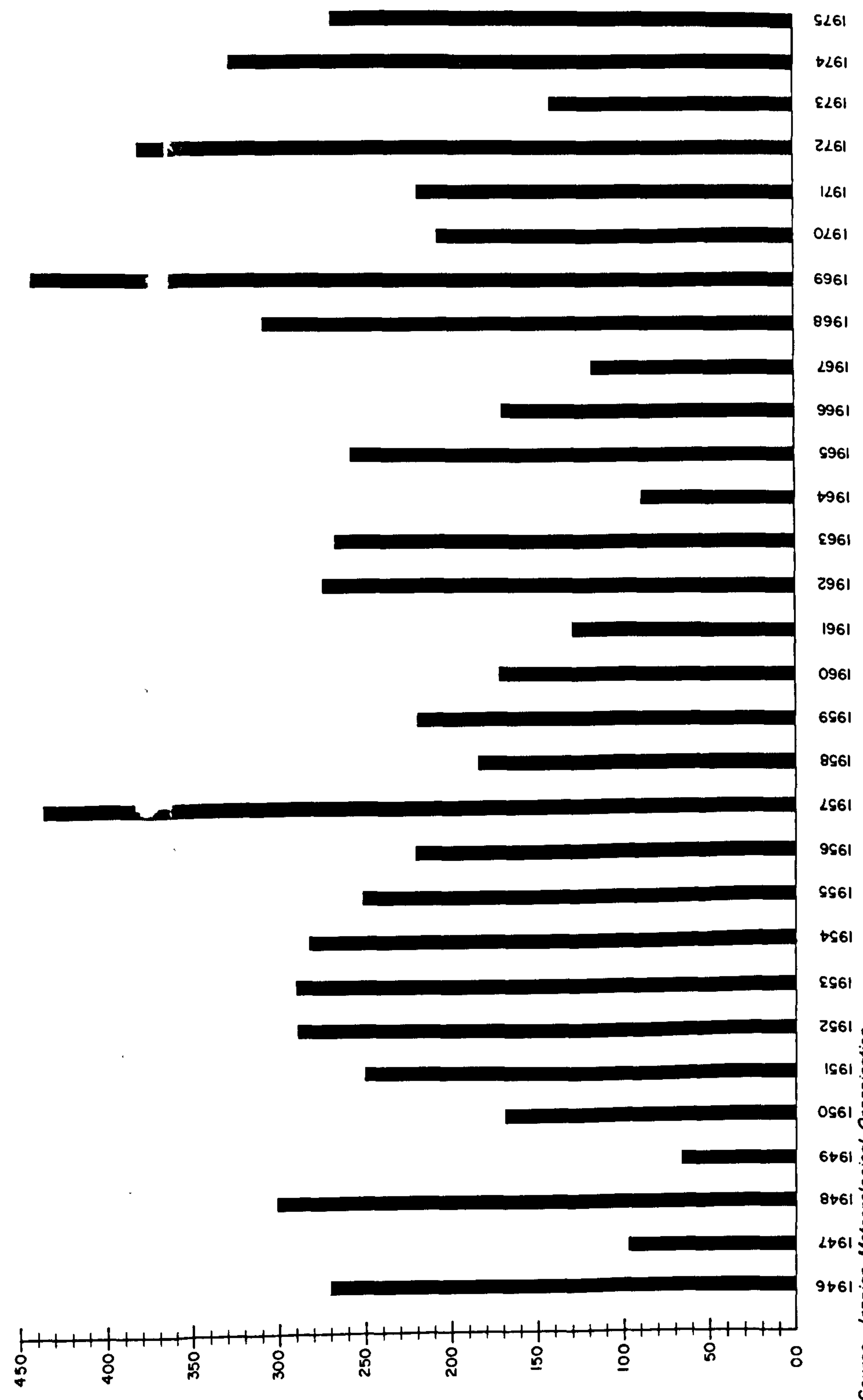
Altitude is an important influence on the amount and the character of the precipitation falling in the Karaj region. With increasing altitude to the north of the region, precipitation totals increase and snowfall becomes more important. Such effects are illustrated by the following table:

Fig. 2.3 A & B, MONTHLY AND ANNUAL PRECIPITATION IN KARAJ CITY 1946-1975

A



B



Source: Iranian Meteorological Organization

Table 2.2: Relationship between precipitation and altitude for selected climatic stations in Karaj region

Seri No.		Altitude (in metres)	Annual Precipitation (mm)
1	Amir Kabir Dam	1,588	450.6
2	Bilaqan Village	1,500	293.1
3	Karaj Agricultural College	1,321	265.7
4	Karaj Industrial Town	1,300	258.3

Source: Iranian Meteorological Organization and Ministry of Water and Power.

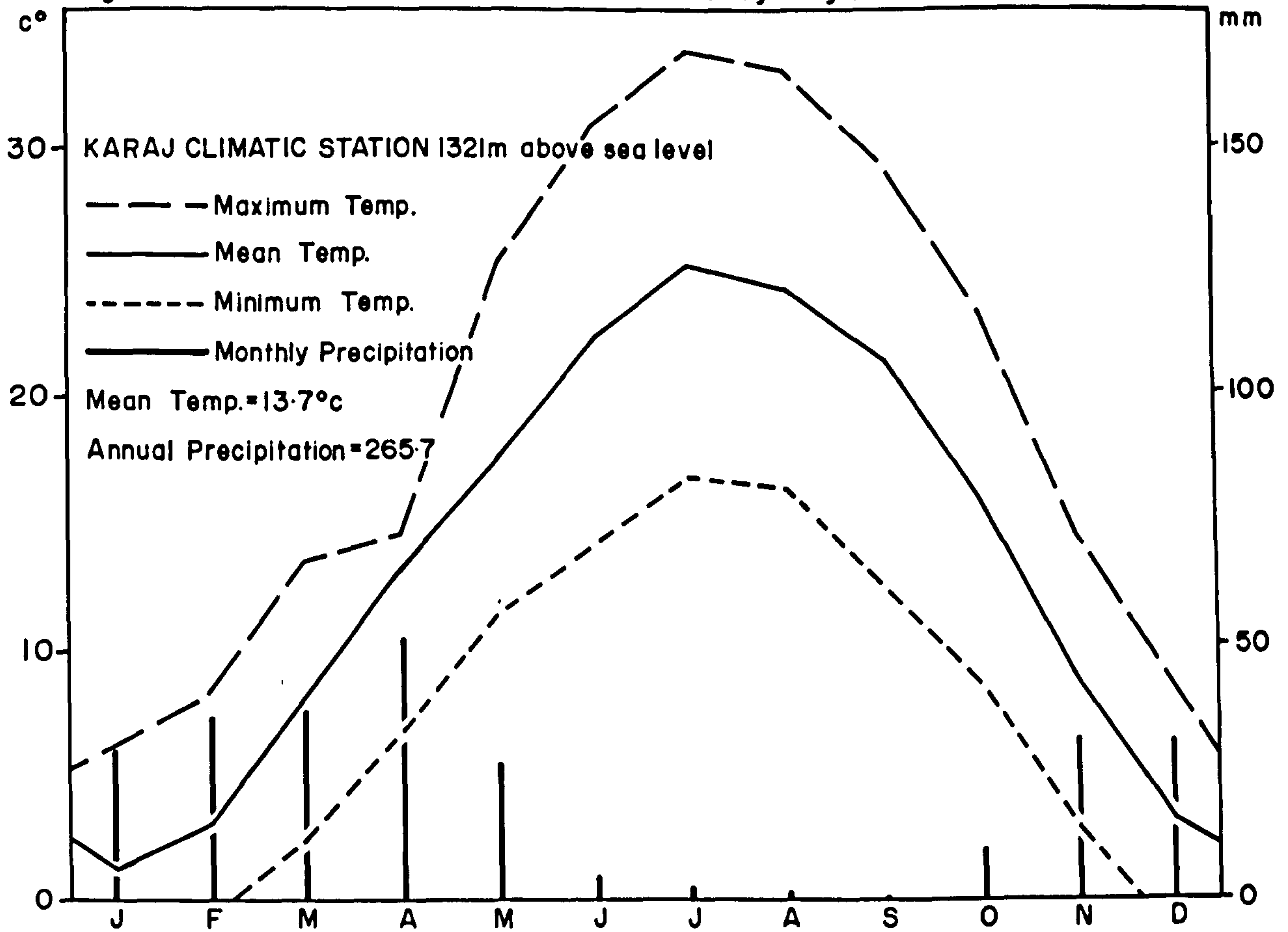
The minimum amount of precipitation and the maximum demand for water coincide in the summer months (see Figure 2.4). The detrimental effect of this situation on agriculture and other activities encouraged the construction of the Amir Kabir Dam in 1961. Associated with the relatively intense amounts of rainfall in the months of March and April, is the danger of flooding and consequent property damage. This problem is still unsolved.

Referring to Table 2.3 which illustrates the temperature differences for the 30 year period between 1946 and 1975, the average minimum temperature is -3.7°C and the average maximum temperature 34.2°C . According to A. Khalili,⁽⁵⁾ the absolute maximum temperature for Karaj city was 38.4°C , recorded in July 1965, and the absolute minimum temperature was -27°C , recorded in January 1948. This considerable difference between the maximum and the minimum absolute temperatures can be related to the nearby Kavir.

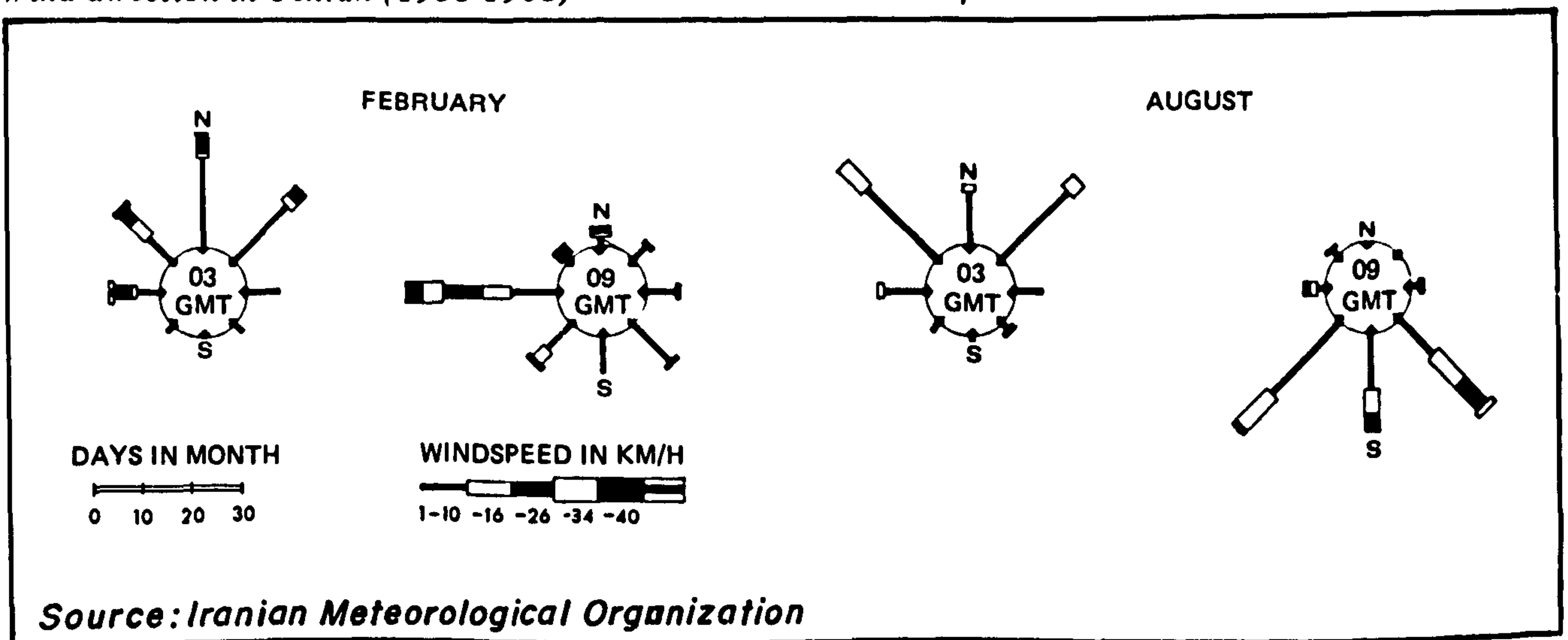
Altitude also affects the temperatures of the Karaj region with high altitudes characterised by markedly lower temperatures.

Besides altitude, the Karaj river also exerts a moderating influence on temperature. The popularity of the extended picnic area or

Fig 2-4 Climatic Characteristics of the Karaj City (1946-75)



Wind direction in Tehran (1951-1968) Refer to text for explanation



so-called "Yeylaq" (summer camp) adjacent to this river, which attracts both Karajis and Tehranis, is perhaps a measure of this microclimatic influence.

Frost is not an unusual phenomenon in the Karaj region with about 60 to 75 days with frost annually. Frost presents problems, especially in the northern part of Karaj city where large settlements have expanded up the steep hills of Tappeh-e-Moradab or eastern part of the Kuh-e-Dashteh.

Average annual humidity in Karaj is only 48 per cent, a figure reflecting the aridity of the Karaj region. The mean minimum recorded at 12.30 p.m. local time is 32.8% and the mean maximum (6.30 a.m.) is 63.5% (see Table 2.3), as would be expected, the highest humidity level, sometimes 86 per cent, occurs in December-January, and the lowest humidity, 17% is recorded in July, the warmest month in Karaj.

Following the general temperature increase of the late spring and the consequent increase in evaporation, the demand for irrigation water becomes critical in the orchards and cultivated area of the Karaj region which determines effectively the type and amount of agricultural products. The types, directions and intensities of the winds affecting Karaj city are important in the context of the physical and social characteristics of the settlement. Two scales of winds, macro scale and micro scale, affect the city. Macro scale winds, affecting Karaj city conform to the general pattern of alternate westerlies and northerlies over Iran. The westerly winds bring precipitation in the autumn and winter and the northerly winds are associated with the increasing temperatures of the early summer. To demonstrate the direction and intensity patterns of winds in Karaj, the data recorded in the Mehrabad Station, 30 kilometres east of Karaj, have been used since the climatic station in Karaj produces no data on wind characteristics. As illustrated in Figure 2.4, the highest proportion of the winds affecting the region blow from the west, south and south-east

Table 2.3: Monthly data on different climatic characteristics of Karaj City
(1946-75)

	J	F	M	A	M	J	J	A	S	O	N	D	Av.
Average Maximum Temperature (°C)	6.1	8.2	13.6	14.6	25.6	31.2	34.2	33.5	29.7	23.5	14.5	8.6	20.6
Average Temperature (°C)	1.3	3.0	8.0	13.2	17.5	22.6	25.5	24.5	21.8	15.8	8.6	3.2	13.7
Average Minimum Temperature (°C)	-3.7	-1.4	2.4	6.8	11.5	14.2	16.9	16.4	12.6	8.5	2.8	-1.6	7.1
Precipitation (mm)	30.0	36.0	37.8	51.8	27.0	4.7	2.3	1.1	0.8	10.0	32.4	31.8	265.7
Per cent Maximum	84	66	51	71	59	52	48	58	54	57	76	86	63.5
Rel. Humidity (6.30 a.m.)													
Per cent Min.	61	49	26	41	27	20	17	21	20	25	41	46	32.8
Rel. Humidity (12.30 p.m.)													

Source: Iranian Meteorological Organization (Published and Unpublished data)

directions. The south and south-easterly winds, which blow mainly in summer, are often associated with sand and dust from the Kavir. Furthermore, a combination of high temperature and frequency of these winds are very effective in a rapid evaporation of surface water. The westerly wind is important because most of the polluted air is evacuated from Karaj city and the smoke produced by the factories on either side of the Karaj-Tehran road travels towards Tehran. The 'Talegan' is a local Katabatic wind that is extremely refreshing in summer because it blows from the north-west and reduces the temperature, particularly in the north of the Karaj region.

2.3.1 The Water Resources of Karaj

Besides being an essential requisite for agricultural activity in the region, management of water within the city of Karaj can be considered as an important urban problem.

The Kordan, Kan and Karaj rivers are the principal sources of surface water in the Karaj region. The two former rivers are ephemeral streams, but the Karaj river is a perennial stream and is thus the most important source of surface water: it could be held to have a fundamental influence on the establishment and the development of Karaj and even Tehran, since it provides 65% and 40% of the water supplies of Tehran and Karaj city respectively.

The water catchment area of the Karaj is about 1,120 square km., and average annual discharge of the Karaj river at Bilaqan for the period 1948-74 was 457 million cubic metres. ⁽⁶⁾ 184 million cubic metres of this water being transported by pipes to Tehran, 13 million cubic metres utilised in Karaj as various urban uses, 60 million cubic metres are used for irrigation purposes, and a further 150 million cubic metres are either lost by evaporation or infiltration. The rest of the discharge eventually collects in the marshlands of Kavir-e-Massileh to the south of Tehran. ⁽⁷⁾

The Karaj river has a similar régime to the other southern Alburz rivers: 55.6% of the total annual flow occurs in spring, 23.2% occurs through the summer and 21.3% occurs during the autumn and winter months. April and May are often characterised by flooding.

Karaj city receives, on average approximately 265 mm of precipitation, which produce 266 million cubic metres of water effective in the area each year. More than 49 million cubic metres of water infiltrate flow down to artesian aquifers. Hydrological studies, completed by the Ministry of Water and Power, have demonstrated that of the four different sedimentary layers which exist beneath the Karaj plain and have already been mentioned, the second layer (Series B), consisting of sands, pebbles and loess has the maximum amount of underground water. ⁽⁸⁾

There is a gradual decrease of particle size from the foothills, north of the Qazvin-Karaj-Tehran road, where the granite and green tuff stones and pebbles are coarse, to the plain areas of the south, where fine particles predominate. Loess, washed out of the surface deposits in the north, has accumulated in similar deposits in the south. This graduation explains the greater infiltration rates in the north than in the south.

Wells and qanats of varying size have been built to exploit the ground-water resources underlying the region. In the 1971-72 water year, there were 1,000 wells and 187 qanats enumerated. Whereas in 1964-65, 418 wells and 339 qanats were counted. ⁽⁹⁾ Table 2.4 shows how increasing numbers of wells have replaced a decreasing number of active qanats. Modern pumping techniques have lowered water-table of the Karaj region thus rendering many of the qanats unusable.

The direction of flow by underground water of the Karaj region is from the north towards the south-west and south-east, and the gradient of the water table decreases from 1:125 and eventually 1:333 in the south. The depth of the top underground water-table is 100 metres, whereas in

Table 2.4: Number of qanats and wells and the annual amount of exploitation 1964 - 1972

Year	Qanats	Total exploitation (Million Cubic M.)	Wells	Total exploitation (Million Cubic M.)
1964 - 65	339	231	418	135
1965 - 66	313	272	482	155
1966 - 67	298	254	577	186
1967 - 68	269	138	697	225
1968 - 69	260	135	906	294
1969 - 70	230	130	935	301
1970 - 71	210	125	970	314
1971 - 72	187	118	1,000	323

Source: Ministère De l'Eau et l'Electricité
 Department Hydrogéologie, Project Correlation D'Atlas
 Hydrogéologique Du sud D'Alborz. Vol.2, 1974, p.92.

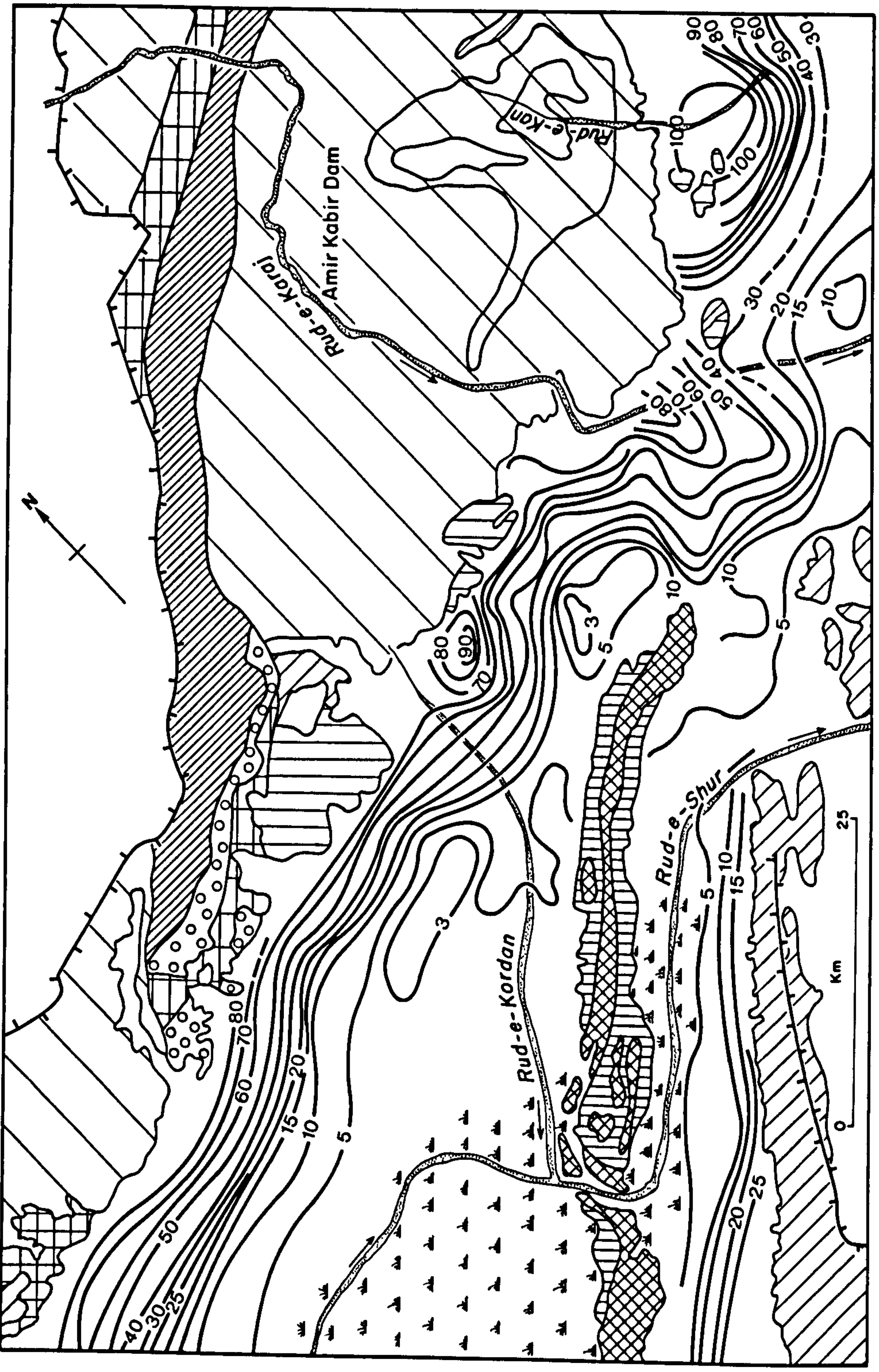
the centre of Karaj it is about 60 metres deep. On the southerly margin of the Karaj region it is no more than 3 metres on average beneath the surface. Within this area the water-table frequently intersects the ground surface producing marsh land. (Figure 2.5). As Table 2.4 indicates, a total of 451 million cubic metres of water are extracted annually from the ground by wells (323 million cubic metres) and qanats (118 million cubic metres). Recent increases in the exploitation of the water beneath the Karaj region have necessitated the introduction of regulatory measures to prevent the water-table being lowered to critical levels. Marked water quality variations exist between the north and the south. Salts in the water gradually increase from 150 milligramms per litre in the north to 1,200 milligramms per litre in the south, thus making the southern waters undrinkable.⁽¹⁰⁾ However, the high levels of salt in the waters of the south do not apparently produce any severe agricultural problems. Different qualities and quantities of water are required by the various industries of the Karaj region, necessitating different levels of purification.

Government officials are concerned that the present already marginal quality levels of the surface and underground waters of the Karaj region, will be reduced by pollution resulting from the increasing housing units and industrial establishments in the areas.

2.4 Soil and Vegetation

The agricultural importance of Karaj has encouraged a number of soil studies in the region, and fertility and the distribution of soil are important factors in determining settlement distribution and land use pattern. In the mountainous northern part of the Karaj region soils are very shallow and gravelly, only reaching 25 centimetres thickness immediately adjacent to the main Karaj river valley and its tributaries. Hence, terraces to stabilise the soil have been constructed, particularly on the

Fig.2.5 HYDRO-GEOLOGICAL MAP OF THE KARAJ REGION



- | | | | | | |
|--|---------------------------------|--|--------------------------------------|--|--|
| | GREEN TUFFS ANDESITE AND SCHIST | | SANDSTONE | | PRE-CAMBRIAN SEDIMENTARY ROCKS-METAMORPHIC SCHISTS |
| | MARSH | | SANDY LIMESTONE | | GREY GYPSIFEROUS MARL |
| | VOLCANIC ROCKS | | OLD ALLUVIUM (Series A) CONGLOMERATE | | CARBONACEOUS (COALY SCHIST) |
| | | | WEATHERED ROCKS | | WATER LEVEL BELOW SURFACE (in metres) |
| | | | | | WATER TABLE BOUNDARY |

Source: Ministry of Water and Power

steeper slopes of the river valleys. Such areas as around the Bilaqan water reservoir, are characterised by gardens, orchards, trees and bushes.

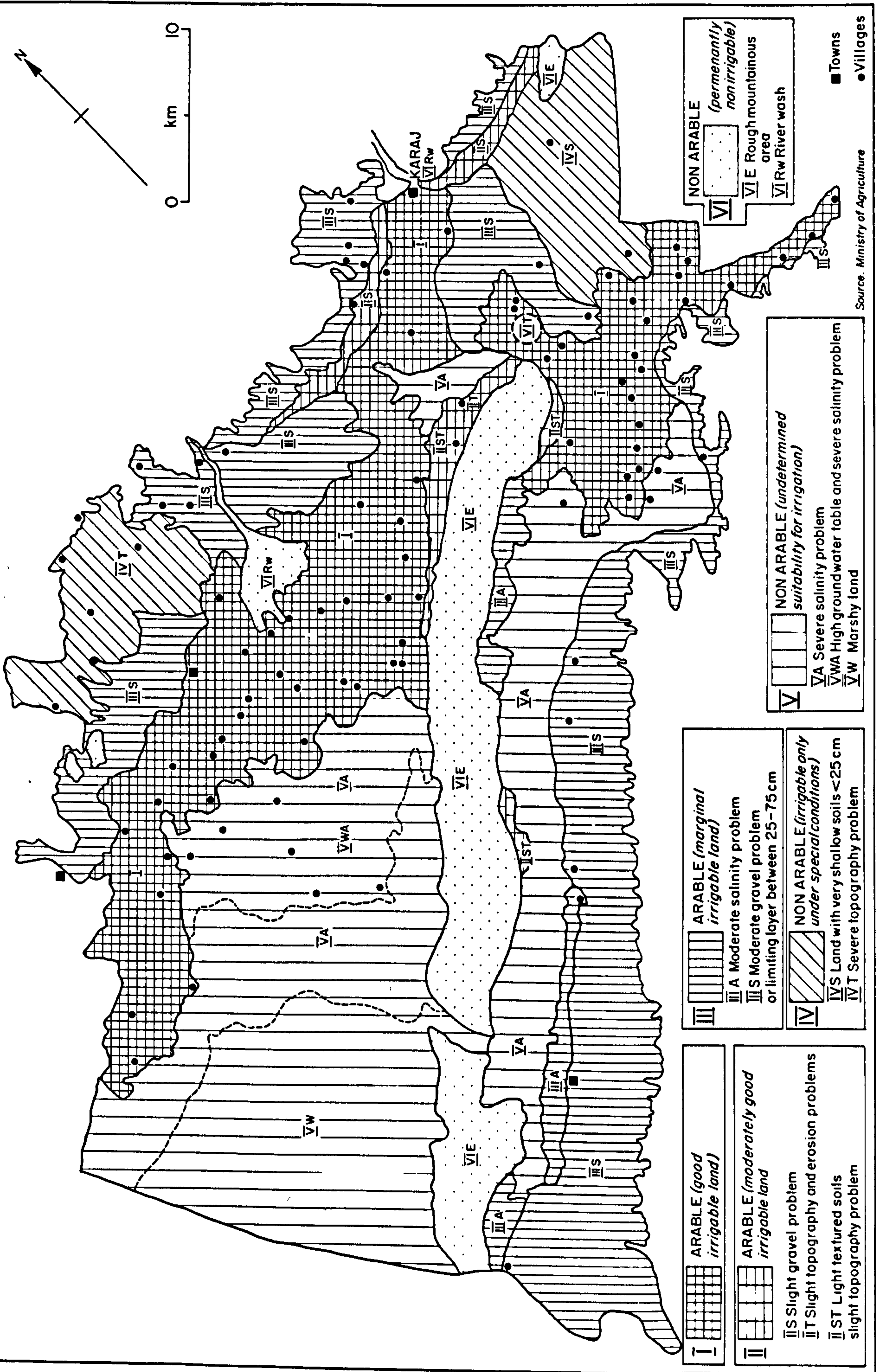
Where the Karaj river expands over its alluvial fan and extends further south, it is associated with a more variable and thicker soil cover. In fact it is the plain of Karaj which is the most important in the context of soil type and land capability. This plain which extends between Karaj and Kordan rivers is characterised by moderate slopes and orderly distribution of soil types. In the northern parts of the Karaj plain, the soil material is generated mainly from the dissected old and recent colluvial fans producing shallow brown gravelly to a deep/moderately deep brown of very gravelly sandy clay loams. With regard to their location, they are either non arable or marginally arable. The alluvial fan consists of the shallow, gravelly soils mentioned above, but there are areas of deep, mostly non-gravelly loams covering large areas adjacent to the fan. There are large areas of fine or moderately textured saline soils and deep, fine textured saline soils with moderately textured saline soils, and deep, fine textured saline soils with moderately saline ground water in the south west of the Karaj region.

As it is shown by Figure 2.6, six major classes of land can be recognised in the Karaj plain in the context of the agricultural land capability. Class 1 which demonstrates the arable and good irrigable land including the Karaj city forms 22.5 per cent of the total area.⁽¹¹⁾ The shallowness and salinity of soil is a major problem for more than 24 per cent of the land distinguished as class 3. The severe salinity problem in the south-west which produce non-arable lands is partially because of the Rud-e-Shur which accumulate the salt here when it is passed through the marsh in the west of Karaj.

In general a very close relationship can be seen between the existing arable land and the spatial distribution of settlements, by which

Fig. 2-6

AGRICULTURAL LAND CAPABILITY CLASSIFICATION OF THE KARAJ REGION



Source: Ministry of Agriculture

out of total 96 villages shown on Figure 2.6, 61 villages or 60% are located on the arable lands which comprise only 22.5 per cent of the total area.

The importance of soil has been traditionally expressed by the siting of buildings on the poorer soils and terraces away from the areas of rich soil. This careful pattern of land-use is however becoming increasingly eroded as land values rise and land sales for building become increasingly profitable (see Chapter 8).

The vegetation of the Karaj region is varied and its abundance is related to soil type and water availability. On the highlands either side of the Karaj river up to the Amir Kabir Dam, approximately 55% of the area is covered by grass or shrubs; nearly 30% of this area is without extensive vegetation cover, and the remainder has either Alpine vegetation or Juniperus species dominant. (12)

The alluvial fan of the Karaj river is covered by sparse steppe or low shrub. In addition to these naturally occurring plants, there are cultivated cereals and vegetables, and grazing lands. On the gravelly clay loams around the alluvial fan there are cereals, cotton, sugar beet, vegetables, orchards and fallow land. These crops are grown with the aid of irrigation and naturally occurring shrubs and trees have been reduced considerably by man. Annual crops can be grown on the saline soils if irrigation is very carefully used, but generally the soils in the south of the Karaj region are covered only by hardy shrub vegetation.

2.5 Summary

The understanding of the physical characteristics of the Karaj region is, perhaps, a necessary prerequisite for the analysis of the human geography of Karaj city. The establishment, development and

functioning and importance of Karaj city is related, sometimes strongly, to physical influences. For example, the fertility of the soils and the suitability of regions climate have encouraged agriculture and Karaj to be an important market centre.

The well defined, extensive valley of the Karaj river functions as a major routeway connecting interior Iran to the Caspian Sea coast. Overall, the well-being of Karaj is clearly dependent upon the sound management, including the conservation, of the surrounding physical environment.

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CHAPTER 3

THE PAST EVOLUTION AND DEVELOPMENT OF KARAJ

This chapter will explore the historical influences and developments, especially those deriving from Tehran, which have shaped and provided the dynamism of Karaj as an urban unit. Modern conditions are particularly important in the context of Karaj because significant agricultural and industrial transformations occurred during the reign of Reza Shah (1925-41) whose reign forms a necessary dividing line in the examination of Karaj because the character of the settlement changed fundamentally during that period.

The general sources for this study have included works completed by past Iranian authors, including geographers, historians and travellers ; accounts by foreign travellers who visited Karaj during or after the Qajar period ; reports and official documents about Karaj at a local or national level, especially from the reign of Reza Shah onwards ; maps, plans and aerial photographs which have aided the historical study of the Iranian cities discussed ; and recent studies and research of the archaeology and the history of the region.

Unfortunately, the literature concerned with the origin of the place-name of Karaj is scanty ; and also sometimes confusing owing to the development and disappearance of another Karaj city located between Esfahan and the present city of Arak, within approximate distance of 180 kilometres from the latter city.

Nafisi has indicated that Karaj means "hollow-middled"⁽¹⁾. Niloufari mentions two possible meanings of the title, one being derived from the term "Keraj" which means "shout" or "loud sound", and the other being derived from "Kerzo" or "Kurz" meaning the cultivation and/or terracing of the foothill

lands⁽²⁾. Considering the topography of Karaj, its agricultural importance and the previous role of the Karaj heights in acting as warning posts, perhaps all of the above-mentioned suggestions are somehow meaningful.

3.1 The Historical Development of Karaj Before the Reza Shah Period

Archaeological studies have revealed ancient remains within the Karaj region which apparently originate from the Achaemenid, Parthian and especially Sassanid periods. Notable amongst these remains are castle walls, citadels, fire altars and water temples. The remains of fire holders used for sending warning signals can still be seen on the heights adjacent to Karaj such as Tappeh-e-Moradab.⁽³⁾ Probably Karaj was an important warning station for the ancient city of Raga (Rey), south of Tehran. The discovery of tools, bricks and expanses of previously utilized land systems indicate the possible connections of Karaj with the important pre-Islamic trade routes which passed nearby. Jackson considered the name of "Drejya", which is mentioned in the Zoroastrian writing "Vandidad", as the home of Zoroast, to be Karaj⁽⁴⁾, but most authorities believe that it was in Rezaiyeh.

Within the early centuries of Islam, although there is no immediate evidence of settlement in Karaj, there is no doubt that the lands of southern Karaj were located on the important trade routes connecting Rey with the western and north western parts of the country. This idea can be supported by Arab interests in Rey during the early centuries of Islam⁽⁵⁾. However, it was the Iranian Hamdullah Moustoufi who for the first time mentioned the name of Karaj as one of the villages of Taleqan in the neighbourhood of Rey, in 740 A.H. (1380 A.D.)⁽⁶⁾. In the mid 16th century during the reign of Shah Tahmasb the Safavid, the construction of a shrine for Imamzadeh Hassan and a large Caravansara, together with a bridge on Karaj river, were the

immediate benefits for Karaj, which was a neighbour of the new capital city of Qazvin. Another reason for the attention paid to Karaj at that time was because it was situated on the route between Qazvin, Tehran, Qom and Esfahan, the favourite cities of Shah Tahmasb the Safavid.

In 1796, the choice of Tehran as the capital city by the founder of the Qajar dynasty was an important factor in the development of Karaj. The favoured location of Karaj meant it was described by many foreign travellers visiting the capital city of Tehran. The following quotation is an account given by James Morier who describes Karaj in his visit to Iran in 1809:

".... We came to a dike cut from the river at Karatch, from which our water-carriers were used to bring drinking water for our party at Tehran As we approached we saw the bed of the river called Aub Karatch, running about S.W., which I am told takes its source in the Albores, and runs towards Kinar-a-Gird We crossed at the winding of the road over a brick bridge of two arches of different sizes : near it are some ruins of other brick buildings, apparently of the same age.

In this spot is an inlet of the mountains, which seems to form a pretty plain, and in which I remarked some hamlets.

The tomb of the son of Imaum Hassan renders Karatch a pleasing object at a distance. The dome is shaded by the rich foliage of two fine chenar trees, and a stream cut from the river near the walls. The Persian Envoy informed me that this village, and those on the plain, belong to his brother-in-law, the Ameen-ed-Doulah, and were formerly the property of his uncle, the late Prime Minister." (7)

Karaj gained from being situated on the Tehran-Qazvin-Caspian Coast road and the Tehran-Qazvin-Tabriz road. Tabriz was extremely important in the nineteenth century, because it was the largest Persian city and the seat of the Qajar regents. Moreover, the natural attractions of the Karaj River valley were also other important factors in its development.

In 1810, James Morier who visited Karaj again on his second journey

to Iran, described hundreds of workers who were constructing a fortified castle in the village, strengthened by towers and containing a royal summer residence called Soleymaniyeh, which was eventually finished in 1812.⁽⁸⁾ Morier and Drovillo⁽⁹⁾ both suggest that the money for the construction of the castle and palace was derived from a successful raid up on a Kurdish district by one of the Fath-Ali Shah's sons. In 1820, Sir Ker Porter refers to the beauties of the Soleymaniyeh palace and the natural attraction of the surrounding gardens.⁽¹⁰⁾ The travel account of Flandin in 1841 is the first one which includes a picture sketch of the Karaj Bridge and shows that the bridge is slightly different from today. He also describes the shrine of Imamzadeh Hassan, as well as the palace of Soleymaniyeh.

".... We stayed at this palace called Soleymaniyeh. This is the resident of one of Fath-Ali Shah's sons called Soleyman Mirza At present it is getting run down and perhaps in a short time it will be totally destroyed. However the existing parts are indeed interesting and quite beautiful."⁽¹¹⁾

It seems that during the reign of Nasser-ul-Din Shah the palace must have been repaired, because Brugsch wrote that when he visited the palace in 1860 it was in a good state of repair. He praises the style of the architecture and especially the beautiful paintings in the palace. He goes into further detail:

".... There is a royal palace with lush and lovely gardens including several courtyards and buildings all surrounded by a wall with towers. We stayed in the Main Hall which is larger and more beautiful than the one I saw in Tabriz Here is just an interesting part of Persia about which I dreamed and imagined in Europe."⁽¹²⁾

During the early 1880's, on his journey from Qazvin to Tehran, Orsolle visited the Soleymaniyeh Palace. He appreciated the natural

attractions of Karaj and explains:

".... The Chaparkhaneh (stage-post) at this stop is called Shahabad, named perhaps because of a palace built there by Fath-Ali Shah; the sparkling dome of this palace can be seen through the tree branches of a large park.... We got down from our coaches and walked to the palace through a route which appeared not to have been cared for regularly. The palace gate showed two different styles. The building contained the combined architectures of a Swiss cottage and a Chinese temple the palace was in a degenerate condition, and most of the buildings were ruined and rooms were deserted.... On the occasional visit of the Shah, apparently furniture was taken there by the caravans from Tehran beforehand." (13)

Orsolle anticipated the total collapse of the palace if it was not repaired in the near future.

Current Persian sources give similar information concerning the palace of Soleymaniyeh, as well as descriptions of the morphology of the village of Karaj which was surrounded by a wall with one gate on either side to the south of the Soleymaniyeh palace. Etemad-ul-Saltaneh points out that, following tribal disturbances in the southern parts of Khorasan, a number of tribesmen were forcibly deported from Khorasan and were placed in this walled village during the 1820's. (14) In 1884, Hadji Farahani described the Karaj Bridge, and stated that

".... from Tehran to the bridge the road is all smooth and sandy and does not get swampy during the rainy season. The Soleymaniyeh Castle is here which was built by Mohamad Hosein Khan Sadr-e-Esfahani in 1226 A.H. (1812 A.D.)." (15)

In 1890 Curzon also describes the palace and especially its colourful paintings

".... at Karaj on this route between the two last stations, and 26 miles from Tehran, is situated a palace or shooting-lodge called Suleimanieh, belonging to the Shah, and built by his great grandfather Fath-Ali Shah, in 1812..... it contains

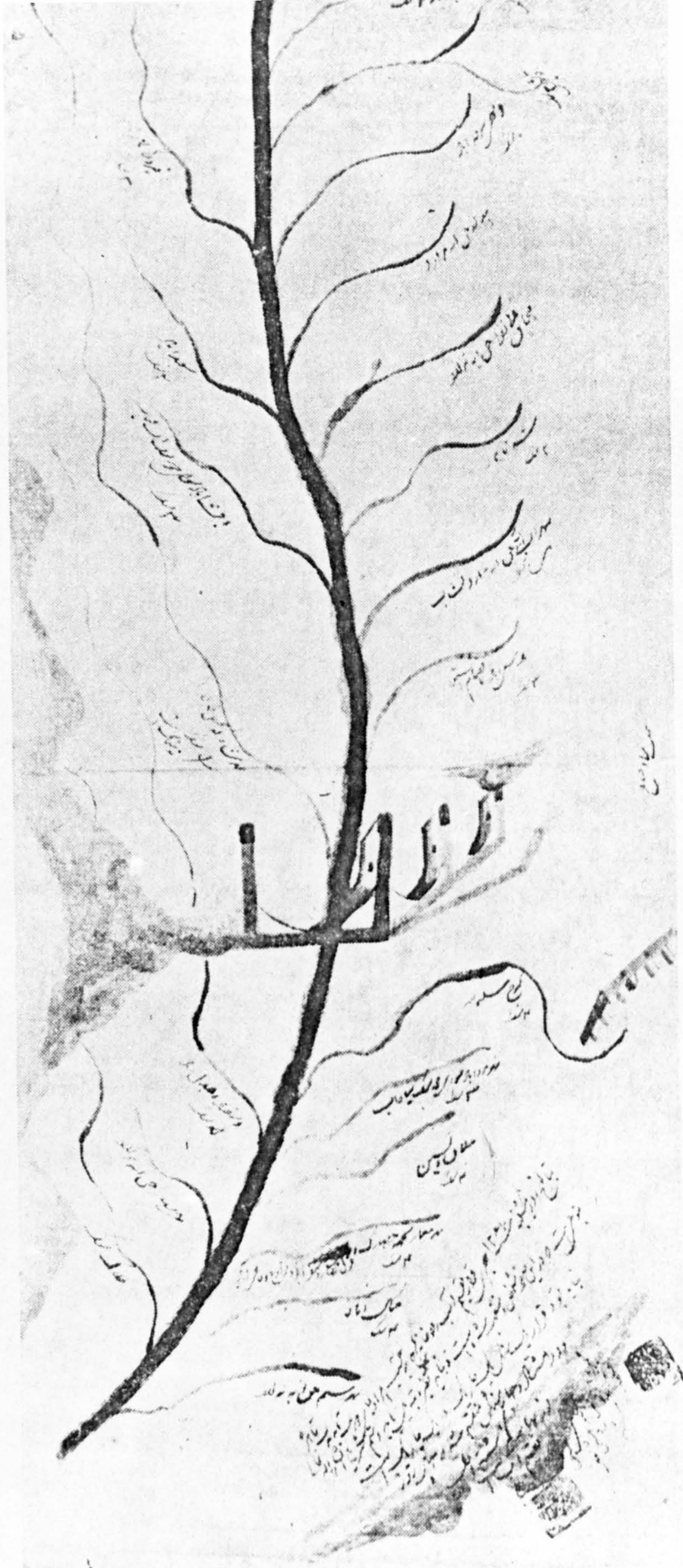
two large portrait panels by Abdullah Khan, the famous court painter of the earlier Karaj sovereign, representing the courts respectively of Agha Mohammed Shah and of his nephew, Fath-Ali Shah." (16)

Nasser-ul-Din Shah and Mozaffar-ul-Din Shah both have mentioned in their travelling diaries about their stay in the palace. (17,18) The latter indicates the recent repairs of the Karaj Bridge and the completion of a road tax collection post next to it.

During the 19th century, water shortages in Tehran resulted in two attempts to take water from Karaj to Tehran. The first attempt was during the late 1830's. A 45 kilometre canal took water to Tehran, and fostered the development of some villages located between Karaj and Tehran because they were able to obtain water. The second attempt in the 1850's included the re-building of the former canal and the re-direction of water from the Karaj to the city of Tehran. This project ran according to the timetable and the water right divisions made by Amir Kabir. The total water of the Karaj River was divided based on this project into 84 portions of which 9 were allocated to Tehran (Figure 3.1). These initial developments increased the close economic and fiscal links between Tehran and Karaj.

Karaj appears for the first time in map form on the map called "Umgegend von Teheran" (Tehran and Surroundings), prepared by Stahl in 1900 (Figure 3.2).

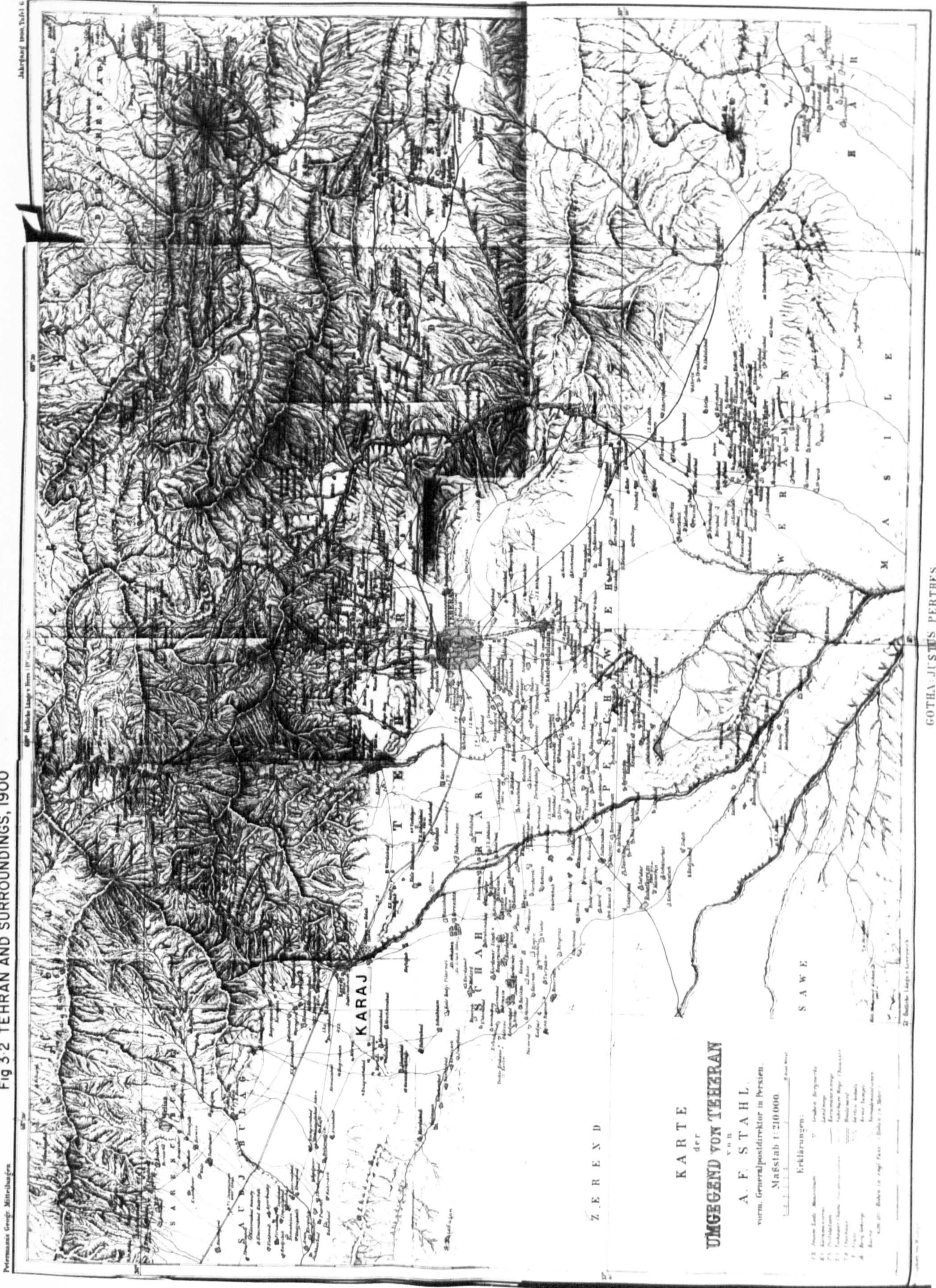
As already pointed out, during the 18th and 19th centuries, Karaj was only a small village at a distance of two caravan stops from Tehran. Agriculture was the major way of life in Karaj and the whole settlement was bounded within a rectangular mud wall enclosing an approximate area of 7 hectares, located to the south of a Qajar palace. In the absence of more adequate information concerning this period, any statement regarding the settlement type, household number and population size can only be guess work. It seems that at this stage the Tehran-Qazvin Road, however, did not affect expansion of the settlement, which was located about 1.5 kilometres away from the main highway, behind the Soleymaniyeh palace and its surrounding large garden. The field study undertaken for this research, revealed that



تصویر قسمتی از تقسیم نامه آب رودخانه کرج که اصل آن بهمه امیر کبیر در بیوتات سلطنتی موجود است.

Fig 3-1 Part of Karaj River Water Right Division Introduced by Amir Kabir in the 1850's (for explanation see text)
Source: Tehran Water Organization

Fig 3-2 TEHRAN AND SURROUNDINGS, 1900



there were very few shops (three altogether) on the Tehran-Qazvin Road near the present Maidan-e-Pahlavi even down to the First World War (Figure 3.3). There was only one narrow mule path which branched off from Tehran-Qazvin Road connecting Tehran and Karaj to the northern mountainous villages, and further north to the Caspian Sea. This was the situation in Karaj just before the Pahlavi period and indeed as we shall see, it was only during the Reza Shah period that Karaj started to expand.

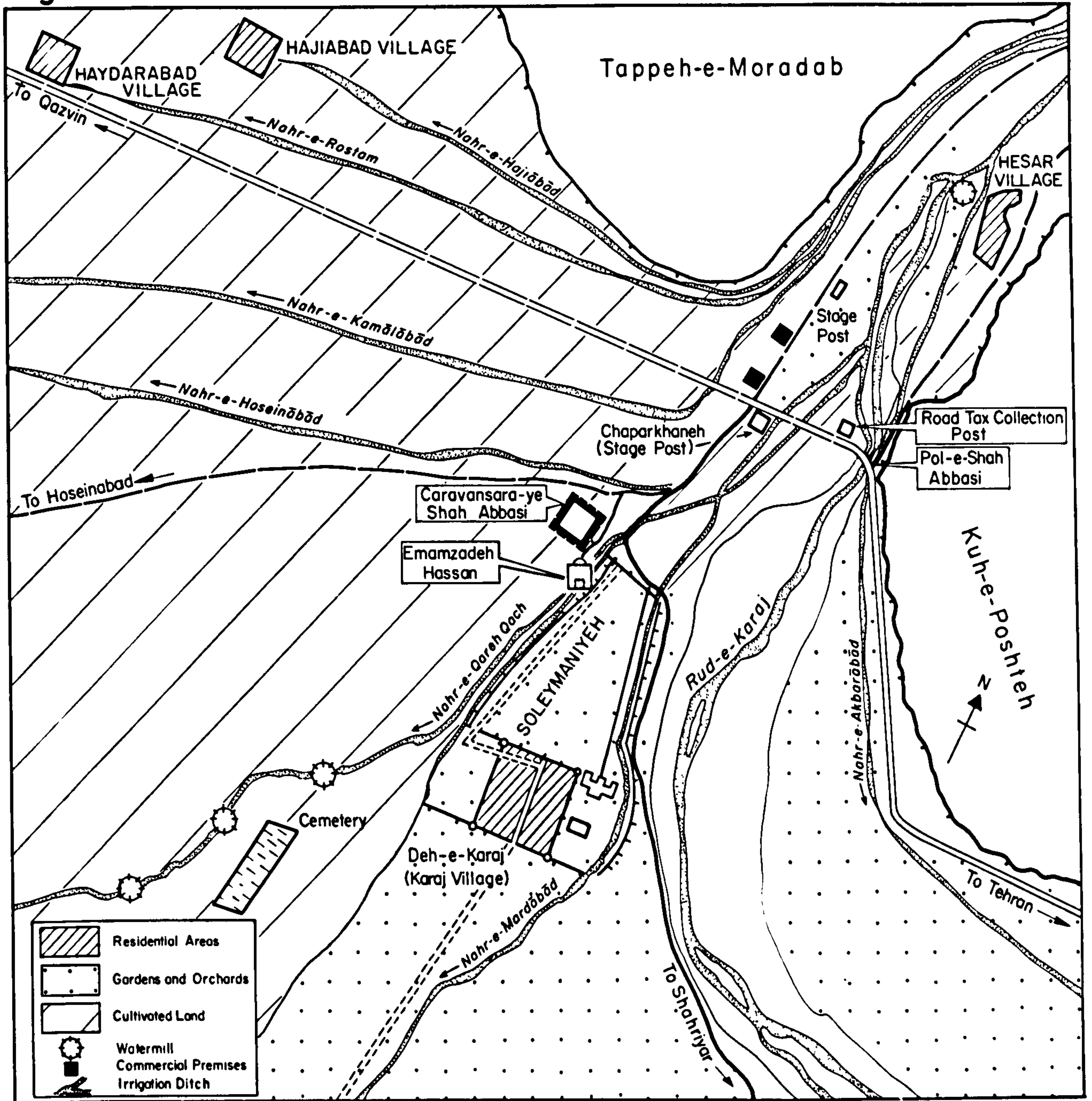
3.2 Karaj During and After the Reza Shah Period

It is necessary first, as an essential preliminary to analysis of the development pattern of Karaj during the Reza Shah period, to sketch the then contemporary socio-economic condition of Iran generally.

Under the rule of Reza Shah, who came to power after the fall of the Qajar Dynasty, Iran entered a period of political stability in which general improvements were made throughout the country. The period 1925-41 was one of the rapid changes, both in the economic structure of the country and in its social and political spheres. Yet, although the growth of industry was generally well distributed throughout the country, the main emphasis, in both the public and private sectors, was on Tehran and its surroundings. The new roads and railways built during this period seemed to have had an effect on the location of the new factories. The smaller centres around Tehran (including Karaj) benefited to some extent from being on the new improved roads and on the railway network.

Public construction and urban development became one of the most spectacular visual aspects of Iranian cities during this period. This was reflected in the construction of many large avenues (Khiaban) driven usually through the old and slum areas of the city centres. Translocation of the shops from the old parts of the cities into a linear pattern along the newly built avenues and roundabouts was a remarkable feature of commercial activity. Construction of the geometrical and spacious squares (Maidan) including the

Fig.3.3 KARAJ IN THE LATE 19th CENTURY



Source: N.C.C. 1956 and Author's Fieldwork

statues of Reza Shah in the middle were among the most characteristic features of city planning in Iran at that time. (19)

During this period the oil industry grew steadily ^{at} an increasing revenue-base for Iran's development and modernization.

Throughout the period mentioned above, Karaj itself also received the generous attention of the new ruler. The agricultural potential of Karaj was a major factor in encouraging its initial development. This was first appreciated when a large experimental farm was established in Karaj to supplement the work of the First Iranian Agricultural College built in Tehran in 1922. (20) Those students attending the college in Tehran were expected to have one year of training experience at this farm. Five years later in 1927, the entire agricultural college in Tehran was transferred to Karaj. (21) At an earlier stage, classes were held in the existing Safavid caravansara and was called Madreseh-e-Barzegaran (School of Farmers) and directed by a German Agronomist named Hans Schreiger. (22) A small number of agricultural graduates who had recently returned from abroad founded a very small academic nucleus in this school. This was followed by the establishment of the first veterinary serum and vaccine laboratories in Hesarak Village to the west of Karaj. A husbandry institute also came into existence at Haydarabad Village, situated between Karaj and Hesarak Village on the Qazvin Road. By 1932, the building of a modern agricultural college (Danesh Kadeh-e-Keshavarzi) including laboratories and an institute of plant pathology were built over a 19.2 hectare site on the gardens surrounding the former Qajar's palace of Soleymaniyeh, (23) although at this stage, as P.W. Avery suggests,

"Karaj became little more than a neatly arranged museum of specimens with a modern farm which bore hardly any resemblance to the reality outside." (24)

Moreover the new development had mainly a Tehran-oriented direction, with little link to its neighbouring traditional area. But the projects under way demonstrated that Karaj had the possibilities to develop into a

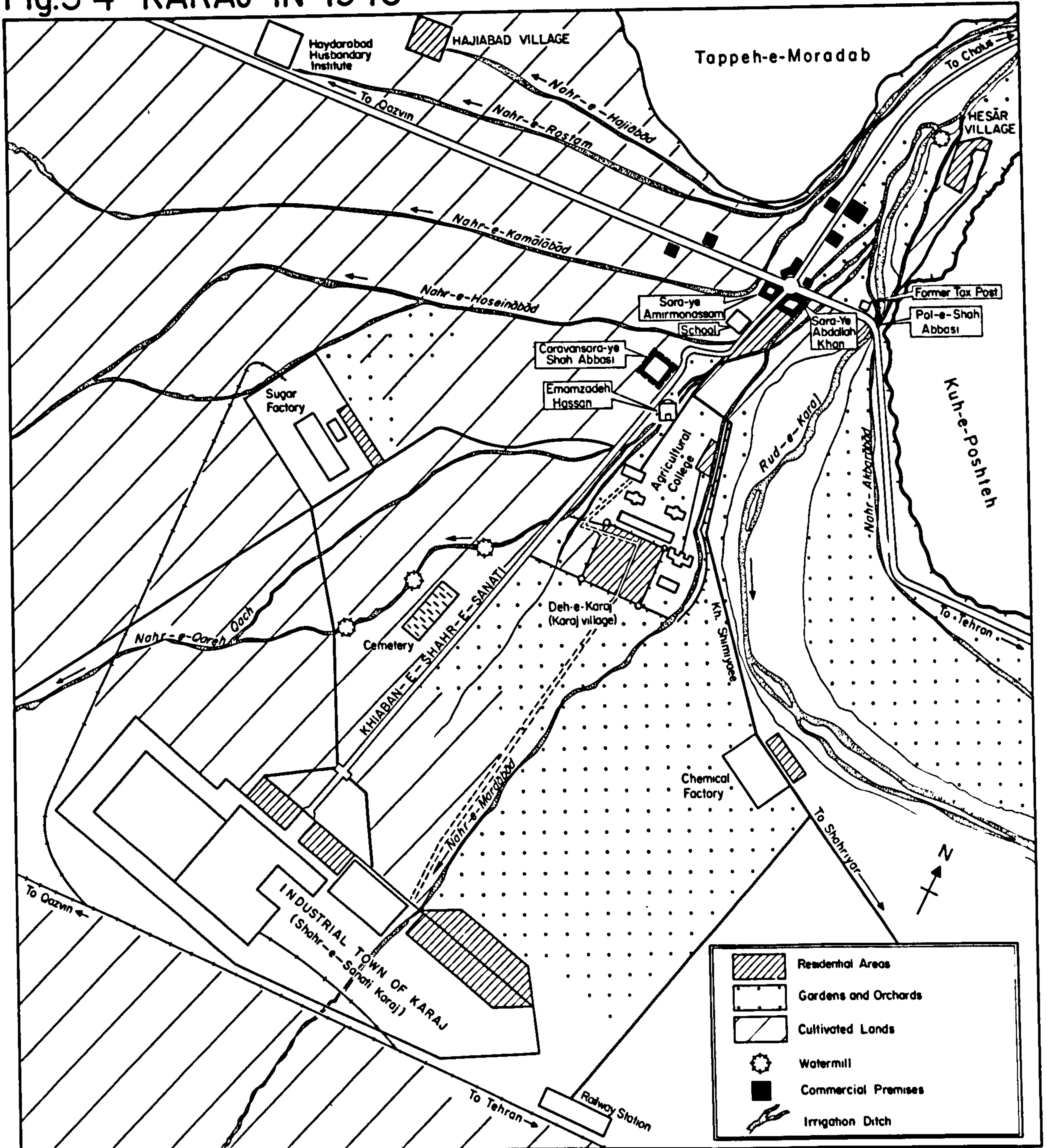
more mature form.

The historical importance of trade routes on the settlement and development of Karaj has been already pointed out. During the early 1930's the construction of the Tehran-Chalus Road which passed to the north of Karaj, put the Karaj settlement nearby a regular route-way between the capital and the north of the country. This road which was one of the more expensive new roads built during the Reza Shah period, and was an alpine shortcut across the Alburz Mountains to connect Tehran with the royal domains on the Caspian. The most immediate outcome of the construction of this road for Karaj was the appearance of a new Maidan (Square) resulting from the intersection of the Tehran-Qazvin and Daneshkadeh-Chalus routes. Soon after, fairly regular traffic led to the development of a number of shops and few garages and "sarais", around or adjacent to the new roundabout. Thus a new and fundamentally important focus for Karaj came into existence which was away from traditional settlement. The old village of Karaj was almost left untouched 1500 m to the south behind the Agricultural College, and a new centre started to expand rapidly. This new road system, north of the old Karaj reflected the developments taking place in Karaj (Figure 3.4).

Another important factor to be mentioned here is that during the Qajar period the status of land ownership in Iran became very confused. Hence the introduction of new laws concerning land registration and the ownership of land was amongst the earliest actions by Reza Shah. The effect of this was that most of the lands within and nearby Karaj were classified as State Land (Khaleseh). Furthermore, some of the villages near Karaj were bought by members of the Royal Family. These purchases proved to be important to the future development of Karaj.

Owing to the natural advantages of Karaj and for the reasons of international prestige, the settlement with its Agricultural College was chosen to spearhead the agro-industrial development of the whole country. Incidentally, as the majority of the land in the Karaj region was now owned by

Fig.3.4 KARAJ IN 1940



Source: N.C.C. 1956 and Author's Fieldwork

the State, as a result of the new Land Ownership Legislation, the allocation of lands to different development projects produced no economic difficulties. In this context, the first step was the building of the largest sugar factory in the country in 1932. The high productivity of the plant was the result of the utilization of high yield sugar beet near the factory. The plant itself was located to the west of the Agricultural College and later was provided with a north-south road and then a local railway system connected it to the national system. The original site area was 250,000 square metres and included housing facilities for its permanent employees.

In 1935 the plan for the establishment of a large chemical factory was completed and located to the south east of the Agricultural College just next to the Karaj River bank.

The administrative status of Karaj was raised from a village to a Bakhsh (town), when a new National Administrative Law was passed by Majlis in 1937. Karaj became one of the Bakhshs of the Tehran Shahrestan. (25)

Towards the end of the decade, much effort was directed towards the development of an iron and steel industry in Iran. The reduction of iron and steel imports necessary for railway and construction operations was one objective, but the major objective of this project as Banani states, was to increase national prestige. (26) In May 1937, a contract was made between the government of Iran and the Demag-Krupp Consortium of Germany to build a 100,000 ton steel plant at a cost of more than 24.1 million German Marks, or about £ st. 2.4 million. (27)

The initial reasons for designating Karaj to have the first Iranian steel plant was in the first place its location close to Tehran. 216 hectares of land were allocated south of the town on which the "Industrial Model Town of Karaj" was planned. The construction of large elaborate furnaces and some of the workshops followed under the guidance of the German engineers. In January 1939, work was then started on the establishment of the Tehran-Tabriz railway and this reached Zanjan in October 1940, passing through

Karaj and Qazvin. Here was an important development facilitating the delivery of most of the raw materials needed by the now expanding "Industrial Model Town of Karaj." In the second place Karaj was chosen at that time for iron working because of location in relation to the coal deposits of the Alburz Range. Deposits of low grade coal too occurred 48 kilometres to the north of Karaj, and at Gajereh, Shemshak and Lashgarak 32 kilometres north of Tehran. Better coal could be obtained from the Delilam Mine Zirab, 35 kilometres from Shahi. Karaj had the advantage of being connected by good communications and being within a short distance of the growing industrial complex of Tehran. Furthermore, the Karaj River was considered to be able to provide the necessary water supply for the steel factory. Although some of the machinery and other equipments were already transported or were under way, however, due to the war disturbances they had to be taken back to Germany. The building establishment which also was partly built unfortunately was forced to stop before the furnace and steel mill were completed.

Although the steel plant in Karaj was never finished, it still inspired some later development in Karaj. During the late 1930's the construction of a wide and straight avenue called Khiaban-e-Shahr-e-Sanati (Industrial Town Avenue) indicated city planning objectives of Reza Shah period in Karaj: its south-north orientation was planned to connect the industrial model town in the south to the newly developed area to the north. The national pattern of urban avenues, traversing old settlement areas was not totally applicable to Karaj, because the presence of the new Agricultural College complex and especially the shrine of Imamzadeh Hassan provided major reasons why the avenue by-passed the old village of Karaj rather than cut straight through, and was not directly connected to the main town square to the north (Figure 3.4)

In the meantime, the present Tehran-Karaj road, then called "Jaddeh-e-Makhsus" (Exclusive Road) which was the westerly extension of Khiaban-e-Shahreza of Tehran, was constructed and connected the northern part of Tehran westward to Karaj. This resulted in a further communication between

the two settlements and naturally helped Karaj to expand more than before.

It is very clear that during the Reza Shah period, Karaj benefited especially from the general socio-economic improvement of this country. During this period that Karaj suddenly expanded from a very small walled village to a fairly active and prosperous town. There could have been more growth, but it was prevented by the outbreak of the Second World War.

The Second World War left scars on the whole country, but Iran's economic prosperity was particularly affected. All the industrial establishments built during the 1930's were experiencing reduced levels of production because there was either the disruption of supplies, or the hindrances due to ageing of old machinery and the unavailability of spare parts.

After the war, measures were taken to improve the general standard of the economy. For example, from 1946 onwards emphasis was given to national development planning, which resulted in the creation of the Plan Organization of Iran responsible for planning programmes in the country. The first Development Plan ("First Seven Year Development Plan") was introduced in 1949.

Revenues derived from the oil, together with foreign aid brought about a gradual improvement in the post-war national economy. Private industry recovered more rapidly in comparison with the public sector and became concentrated in Tehran. Subsequently, Tehran became the major centre of immigration as its population increased by approximately 300% during the 1940-56 period. (28)

The proximity of Karaj to Tehran was a major reason why immediately after the war Karaj attracted large numbers of well to do people. These people purchased a large proportion of the rural areas adjacent to Karaj, a development which has been facilitated by the "Law for the Sale of State Lands" which had been introduced in 1937. For instance, the land belonging to the villages Hajibad and Haljard, was bought at a very low price during the late 1940's. As we shall see, such deals later proved to be advantageous in the development of important industrial and housing schemes in Karaj.

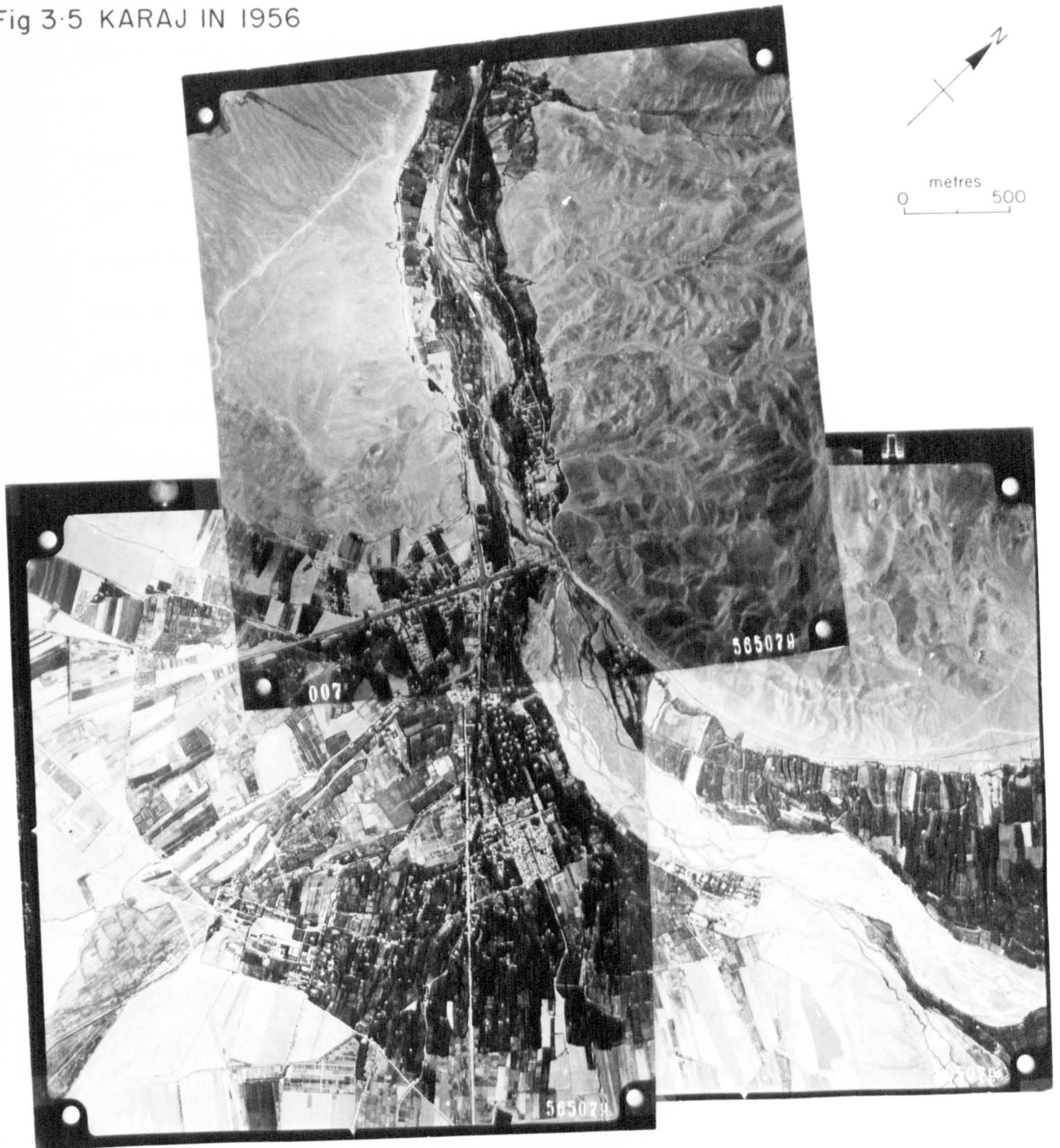
In 1955, the fact that Karaj was approved by the government to be the centre of a new Shahrestan,⁽²⁹⁾ separated from Tehran Shahrestan, was perhaps an indication of general improvement of Karaj. This new role which improved the administrative status of Karaj, increased the possibility of decision making at a local level. In the meantime, it necessitated the establishment of offices which were built mainly on the two sides of Khiaban-e-Pahlavi, close to the city centre. The increase in private development was one of the most immediate results of the change in the administrative status of Karaj. In the same year an important industrial project, "Jahan Industrial Complex", was built on the lands of the Hajibad Village, three kilometres to the west of the Karaj city centre. The total area of this development was almost 2 million square metres, and it expanded rapidly because of its proximity to the fast Tehran-Qazvin Road and its connection with the Tehran-Tabriz railway. Various factories such as textile, vegetable oil products, tea packing, tile making, plastic products and ice making were constructed during 1955 to 1959. The initial labour force was supplied from Yazd and lived in a residential quarter (Mahelleh) called "400 Housing Units" near the factory.

The remaining area, which was more picturesque than the land located on the southern part of the Qazvin Road, favoured residential development and indeed a large private housing scheme called "Jahan Shahr" was later built there.

In November 1956, the First Population Census held in Iran recorded 14,526 persons in Karaj (which was the only urban settlement in the whole Shahrestan) and placed Karaj as the 70th largest city in Iran.⁽³⁰⁾ However, the existence of large gardens and cultivated farm lands evident on the aerial photographs taken in 1956, shown by Figure 3.5, indicate that Karaj still retained many rural characteristics.

However, one major perceptible linear development was the extension of shops and offices along Pahlavi Avenue. The total housing units in 1956 numbered 3,300⁽³¹⁾ and had, as can be seen from aerial photographs, a scattered distribution.

Fig 3.5 KARAJ IN 1956



Source: National Cartographic Centre

By 1956, when the "Second Seven Year Development Plan" (1956-62) was introduced by the Plan Organization, a general improvement in the national economy was envisaged. Financial grants by the Plan Organization through the Ministry of Industries and Mines, encouraged the industrial development of the country. In Karaj, the 216 hectare site of the former Industrial Model Town which, as mentioned earlier, had been built during the Reza Shah period and then later neglected, was an appropriate site for re-development, namely the construction of new national industrial projects. To fulfil the initial planned objectives of "the Industrial Model Town of Karaj", the Plan Organization studied the possible siting of large factories. A 70,000 ton coke factory was proposed to supply the planned steel plant at Azna.⁽³²⁾ This plan was never carried out, but other factories were established during the late 1950's. In 1957, a large wool washing factory was built by the Ministry of Industries and Mines with the economic assistance of the U.S. point Four projects. In the same year, a vocational Institution was founded with the technical assistance of the International Labour Organization (I.L.O.), to train annually 150 skilled labourers. In 1958, the first part of a centre called the "Industrial Research Laboratories" was established in Karaj to standardize all the industrial products made within the country. The impetus of this industrial development was continued until 1960 by the establishment of other factories such as those devoted to match making, paint products, vegetable oil plant and a petro-chemical product.⁽³³⁾

The fertility of land in the southern part of the Karaj City resulted in the appearance of a "Centre for agricultural, irrigation and soil studies", the money being presented by CENCO in 1959.⁽³⁴⁾

Work was provided for immigrants by the numerous factories which had been built beside the road between Karaj and Tehran and in the Karaj area. One consequence of this increased work force, was the gradual housing shortage.

in the early 1960's. A new residential quarter called Khalajabad, 1.5 kilometres east of Maidan-e-Pahlavi, was built out of necessity on a cliff-like slope on the foothills of the northern part of the Tehran-Karaj Road. This residential quarter was at such a height that later it was unable to utilize water from the city pipeline (Fig. 3*6).

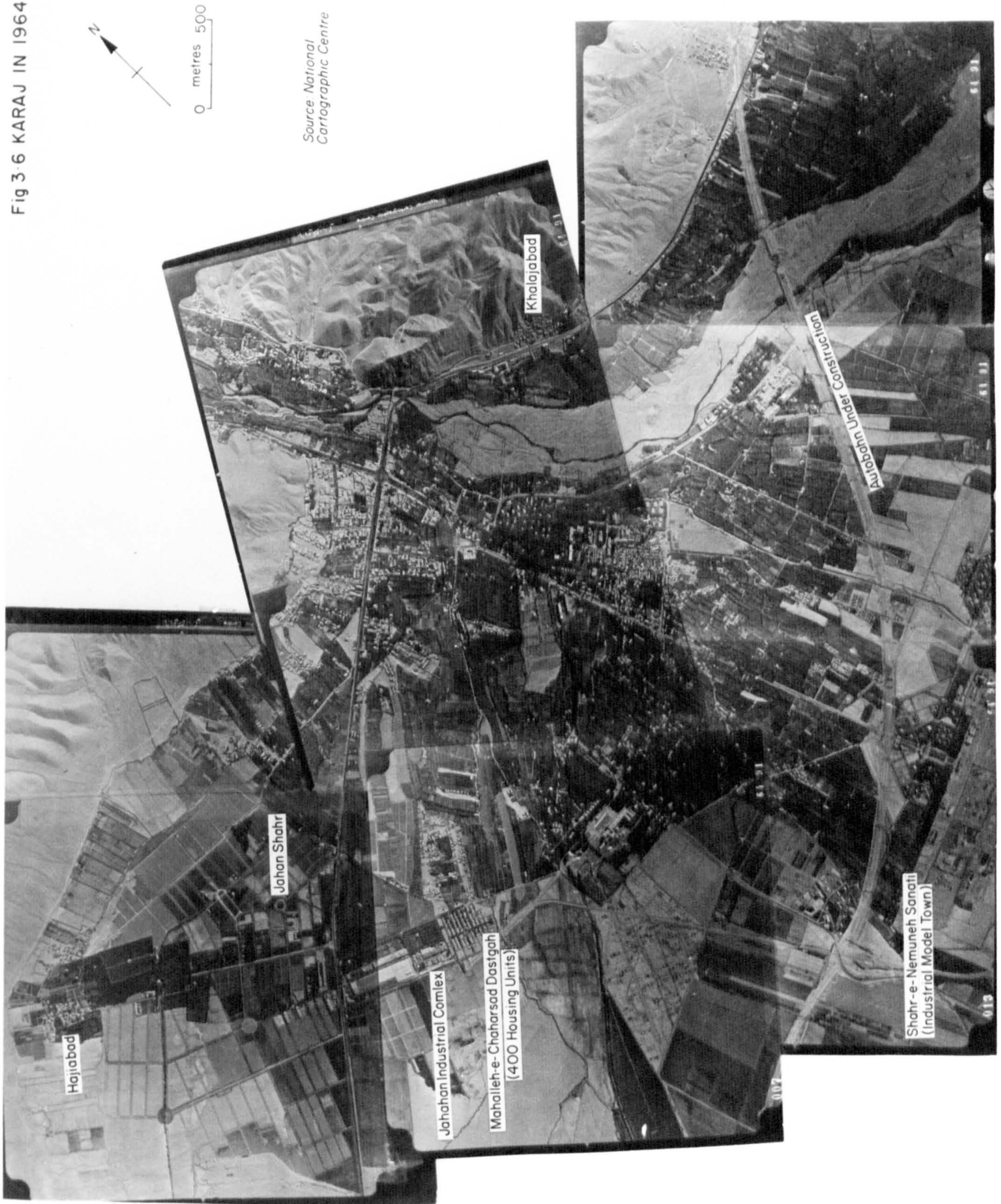
An increase in traffic between Tehran and Karaj necessitated further road improvement, such as the construction of the new metal and concrete bridge over the Karaj River Valley, immediately adjacent to the former brick bridge (i.e. Pol-e-ShahAbbasi). Then the 40 kilometre road connecting Tehran to Karaj was also re-paved and widened, so as to facilitate both passenger and goods transportation.

In October 1961, a new official boundary for Karaj City was introduced by the Ministry of the Interior. The distances given below from the city centre are radii to the various directions designated as the city boundary for Karaj ; to the north 3,300 metres to the Bilaqan Village along the Chalus Road ; to the east 3,500 metres along the Karaj-Tehran highway to the Kalak Village ; to the south 3,850 metres to the Tehran-Tabriz Railroad ; and to the west 4,500 metres along the Karaj-Qazvin Road to Haydarabad Village.⁽³⁵⁾

In the meantime, the construction of the Amir Kabir Dam, which was a direct response to the water shortages of Tehran, was completed in 1961. As will be discussed later, the Amir Kabir Dam proved to be an important factor in the economic growth of Karaj City. Besides being a major water and power source, the Amir Kabir Dam became a recreational centre, attracting a large number of Tehranis, especially during the holidays. The construction of Amir Kabir Dam also meant the flooding and disappearance of several villages. This destruction necessitated the building of a new residential quarter called Razkan-e-Naw in the southern part of Karaj, near the railway station, to house the families shifted from the Razkan Village.

In 1963, work for the provision of a piped water system was started

Fig 3-6 KARAJ IN 1964



when parallel to which a considerable improvement occurred in the city's electricity supply. The purification facilities and water storage tanks were supposedly planned to meet the needs of a population of 55,000 over the next 20 years. This calculation was based on the assumption that a 2.5 per cent natural increase in the total national population would hold true for the 22,000 population of Karaj.⁽³⁶⁾ It is interesting to note that only 3 years later in 1976, the population of Karaj was more than 137,000,⁽³⁷⁾ (i.e. more than twice the figure which was originally projected for the year 1983). Whilst the latter figure shows the rapid increase in population, it also demonstrates the planning difficulties for a step migration city such as Karaj.

Following the Land Reform Programme of 1962, some of the landlords who migrated to Tehran, evaluated that Karaj was a suitable place for investment. Consequently, a number of factories specializing in light industry and services such as fruit conserving and refrigeration storage were built. Furthermore, increases in land prices and rents in Tehran which was on average approximately three times more than that of Karaj provided the impetus for more housing construction in Karaj. The provision of water and electricity by the Amir Kabir Dam was also an important factor in encouraging such development. In 1964, the first planned residential quarter built in response to these factors, was called Azimiyeh ; situated 3 kilometres to the north of Karaj off the Chalus Road (see Figure 3.7). The location of this area perhaps attracted some Tehranis who had visited Amir Kabir Dam or the Caspian Sea, because they had to pass beside Azimiyeh. The construction of more houses followed, and the residential areas consequently expanded significantly.

Apparently the ownership of several villages around Karaj by the Royal Family has also facilitated and furthered the development of residential activities in the area.

Fig 3-7 KARAJ IN 1966



Source: National Cartographic Centre

The proximity of Karaj to Tehran meant that sometimes governmental decisions taken for Tehran also included the city of Karaj. For instance in 1963, the Act which prohibited the establishment of industrial plants within the 60 kilometres radius of Tehran, naturally affected the industrial development of Karaj. Although this Act could have, and to some extent did, encourage the development of orchards, fruit products, nurseries, flower and plants cultivation, it also led to an increase in land and housing speculation activities as this proved to be fairly easy and a short cut to big profits.

During the Third Development Plan (1963-67), special attention was paid to the introduction of sound city planning programmes.⁽³⁸⁾ The production of a large variety of aerial photographs, maps and master plans reflect this interest. In 1965, the first series of 1:2500 scale city maps were completed, based on aerial photographs taken in 1963. One of such maps had, for the first time, the new title of "Greater Tehran" which included a large area from the east of Tehran to the west of Karaj City. Thus an official new metropolitan sphere of influence of Tehran on its surroundings region could be delimited. Since then this map, which comprises 453 sheets, has been used for many purposes, including the issuing of the building permits by both Tehran and Karaj Municipalities.

During this period, the overall growth of the city of Karaj was reflected in its population increase. The 1966 Population Census of Karaj reported 44,243 people which indicated a 205 per cent increase as compared with the 1956 figure. This figure raised Karaj to the 34th place among the other Iranian Cities. This Census also indicated that there were about 5,521 housing units in Karaj, of which 65.6 per cent were built during the 1956-66 intercensal period.⁽³⁹⁾

Morphological changes in housing patterns in the period 1956 to 1966, can be studied by the comparison between the two aerial photographs, shown by Figures 3.5 and 3.7, taken in 1956 and 1966 respectively. The latter

photograph shows a considerable increase in housing units especially in the centre and west of Karaj.

The subsequent attempts at national development also resulted in the provision of 30 different master plans for the Iranian Cities, including Karaj.⁽⁴⁰⁾ Soon afterwards there was the production of different master plans for Tehran and Karaj. This was done in two different stages of Preliminary and Executive Reports. The first stage of Karaj Master Plan was completed in 1967 and included the following directives : City expansion and directions ; internal subdivisions ; the complementary role of Karaj for Greater Tehran, and the improvement of Karaj to act as the commercial centre of the whole Karaj Shahrestan.⁽⁴¹⁾

In 1967, the heavy and dangerous traffic on the Karaj-Tehran Highway necessitated the building of a faster and safer system of transportation. As a result, a 45 kilometre four lane autobahn was completed, which connected Tehran to Golshahr, 7 kilometres to the west of Karaj. The new road system, officially opened in 1967, and reduced the time distance between the two places by half to about 30 minutes. Consequently, Karaj attracted even greater attention; it became even more dynamic and its residential areas expanded even further.

Meanwhile, the population of Tehran had increased so significantly that a 1.2 million or 79% population rise was recorded during the period 1956-66.⁽⁴²⁾ This population increase necessitated even more residential space. Expansion limitations imposed by the City Master Plan for Tehran exacerbated this accommodation problem, since the existing boundary of Tehran was not allowed to be changed until the empty plots within the city limits had been fully utilized.⁽⁴³⁾ Rapid increases in land and rent prices were the most immediate outcome of this scheme. Further population growth plus immigration increased the seriousness of the situation, so eventually, the "Majlis" approved a second act to extend the boundary limits of industrial factories to 120 kilometres away from Tehran.⁽⁴⁴⁾

Discrepancies over the time and the way in which the preliminary directives of the Tehran and Karaj Master Plans were implemented resulted in a boom of land speculation in the Karaj region. Increases in the per capita income, the reduction of the weekly work hours and the profitability of land and housing speculation all encouraged the movement of population towards Karaj. Sudden increases in land prices (sometimes from 60 Rials to 1200 Rials per square metre) were associated with a number of preliminary efforts such as land levelling, road paving, land dividing and housing programmes. Facilities such as the quick registration of land deeds, easy provision of electricity, together with delays in the approval of the second stage of the Karaj Master Plan, were all responsible for a rapid expansion of housing and land speculation in Karaj.

Meantime the government's development plans were having important effects on Karaj. Various projects were initiated to improve the existing research and educational activities in Karaj. A sum of Rls. 400 million was spent on the projects during the last two years of 3rd Development Plan and the first year of the "4th Development Plan".^(45,46) There was the establishment of the Faculty of Forestry and Natural Resources, the expansion and the improvement of the Agricultural College and the extension and modernization of the Industrial Research Laboratories. Furthermore, there was the erection of some experimental farms and plant disease survey projects, and with establishment of a "Centre for Agricultural Studies" to train the Extension and Development Corps. These are just some of the projects initiated by the Plan Organization of Iran. Other examples could be mentioned such as joint investment with private sector in food factories including a project for the expansion of a fish plantation called "Mahi Sara" on Karaj River south of Bilaqan Village. Provision of some artesian wells and accomplishment of the Karaj Telephone Exchange to be connected with the National Grid Project were among the other projects supported financially by the Plan Organization of Iran.

The job opportunities produced by the above-mentioned development programmes and constructional and industrial activities in Karaj area, together with the low land prices and housing rents of the area, as compared with Tehran led to great immigration into Karaj. But on the other hand, the physical barriers, such as the braided bed of Karaj River and the manner of land ownership and land use, all limited the required space needed for housing expansion. Other problems such as water and electricity shortages as well as scarcity of construction materials resulted in reluctance to issue building permits.

Despite the introduction of restrictive controls by the Karaj Municipality, the rapid illegal development of small dwelling places on the Tappeh-e-Moradab 500 metres to the north of Maidan-e-Pahlavi, is an indicator of the critical housing shortage and incidentally a good example regarding the ever-increasing population experienced by Karaj. These squatter dwellings will be studied in detail at an appropriate place in Chapter 4. The latest National Population Census held in November 1976, recorded 138,774 persons in Karaj City. This figure, which shows a 3.1 fold increase during the period 1966-76, put Karaj as the 16th largest city in the country⁽⁴⁷⁾ compared with 70th place in 1956 and 34th in 1966. The acute housing shortage, drinking water difficulties, and the congested traffic conditions which are currently the main problems of the city, all are the result of this population expansion. Furthermore, many financial problems of the Karaj Municipality are caused by revenues from some of the Karaj industrial factories, and Karaj Autobahn going to Tehran rather than being collected by the Karaj Municipality. As a result of over-centralization, the possibility of decision making at a local level has been reduced so much so, that discussion and disputes concerning the Karaj Master Plan had to take place at the "High Council of City Planning" Organization in Tehran, rather than in Karaj itself.

However, there are a number of potential and actual advantages which herald a much better future for Karaj. The tourist and recreational attractions, the provisional plan for the creation of Farabi University, together with the agricultural suitability of the area, are all factors which assure a prosperous future for Karaj both regionally and nationally.

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POPULATION CHARACTERISTICS AND HOUSING PATTERNSA. Population Characteristics

The study of population and housing and their inter-relationships forms a starting point for many investigations in the social sciences, and they are central in this examination of Karaj and its role as a satellite settlement for Tehran.

Despite the complexity of the relationship between population and housing it is worth drawing a basic distinction between the more dynamic nature of population and relatively static nature of housing, as demographic changes may well have actually occurred some time before they are fully reflected in the type and nature of housing provided in a city. In this chapter, therefore, both elements will be examined separately under two divisions of A. Population Characteristics, and B. Housing Patterns; and then in the final part of this chapter, they will be drawn together as the two sides of a demand and supply study of population increase and housing problems.

However, before discussing these two major elements in detail a brief review of the data sources employed and analysed in this chapter would seem appropriate.

The data

Data used in the following chapter are mainly based on the two previous National Censuses (1956 and 1966), together with some preliminary unpublished results of the latest enumeration held in November 1976. Where appropriate, an attempt has been made to integrate some of the personal findings derived from fieldwork in Karaj.

In 1976, for enumeration purposes, Karaj city was divided into a number of smaller areas each of which was further divided into various sub categories. The hierarchy of these enumeration areas and the number

of divisions in each was as follows:

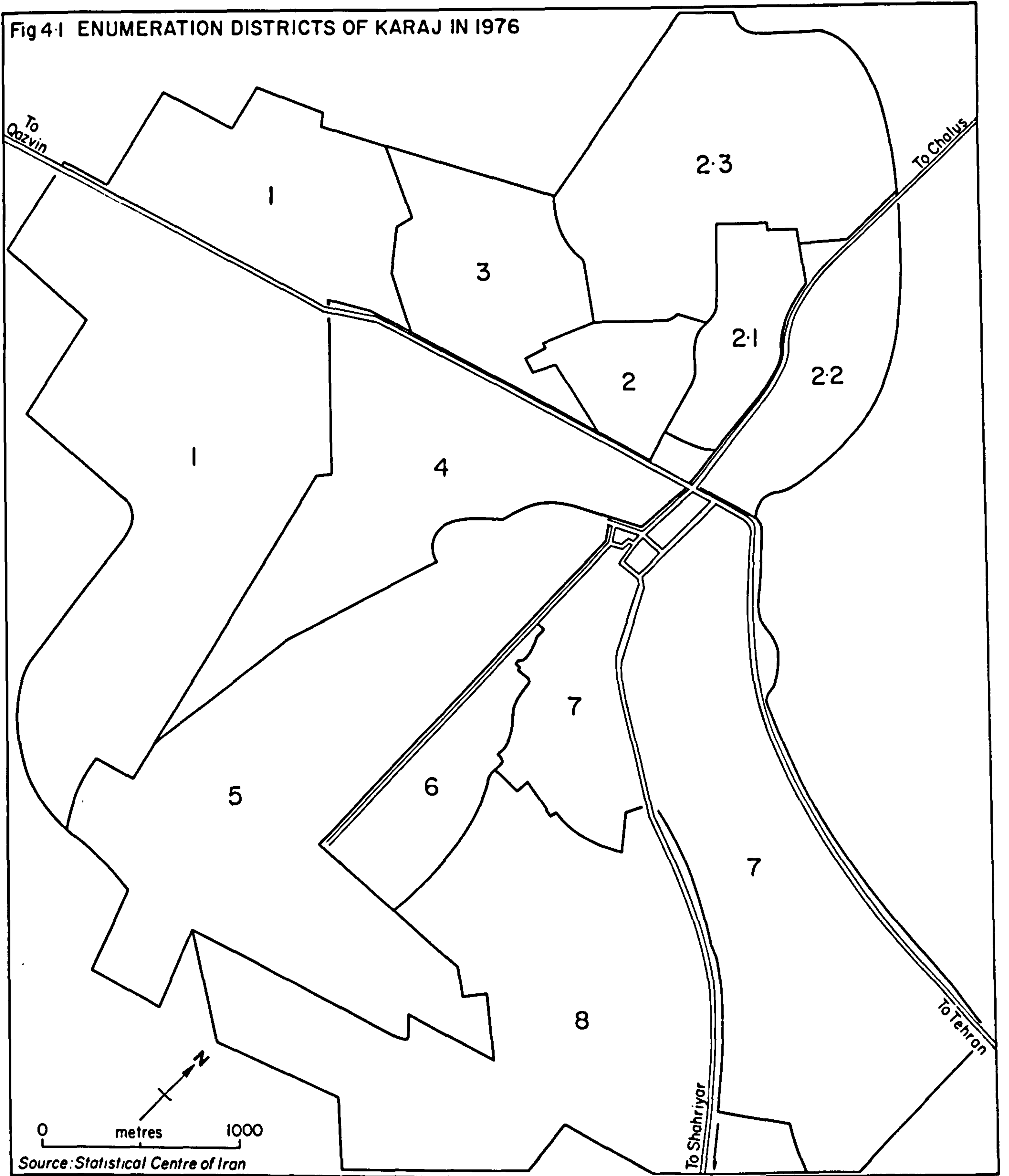
(a)	Karaj city	1
(b)	Enumeration divisions	2
(c)	Enumeration districts	11
(d)	Enumeration units	44

In this study the preliminary census data for 1976 will be examined within the 11 Enumeration districts. It is interesting to note that population increase in Karaj has been so rapid that it even surprised the demographic experts at the Statistical Centre of Iran. One reason for this is that although the enumeration map of the whole city produced in 1975 was divided into 8 Enumeration Districts, referring to Figure 4.1, the area to the immediate north of the city centre which was originally one Enumeration District was subdivided into a further four districts (2, 2.1, 2.2 and 2.3) and these were regarded as of equal status to the other seven unmodified Enumeration Districts when the census was held in November 1976. The overriding reason for this rearrangement of the enumeration boundaries in this quadrant was the existence of the squatter dwellings of Mahalleh-e-Zurabad.

As shown by the Enumeration District map of Karaj, the larger extent of some of the districts make it impossible to include areas which could be regarded as homogeneous. With the exception of a few districts (e.g. 2, 2.1 and 6), the majority of enumeration districts cover large agricultural areas or open spaces. This as we shall see, affects the distribution and density patterns of both population and housing units.

In examining the different demographic characteristics of Karaj, the density and spatial distribution of population are studied first of all. Secondly, attention is given to the patterns of migration to Karaj which provides the major reason for the rapid growth of the city's population. This is followed by a discussion of the population composition of Karaj in order to shed some light on one aspect of its demography which has a major impact on the socio-economic features of the city. Finally, the overall growth and change of the city's population resulting from the combination of all the factors mentioned earlier will be considered. This last section

Fig 4-1 ENUMERATION DISTRICTS OF KARAJ IN 1976



Source: Statistical Centre of Iran

also provides the necessary background for the second part of this chapter dealing with housing patterns in Karaj.

4.1 Population Density and Distribution

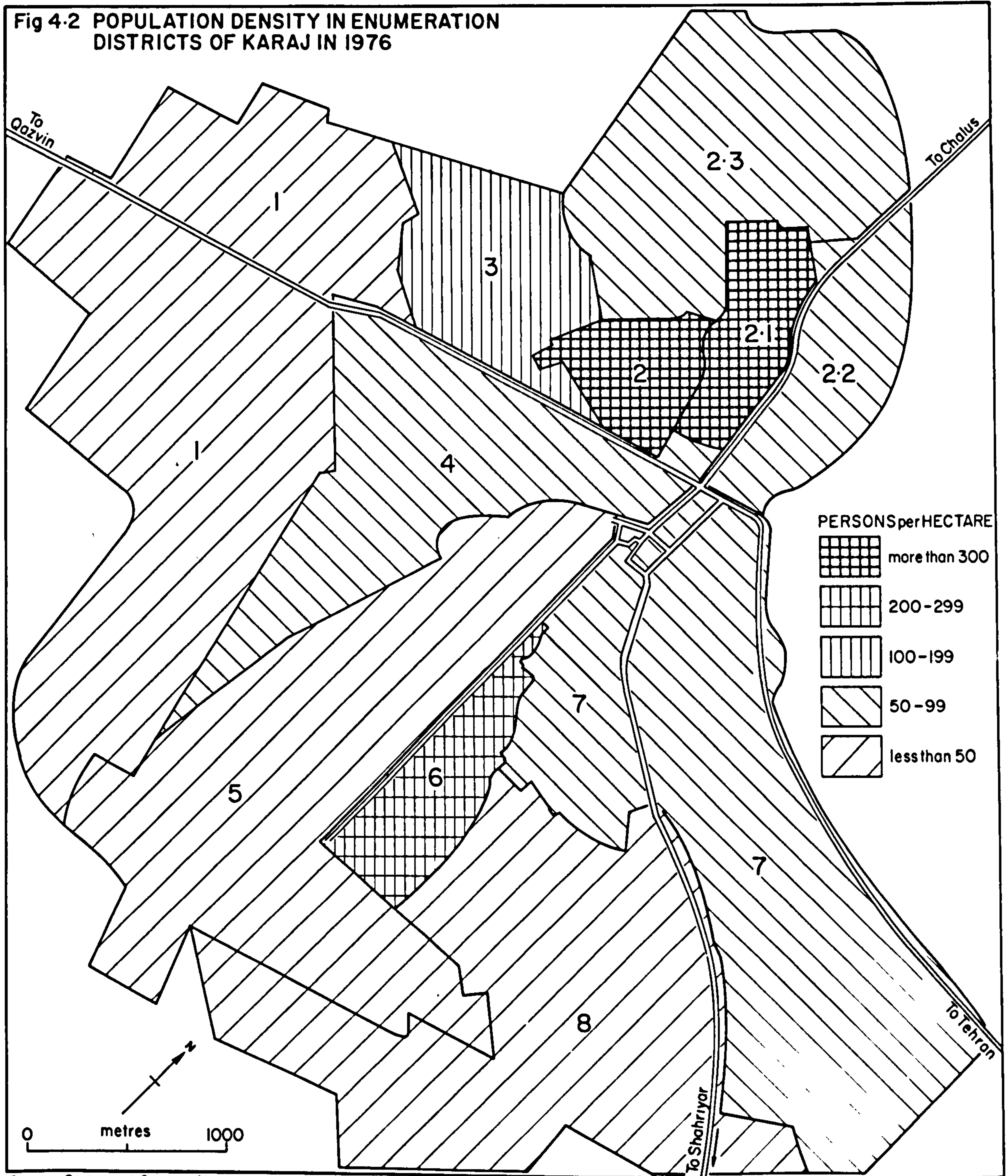
Population density can be defined simply as the number of persons per hectare or square kilometre. Although this is a crude measure and many scholars of population geography such as Clarke⁽¹⁾ have introduced other alternatives, in the absence of any other available data, the direct Man/Land criterion seems to be the only possible measure for examination of population densities in different parts of Karaj.

Man/Land ratios in the central area of Karaj are fairly high, especially for those residential quarters attached to the factories, such as Mahalleh-e-Chaharsad Dastgah (400 housing units) to the south of the Jahan Industrial Complex. The nucleated pattern of such quarters with no large open space or unbuilt vacant land in between them, makes the Man/Land ratios in these areas very high. Furthermore, Mahalleh-e-Zurabad, which includes a compact area of squatter dwellings, and exhibits the highest population density (more than 300 persons per hectare) is also located within this central area of Karaj. (See Figure 4.2, districts 2 and 2.1).

In the northern suburb of Azimiyeh (district 2.3) and western suburb of Jahan Shahr (located in district 1), are located the largest and most spacious houses of Karaj. These villa-style dwellings house the wealthy industrialists, businessmen and more recently government officials and professional workers, including some of the academic staff of the Agricultural College who previously commuted daily between Tehran and Karaj, as well as other middle class, mostly professional, Tehranis. These areas exhibit the lowest population densities (less than 50 persons per hectare) in the city. (See Figure 4.2).

As a general rule, the very advantages attached to the centres of

Fig 4.2 POPULATION DENSITY IN ENUMERATION DISTRICTS OF KARAJ IN 1976



Source: Statistical Centre of Iran

cities, have made a central area location a place of maximum attraction and consequently a place with the highest population congestion. The relationship between population densities and distance from the city centre has, therefore, become the subject of studies for many scholars such as Clark⁽²⁾ (1951) and Berry⁽³⁾, Simmon and Tenant (1963).

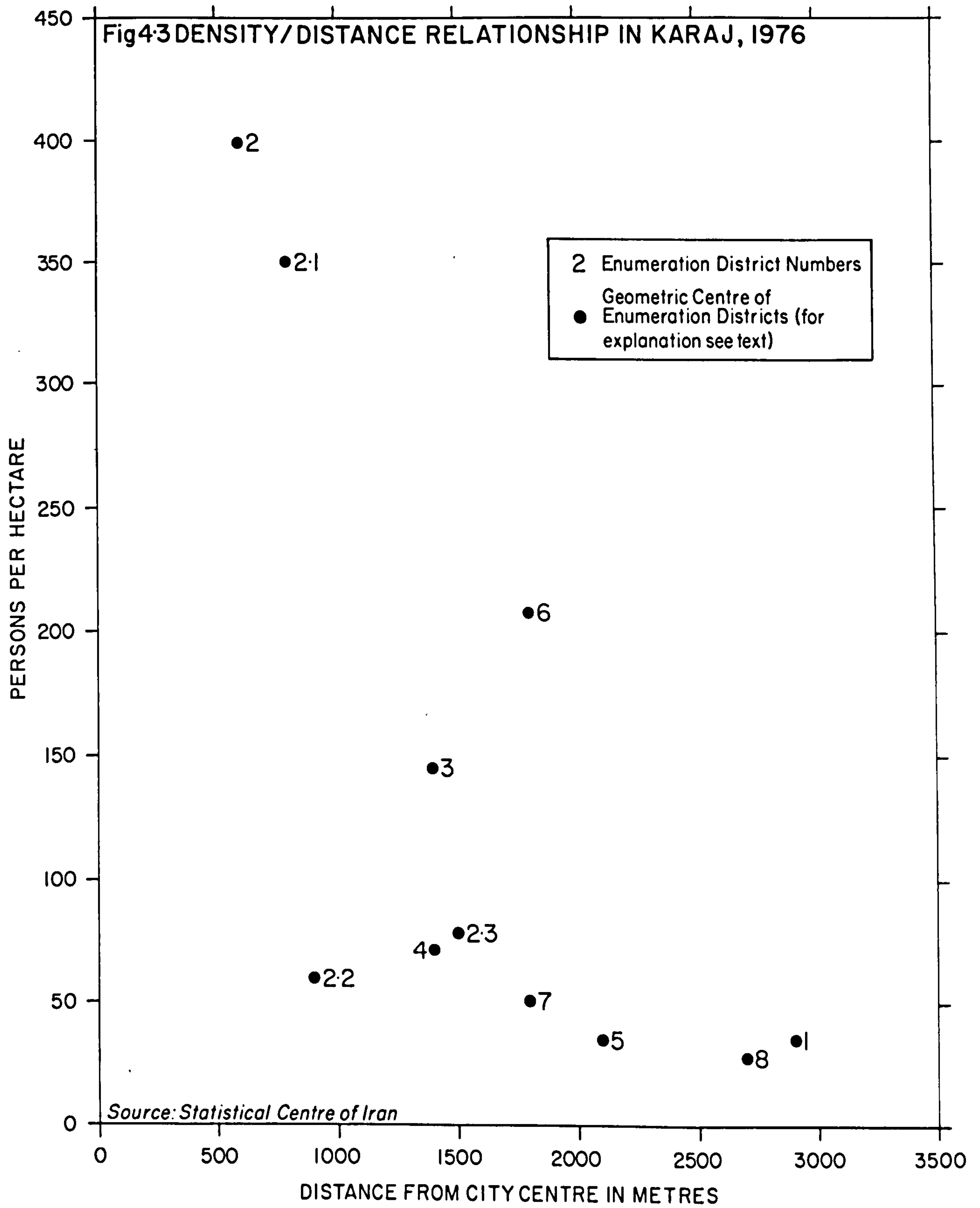
Clark, analysing thirty-six sample areas from the western world, taken from different periods of time, has showed that population densities declined at a constant rate from the city centre. Further studies by Berry et al revealed the validity of this observation even for non-western cities where they showed that "in every place so far studied a statistically significant negative exponential relationship between density and distance appears to exist."

To examine the extent to which the population density distribution of Karaj can be described in the terms which Berry (1963) have used, Figure 4.3 has plotted the distance from the city centre (Maidan-e-Pallavi as the peak of the city's highest land values) to the geometric centre of each of the 11 enumeration districts and relates this to the number of persons per hectare (see Table 4.1 and Figure 4.3).

Table 4.1: Density/distance relationship for Karaj city in 1976

Enumeration District No.	Distance to the city centre (in Km.)	Persons per hectare
1	2.9	35.6
2	0.6	399.0
2.1	0.8	350.5
2.2	0.9	59.7
2.3	1.5	78.0
3	1.4	145.6
4	1.4	71.5
5	2.1	35.4
6	1.8	207.2
7	1.8	50.3
8	2.7	28.6

Source: Unpublished data from Statistical Centre of Iran Third National Census of Population and Housing, November, 1976.



As shown, the graph has some variations, partly due to the fact that gross densities are used, and partly because some of the enumeration districts (e.g. 1,5,7 and 8) are very large. However, with some exception (i.e. districts 2.2 and 3) there is a fairly clear decline of densities away from the city centre. This finding shows apparently some similarities with the trend observed in western cities in which areas immediately around the city centre are characterised by zones in transition and low-status residential areas, both of which possess very high figures of population density. This pattern supports the fact that a trend towards an over-concentration of population in areas close to the city centre of Karaj is in progress which is quite in contrast with the pattern of low density in the peripheries of the city. These 'inner areas' of Karaj are also important reception quarters for recent in-migrants to the city which further accounts for their high population densities.

4.2 Population Composition

In this section such factors as age and sex structure, household size and family life-cycle, and the economic structure of the population of Karaj city will be examined. Because of their importance as well as the availability of more data, age and sex structure will be studied in greater depth. Indeed demographic information for age groups and sex is a major requirement for any form of socio-economic planning, such as education and employment. The factors outlined above will be examined as follows:

4.2.1 Age structure

The youthfulness of the population is one of the most striking characteristics that emerges from any study of the age structure of the Iranian population and Karaj city is no exception to this general observation. During 1956-66 intercensal period, the decrease in the median age of the whole population of Iran was from 20.2 to 16.9 years. For Karaj

this decline was from 20.4 to 17.5 years and provides a good indicator of this youthfulness of the population. The decline in the median age may be attributed to an increase in the number of children, due to the decrease in infant mortality for which improvements in medical welfare and living standards are largely responsible.

The age structure of population is usually examined by different means such as by age group and age pyramid. In the case of Karaj, age structure has been studied in terms of age groups which have been defined in three major categories, namely children (0-14), adults (15-64) and elderly persons (65 years and over). This classification conforms with that of the United Nations and therefore makes any national and international comparison easier. The adult group which is generally known as the economically active population has also been subdivided into two groups of younger adults (15-34), and older adults (35-64). This division of the adult population has also been employed in this study because of the youthfulness of the population.

Tables 4.2 and 4.3, show both the number and proportion of population by 5 year age groups, as well as the broad classification of children, younger and older adults and elderly persons, mentioned earlier, together with sex ratios, to be considered later, for 1956 and 1966.

Some interesting results can be obtained when the figures of the age groups for both 1956 and 1966 are compared. The findings are given below.

- (i) There has been a significant increase in the percentage of children, rising from 40 per cent to 44.3 per cent of the total population during the intercensal period, which is an indicator of decrease in infant mortality and general improvement in living standards. It may also be attributed to the fact that the majority of the migrants to Karaj are from rural areas, with a tendency to have a larger size family which,

Table 4.2: Age Groups, Sex Ratio and Median Age for Karaj City in 1956

Age groups	Total	%	Male	Female	Male per 100 female
0 - 4	2,375	16.3	1,216	1,159	104.9
5 - 9	2,012	13.8	1,039	973	106.8
10 - 14	1,439	9.9	772	667	115.7
Young people	5,826	40.0	3,027	2,799	108.2
15 - 19	1,321	9.1	706	615	114.8
20 - 24	1,446	10.0	723	723	100.0
25 - 34	2,438	16.8	1,327	1,111	119.4
Younger adults	5,205	35.9	2,756	2,449	112.5
35 - 44	1,510	10.4	890	620	143.5
45 - 54	1,122	7.7	662	460	143.9
55 - 64	584	4.1	320	264	121.2
Older adults	3,216	22.2	1,872	1,344	139.3
65 - 74	193	1.3	104	89	116.9
75 - 84	63	0.4	34	29	117.2
85 and over	23	0.1	10	13	76.9
Aged group	279	1.8	148	131	113.0
All ages	14,526	100.0	7,803	6,723	116.1
Median age	20.4	-	21.2	19.6	-

Source: First National Census of Population and Housing, 1956, Karaj Shahrestan

Table 4.3: Age Groups, Sex Ratio and Median Age for Karaj City in 1966

Age groups	Total	%	Male	Female	Male per 100 female
00 - 5	7,119	16.1	3,632	3,487	104.2
5 - 9	6,715	15.2	3,412	3,303	103.3
10 - 14	5,740	13.0	3,180	2,560	124.2
Young people	19,574	44.3	10,224	9,350	109.3
15 - 19	4,676	10.6	2,649	2,027	130.7
20 - 24	3,593	8.1	1,833	1,760	104.1
25 - 29	3,373	7.6	1,822	1,551	117.4
30 - 34	2,945	6.7	1,661	1,284	129.4
Younger adults	14,587	33.0	7,965	6,622	120.3
35 - 39	2,530	5.7	1,400	1,130	123.9
40 - 44	1,979	4.5	1,207	772	156.3
45 - 49	1,584	3.6	974	610	159.7
50 - 54	1,334	3.0	726	608	119.4
55 - 59	647	1.5	374	273	137.0
60 - 64	932	2.1	556	376	147.9
Older adults	9,006	20.4	5,237	3,769	138.9
65 and over	1,076	2.4	576	500	115.2
All ages	44,243	100.0	24,002	20,241	118.6
Median age	17.5	-	18.3	16.7	-

Source: Second National Census of Population and Housing, 1966 Karaj Shahrestan, Vol.1, p.3

because of the greater availability of medical facilities in Karaj has a higher survival rather than would be the case in their home villages.

(ii) As a city experiencing a high degree of immigration, Karaj could be expected to have a high proportion of its population of working age. This is borne out, to some extent by the numerical increase of about 2.8 times in the adult population compared with 1956. Indeed, the growing attraction of Karaj as a place of residence or work is demonstrated by the fact that during the intercensal period, the number of young adults of working age increased from 5205 to 14587 and the older adults (35-64) from 3216 to 9006. However, it is inevitable that because of an increase in the percentage in the age group 0-14, the actual proportion of adults in the total population should have declined during the 1956-66 period from 58.1 per cent to 53.4 per cent.

The breakdown of adults into two sub-groups also reveals a significant difference between the two census dates. In 1966, young adults (15-34) comprised 33 per cent of the city population, a figure which was higher than in many other medium sized Iranian cities such as Zanjan (27.3%), Kashan (28.2%) and even a large city such as Esfahan (29.6%).

The older adults (35-64) too formed a relatively high percentage (20.4%) of the total population when compared, for example, with Tehran (10.7%). This can perhaps be related to the possibility that some grown-up families from Tehran or other cities moved to Karaj to settle there. It is a trend which, as we shall see in Chapter 8, has recently grown in popularity especially in the satellite settlements around Karaj city.

(iii) In the case of the elderly age group, as can be seen from Tables 4.2 and 4.3, there was an increase from 1.8 per cent of the total population in 1956 to 2.4 per cent in 1966, although this was relatively low compared to the national figure of 3.6% of persons in this age group.

However, this increase in the proportion of elderly people can be taken as an indicator of the increase in life expectancy as well as being partially due to the increasing number of those who have chosen Karaj as their retirement home, away from the crowds and the pollution of Tehran or other large Iranian cities.

4.2.2 Sex structure

Sex structure is usually examined in terms of the sex ratio - that is the number of males per 100 females. As mentioned before, in 1956 the population of Karaj city was 14526, of which 7803 (53.7%) were males and 6723 (46.3%) were females. The corresponding figure in 1966 was 44243 for the total population of which 24002 (54.2%) were males and 20241 (45.8%) were females. The preliminary results of the 1976 population census show that in November that year out of the total 138774, there were 72323 (52.1%) males and 66451 (47.9%) females. It is interesting to note that whereas during the 1956-66 intercensal period there was a greater excess of males over females, during 1966-76 the trend was changing and the gap between the number of males and females has decreased substantially. As a result of these changes the sex ratio for Karaj city which rose from 116.1 males per 100 females in 1956 to 118.6 in 1966, decreased to 108.8 in 1976. One reason for such a relationship could be the frequency with which more single or independent males at working age migrated to Karaj during the 1956-66 period. Another explanation for the high sex ratio between 1956-66 could be the lower accuracy of the 1966 census compared with 1976 and the possible underestimation of females, especially female children. On the other hand the more balanced ratio in 1976 may be attributed to the fact that in contrast with the past, the present migration trend to Karaj is composed predominantly of whole families, rather than single migrants.

Figures 4.4 and 4.5 show the age-sex differentials of Karaj city by age-sex pyramids for 1956 and 1966, whereas the spatial variation of

sex ratio for 1976 is shown for different Enumeration Districts of the city in Table 4.4, as well as Figure 4.6. The first two figures (Figures 4.4 and 4.5) compare the age-sex pyramids for the total population of Karaj city in 1956 and 1966. As can be seen, a broadening at the base of the 1966 pyramid is clearly apparent which can be attributed to a considerable numerical increase of children during the intercensal period of 1956-66. This has also been due to the proportional increase in the size of this age group because by 1966, 31.3% of the population were under 10 years of age and 54.8% were under 20 years, whereas the 1956 figures were 30.2% and 49.2% respectively. The distribution of male/female ratio in 1976 is shown in Figure 4.6. This figure, together with Table 4.4, indicates that there are some significant spatial variations in sex ratio when examined by different enumeration districts of the city. For instance in contrast to some of the residential districts such as 1, 2, 2.1, 3, 7 and 4, in which the sex ratio is either relatively balanced or is similar to that of the city average, there are districts with extreme differences. For example female surplus (65.9 males per 100 females) is a distinctive feature of district 2.2, whereas male surpluses are predominant in districts 8 and 5 (125.7 and 131.3 respectively).

The excess of females over males in district 2.2 is in marked contrast to the city's average sex-ratio, and the reasons for this aberration are not entirely clear to the author.

It is thought that misrecording and underestimation of males or over estimation of females might be the reason for such an unbalanced sex ratio. Furthermore, due to the very rural nature of the population of the district (which includes the two quarters of Mahalleh-e-Hesar and Sarjub which until recently were two separate villages to the north of Karaj, beside the Karaj river, and are now part of the city urban boundary) the households are experiencing a pattern of independent migration of

Fig 4.4 AGE - SEX PYRAMIDS FOR KARAJ IN 1956 AND 1966

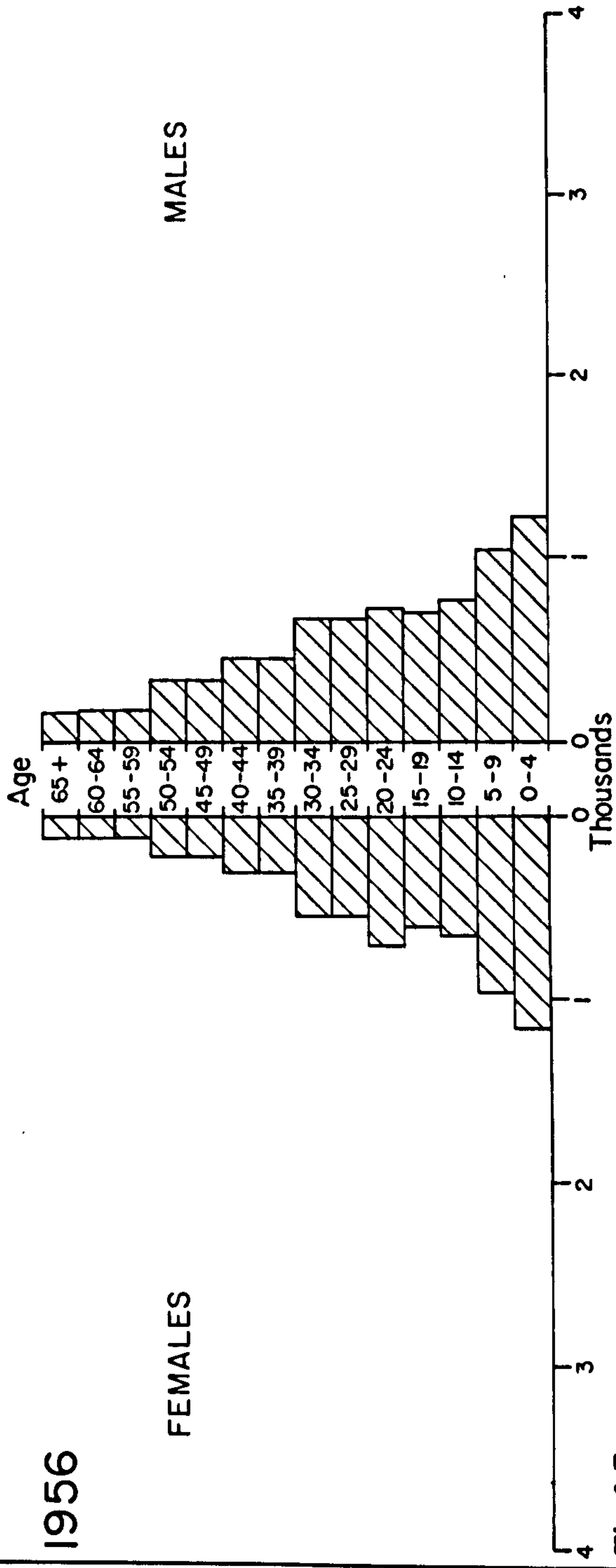
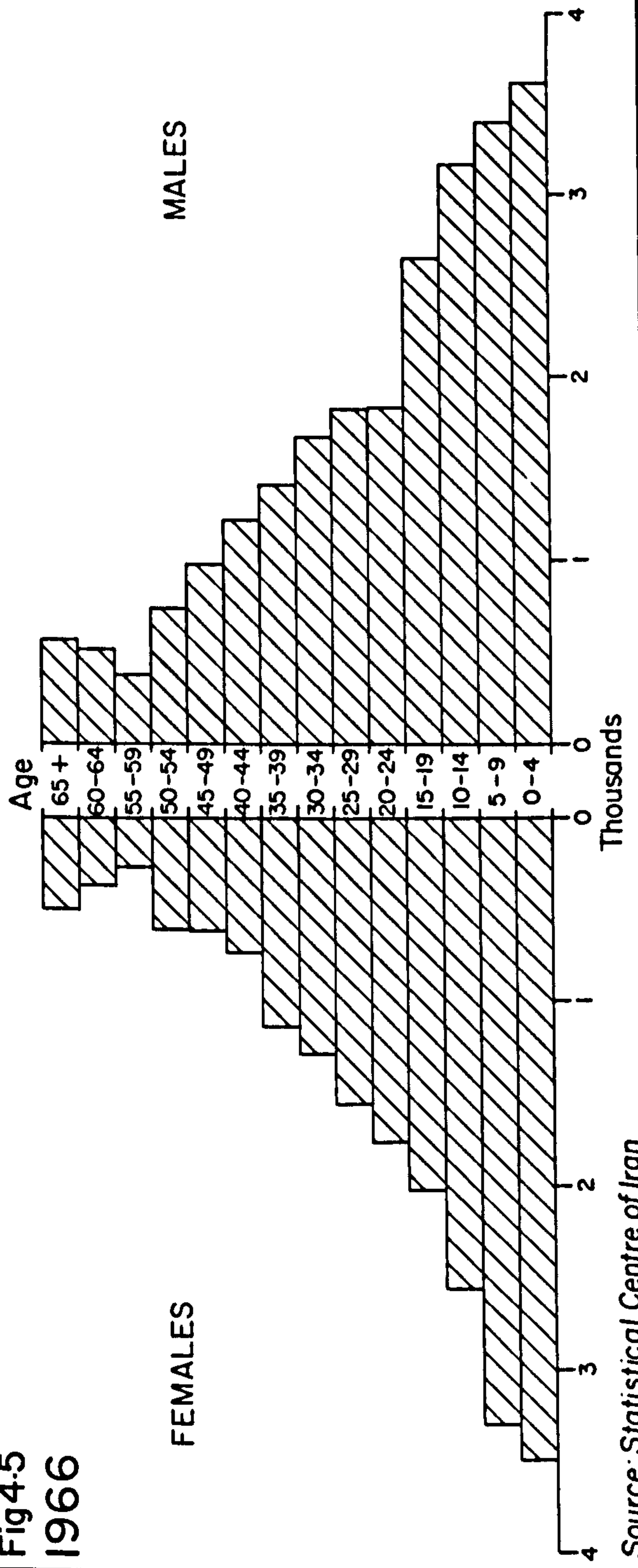


Fig 4.5
1966



Source: Statistical Centre of Iran

the heads of households to Tehran. However, in the light of the author's personal field observation, the misrecording of the male population during the enumeration seems to be the major reason for this female surplus in district 2.2.

Table 4.4: Sex ratio in Karaj city by Enumeration Districts, 1976

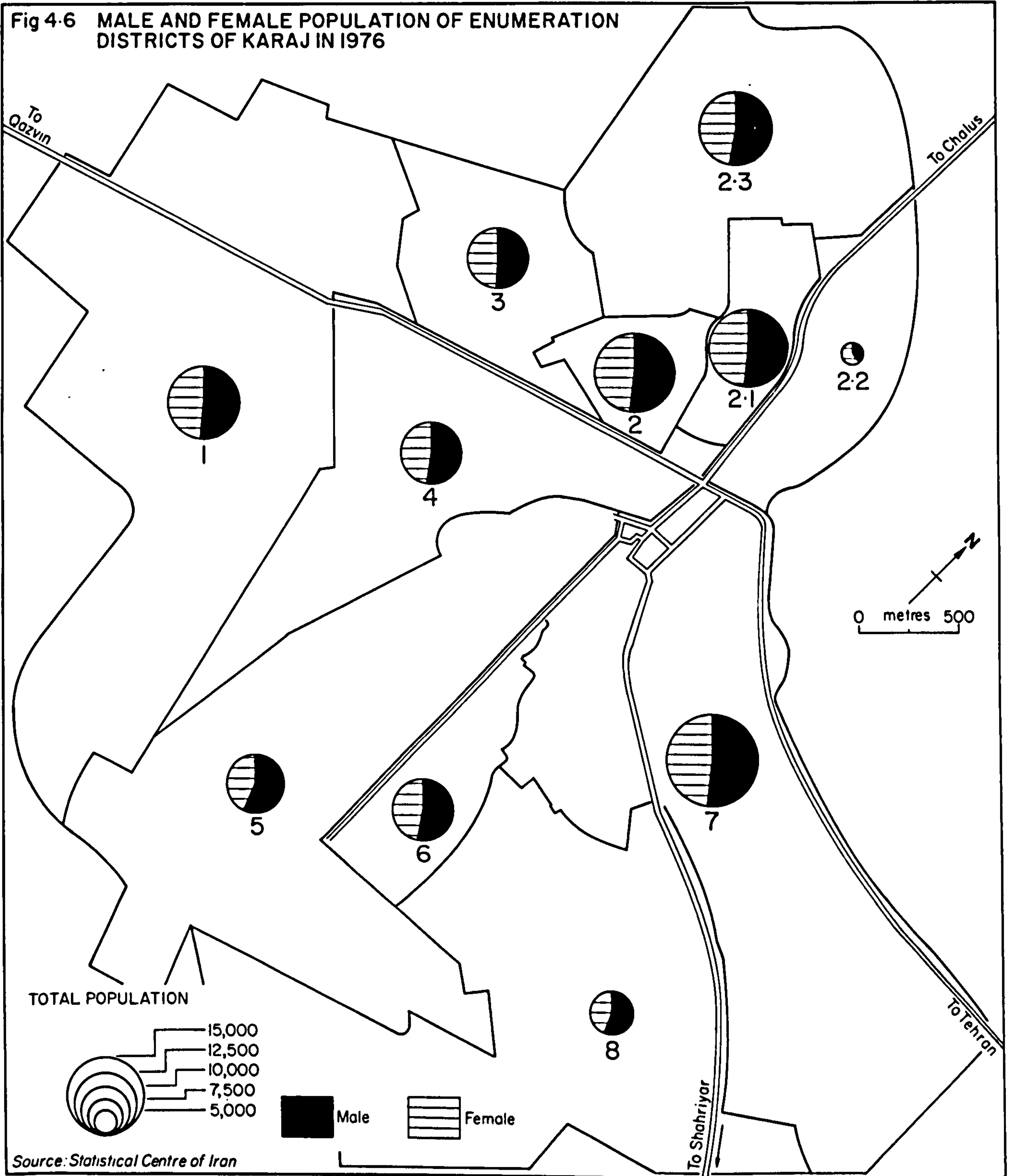
Enumeration district No.	Total No. of population	No. of Males	No. of Females	Male/Female ratio
1	14625	7543	7082	106.5
2	15159	7852	7307	107.4
2.1	15774	8177	7597	107.6
2.2	4445	1766	2679	65.9
2.3	13811	7281	6530	111.5
3	12883	6534	6349	102.9
4	12797	6693	6104	109.6
5	10903	6189	4714	131.3
6	11501	6057	5444	111.3
7	17944	9257	8687	106.6
8	8932	4974	3958	125.7
Total	138,774	72,323	66,451	108.8

Source: Unpublished data, Statistical Centre of Iran Third National Census of Population and Housing, November 1976.

Male surpluses in districts 5 and 8 whilst in contrast to the city average are nevertheless to be expected because both districts include the southern industrial quarters of the city as well as the railway station and its related workshops, areas in which the frequency of single male workers is not surprising (see Figure 4.6).

As mentioned earlier, the average sex ratio for the whole city has become less unbalanced in recent years. And, because of a general tendency of the city to act as a dormitory town, it can be expected that the sex

Fig 4.6 MALE AND FEMALE POPULATION OF ENUMERATION DISTRICTS OF KARAJ IN 1976



Source: Statistical Centre of Iran

ratio for Karaj will show an even more balanced relationship in the near future.

4.2.3 Household Size and Family life-cycle

According to the latest national census of Iran held in 1976 (final results still being processed), a private household is defined as "... persons living together in one residence, sharing their living expenses, and eating together. Household members are not necessarily related and a household may consist of only one person."⁽⁴⁾

Knowing the number of families and households is importance because they "greatly influence the character of settlement, and that is of considerable geographical significant."⁽⁵⁾

The total number of households in Karaj city in 1956 was 3300 units which increase considerably to reach 9136 units by 1966, and by another three-fold increase rose to 28484 units in 1976. Study of the households of Karaj city indicates that not only has the total size of household increased during the last two decades, but also the number of persons per household has increased. Furthermore, as shown by Table 4.5, there are clear differences in the average size of some households, when they are examined at district level. For instance whereas most districts exhibit an average size of household comparable with that of the city as a whole (4.9 persons), district 2.1, which comprises most of the squatter settlements of Mahalleh-e-Zurabad, exhibits a fairly high average size of 6.1 persons.

However, when the change in the average size of household for between 1966 to 1976 (from 4.8 to 4.9) is compared with that for 1956 (4.4), the slower rate of increase during the last intercensal period (1966-76) deserves consideration. Whilst this can be attributed to the gradual tendency towards family limitation, an alternative explanation, which

may also be likely is that recent immigrants, who are the major cause of the population increase in Karaj, are predominantly young families still at an early stage of the family life-cycle and therefore with the potential to become even larger in size.

Table 4.5: Number of Households and Persons per Household in Karaj city by Enumeration District.

Enumeration district No.	Total No. of population	Total No. of households	Persons per household
1	14,625	3,155	4.6
2	15,159	2,995	5.1
2.1	15,774	3,262	4.8
2.2	4,445	728	6.1
2.3	13,811	2,771	5.0
3	12,883	2,679	4.8
4	12,797	2,935	4.4
5	10,903	2,105	5.2
6	11,501	2,394	4.8
7	17,944	3,809	4.7
8	8,932	1,651	5.4
Total	138,774	28,484	4.9

Source: Unpublished data, Statistical Centre of Iran, Third National Census of Population and Housing, November 1976.

Recent improvements in the literacy ratio at the national level which have been paralleled by the increase in the number of educated women, have in turn been reflected in a high tendency toward female employment. This has had a two-fold effect.

- (a) postponement of the age of marriage , and
- (b) reduction in the size of families due to both employment responsibilities and an awareness of the advantage of a smaller size of family, both of which are decisive in controlling family size.

Most families in urban areas in Iran are predominantly "nuclear" in character - a young married couple with their children, living separate from their parents. Socio-economic improvements, the increase in the level of urbanization, together with the effects of westernization (introduced through the different communications media, overseas travel and the large number of foreigners living in Iran) have all been important and had their own particular effects on the changing household patterns.

By listing different types of household, the 1966 census gives a fairly detailed profile of Iranian family structure. These categories are as follows:

- A. Married couple without children
- B. Parent(s) and unmarried children
- C. Parent(s) and married children with no grandchildren
- D. Parent(s) and married children with grandchildren
- E. All other types of private household.

As shown by Table 4.6, the majority of households (73.7%) of Karaj city can be classified under category B, which consists of parent(s) and unmarried children. The so called "extended family" which can be represented by category D, including parent(s) and married children with grandchildren accounted for only 2.3 per cent of the total of households in Karaj city. In 1966, the corresponding figures for the whole of Iran, urban and rural areas, were 73.%, 72.8% and 73.1% for category B, whereas for category D they were 4.6%, 3% and 5.7% respectively (see Table 4.7).

Whilst Karaji families in category B represent a higher proportion of households in comparison with the total of both urban and rural families, category D forms a smaller proportion (2.3%) (see Table 4.7).

4.2.4 Economic Composition

The economic composition of Karaj's population is examined here in terms of the economically active and inactive components as well as the occupational structure of the city's population as a whole. It helps

Table 4.6: Total Households by Size and Categories of Household in Karaj in 1966.

Size of household	Total		A		B		C		D		E	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total household	9,113	100	1,097	12.8	6,724	73.7	67	0.8	206	2.3	1,019	11.2
1	565	6.2	-	-	-	-	-	-	-	-	565	6.2
2	1,185	13.0	848	9.3	84	1.2	2	0.03	-	-	251	2.8
3	1,383	15.2	141	1.5	1,129	12.3	4	0.04	1	0.01	108	1.2
4	1,422	15.6	67	0.7	1,278	14.0	11	0.12	14	0.15	52	0.6
5	1,435	15.7	22	0.2	1,359	14.9	13	0.14	24	0.26	17	0.2
6	1,229	13.5	7	0.08	1,168	12.8	11	0.12	30	0.33	13	0.14
7	887	9.7	4	0.04	839	9.2	8	0.09	28	0.31	8	0.09
8	543	6.0	2	0.02	486	5.3	11	0.12	43	0.47	1	0.01
9	272	3.0	3	0.03	241	2.7	3	0.03	23	0.25	2	0.02
10	192	2.1	3	0.03	140	1.5	4	0.04	43	0.47	2	0.02

Source: Second National Census of Population and Housing of Iran, Karaj Shahrestan, November 1966, Vol.1, p.78.

Table 4.7: Size and type of the total households of Karaj city in comparison with Tehran, Urban and Rural areas, and the Whole Country in 1966

Areas	Total		A		B		C		D		E		Medium Size
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Total Country	5,029,320	10.9	545,480	10.9	3,671,878	73.0	62,155	1.2	234,104	4.6	515,703	10.3	5.1
Urban Areas	1,960,701	10.7	210,395	10.7	1,427,474	72.8	26,458	1.3	60,520	3.0	235,854	12.2	4.7
Rural Areas	3,068,619	10.9	335,085	10.9	2,244,404	73.1	35,697	1.2	173,584	5.7	279,849	9.1	4.9
Tehran	587,625	10.8	63,612	10.8	421,500	71.7	7,071	1.2	15,008	2.6	80,434	13.7	4.6
Karaj City	9,113	12.0	1,097	12.0	6,724	73.7	67	0.8	206	2.3	1,019	11.2	4.8

Source: Second National Census of Population and Housing, "Total Country, Settled population", 1966, Vol.168, p.173
 Tehran Shahrestan, 1966, Vol.10, p.249
 Karaj Shahrestan, 1966, Vol. 1, p. 78

A = Married couple with no children
 B = Parent(s) and unmarried children
 C = Parent(s) and married children with no grandchildren
 D = Parent(s) with married children with grandchildren
 E = All other types of private household.

to provide a useful background for understanding the city's economic function which is discussed in depth in Chapters 5 and 6 where the commercial and industrial structure of the city are examined.

Most studies of the economic structure in Iran highlight three major features of the economic composition of the population:

- (a) The low percentage of the total population which is economically active, due mainly to its overall youthful nature.
- (b) The great difference in the activity rates between males and females
- (c) A general tendency in the occupational structure of population to move from primary towards secondary and tertiary activities, especially in recent years.

All of these aspects, as will be explained, are applicable to Karaj.

As stated earlier, because of the rapid growth of population in Karaj city, it can be expected that the economically active population will form only a relatively small proportion of total population as children who are generally regarded as economically inactive, form such a high proportion.

In 1966, out of the total population of Karaj, there were 12,657 persons who were economically active of whom only 747 were women. The general activity rate, therefore, was about 28.6 per cent.

As Table 4.8 shows, there have been marked changes in the composition of employment in different industries in the intercensal period of 1956-66. Worth mentioning is the decrease in total percentage of employment in agriculture, which has fallen from 23.5 per cent to 14.3 per cent, although because of the importance of primary sector in Karaj, this proportion is still nearly twice the average figure for all urban areas in Iran. The reduction in agricultural employment has had important implications for industrial employment as the proportion engaged in the manufacturing industry increased from 17.9% to 33.8% between 1956-66. In the tertiary

Table 4.8: Percentage of Employed Population 10 years of Age and Over by Major Industry Groups for Iran, Urban, Rural areas and Karaj City, 1956 and 1966

Type of Activity	Agriculture and Forestry and Fishing,		Mining and Quarrying		Manufacturing		Construction		Electricity Water, Gas & Sanitary Service		Commerce		Transport storage, Communication		Services		Activities not reported	
	1956	1966	1956	1966	1956	1966	1956	1966	1956	1966	1956	1966	1956	1966	1956	1966	1956	1966
Total country	56.3	46.2	0.4	0.4	13.8	18.4	5.7	7.4	0.2	0.9	6.0	8.0	3.5	3.3	11.1	13.6	3.0	1.9
Urban areas	12.1	7.6	0.5	0.3	26.2	27.7	9.9	10.2	0.5	1.8	14.5	16.1	8.1	6.5	23.8	27.4	4.4	2.4
Rural areas	75.8	70.0	0.4	0.4	8.3	12.8	3.8	5.7	0.1	0.1	2.3	3.1	1.5	1.3	5.5	5.1	2.3	1.5
Karaj City	23.5	14.3	0.1	0.3	17.9	33.8	17.6	9.9	0.4	1.0	8.7	8.2	5.3	4.3	24.6	25.6	1.9	2.5

Source: First and Second National Census of Population and Housing, 1956, Vol.2, and 1966, Vol.168 Karaj Shahrestan, Vol.1

Table 4.9: Percentage of Male and Female Age-specific Activity rates for Karaj City in 1956 and 1966

Age groups	Male		Female	
	1956	1966	1956	1966
15 - 19	61.9	56.2	4.4	3.9
20 - 24	74.8	78.8	3.3	5.5
25 - 44	95.8	96.4	4.1	6.5
45 - 54	98.9	92.8	9.1	8.3
55 - 64	95.6	75.2	7.6	6.0
65 and over	75.7	46.0	5.3	4.2

Source: First and Second National Census of Population and Housing, 1956, Karaj Shahrestan 1956, Vol.1 and 1966, Vol.1

sector there has been little change in the proportion of persons employed in the different service industries during the intercensal period.

Of the male population aged 10 years and above in 1966, 70.2% were economically active. In the economically inactive groups, school children and students predominated and accounted for about 24% of the total population.

Table 4.9 shows the Age-Specific Activity Rate for the population of Karaj. A proportional decrease in the 15-19 age group (from 61.9% to 56.2% for males) can be explained by the tendency for larger numbers of this age to be engaged in full-time education.

In the absence of the relevant data of the 1976 census, a sample survey carried out by the Master Plan for Karaj in 1975, provides more up to date data on activity rates.⁽⁶⁾ According to this survey, whereas the proportion of economically active females has increased in comparison to that of males (103 females per 900 males), nevertheless the overall activity rate has declined to 25 per cent of the total population. This was attributed to the increasing tendency of the population to become younger as well as to an increasing number of school children. The largest decline was experienced by the under 20 age group, so much so that the position of this age group declined from 17.6 per cent in 1966 to about 10.8 per cent of the total active population in 1975.

There has also been a remarkable change in the occupational structure of the population during recent years. This was particularly apparent for those self-employed workers who declined numerically in comparison with private and government wage earners. Similarly there was a decline in the number of those who were engaged in the primary sector, whereas those working in secondary and tertiary sectors increased.

In the light of the above mentioned factors, it is likely that the general activity rate for the city's population will still remain at under 30 per cent for the next decade or so. However, because of the increase in

job opportunities, especially in service industry and constructional activities, the present rate of 4.5 per cent unemployment will gradually decline to its minimum proportion (about 1.3%) by the end of the current Master Plan Planning period (1966-91).

4.3 Patterns of migration

Why people migrate, how far they move and the consequences of these movements are the major questions of every migration study. A simple model for explaining the reasons why people move, has been formulated in terms of the "pull-push" hypothesis, whereas in response to the question of how far people move, explanations can be classified broadly into deterministic and probabilistic models⁽⁷⁾.

Studies dealing with different aspects of migration in Iran are few in number and often very general and not comparable. One reason for this could be the type of limited information provided by the Iranian National Censuses. In both the 1956 and 1966 censuses, migration data are available only in the form of place of birth and place of current residence and it was not until the 1976 census that a question was included asking where the person replying was five years before the enumeration date (November 1976).*

In the first census (November 1956), the exact locations of birth place (origin) and residence place (destination) of migrants were clearly identified. Each person was asked to state the "Ostan" and the "Shahrestan" where he was born and his residence in November 1956. The inter-Ostan and inter-Shahrestan population flow were also given in two separate tables. Moreover, population interchange between contiguous and non-contiguous provinces was also tabulated (see Table 4.10). Whilst the 1966 census

* This information about the residence place of a person, 5 years before the 1976 census is taken from the questionnaire used in that census; otherwise to date there is not yet any published information available about the birth place of population or migration pattern from the 1976 census.

has the advantage of including detailed data by age, sex and five year age groups, a classification which permits some examinations of differential migration - it suffers from the same drawback that the exact location of the birth place of migrants is not given (see Tables 4.10 and 4.11). However, in 1970 information dealing with birth places of the total population of Iran by Ostan and Shahrestan were published in one volume⁽⁸⁾ which was based on the 1966 census. The relevant data in this volume for Karaj have been used to examine the city's population by place of birth. This information allows a distinction to be made between those who moved from one locality to another within the same "Ostan" as well as those who moved to a city from another "Ostan". These two patterns can, as Hemmasi⁽⁹⁾ suggests, be divided into "short distance" and "long distance" migrants.

As has already been mentioned, one of the most distinctive features of Karaj's population is the high percentage of migrants in the city's total population.

In 1966, about 52.5 per cent of the population of Karaj had been born outside the city. This shows a modest increase in comparison with the figure for 1956 (50.3%). Although the figure for migrants in 1976 is not yet available, the very rapid growth of the city's population during 1966-76, shown by a 12.1 per cent annual increase, suggests that there has been a continuous flow of migrants to Karaj. Davis⁽¹⁰⁾ has shown that theoretically to maintain an annual population growth rate of 3 per cent per annum, an in-migration of 4 to 4.5 per cent per annum is required. Working on this assumption it is therefore suggested that Karaj could have received annually between 16.1 to 18.1 per cent of its total population from in-migration during the intercensal period of 1966-1976.

As shown by Table 4.11, those who were born in other Shahrestan of the Central Ostan in 1966 and enumerated in Karaj city were reported to be 7770 or about 17.6 per cent of the city's total population, which is a fairly high proportion. One major reason for the apparent large number

Table 4.10: Place of Birth by Age for Karaj City, 1956

Age	Total	Born within census district		Born in other census districts		Born in foreign countries	Place of birth not reported
		No.	%	Contiguous districts	Non-Contiguous districts		
All ages	14,526	7,222	49.7	2,174	4,977	83	70
Under 5	2,375	1,879	79.1	236	254	1	5
5 - 14	3,451	2,065	59.8	510	864	3	9
15- 24	2,767	981	35.5	471	1,281	16	18
25- 34	2,438	829	34.0	393	1,180	17	19
35- 44	1,510	576	38.1	271	633	21	9
45-54	1,122	643	57.3	145	322	8	4
55- 64	584	173	29.6	96	298	11	6
65 and over	279	76	27.2	52	145	6	-

Source: First National Census of Iran, November 1956, Vol.1, Karaj Census District, p.19.

Table 4.11: Place of Birth by Age for Karaj City, 1966

Age	Total	Born within Shahrestan Kajar		Born in other Shahrestans of Central Ostan	Born in other Ostans	Born in foreign countries
		No.	%			
All ages	44,243	21,032	47.5	7,770	15,286	155
Under 5	7,119	5,977	84.0	635	496	11
5 - 9	6,715	4,566	68.0	959	1,181	9
10 - 14	5,740	3,088	53.8	1,105	1,546	1
15 - 19	4,676	1,819	38.9	938	1,917	2
20 - 24	3,593	1,004	27.9	734	1,849	6
25 - 29	3,373	923	27.4	720	1,710	20
30 - 34	2,945	794	27.0	579	1,545	27
35 - 39	2,530	701	27.7	511	1,300	18
40 - 44	1,979	505	25.5	432	1,030	12
45 - 49	1,584	477	30.1	297	795	15
50 - 54	1,334	360	27.0	270	689	15
55 - 59	647	193	29.8	136	313	5
60 - 64	932	271	29.1	227	428	6
65 and over	1,076	354	32.9	227	487	8

Source: Second National Census of Population and Housing November 1966, Vol.1, Karaj Shahrestan, Table 2, p.3

of such migrants in Karaj could be the fact that as better hospital and medical facilities are available in Tehran, many mothers in Karaj prefer to give birth to their children in Tehran where they will be naturally registered. Furthermore, there is also some prestige attached to being born in Tehran, a Tehrani.

Figure 4.7 indicates that amongst the whole population of the city born outside Karaj, 46% were from the Central Ostan, of whom 29.7% were born in Tehran, 24.1% in Qazvin and 20.6% in Saveh. Of the remaining population (54%) born outside Karaj and the Central Ostan, with two major exceptions (i.e. Yazd 22.3% and Esfahan 11.5%), the remainder were mainly from the north westerly and westerly provinces of East Azarbaijan (14.6%) Hamedan (15.9%) and Zanjan (8.2%) respectively.

It is often hypothesised that people tend to move toward areas where they believe they can improve their life status and this is the reason why most studies deal with internal migration as a response to socio-economic motives. (11)

The dominant effect of socio-economic factors on migration decisions can be supported by a study carried out by the Ministry of Labour and Social Affairs, Department of Manpower, in 1964. (12) According to this study, about half of the total migrants (49.2%) stated that their main reason for migration was to find a better job. An additional 11.2% moved because of unemployment. Therefore, more than 60% of migrants thought of migration as a means to find a job or to improve their job status (see Table 4.12).

As a general rule the more a settlement is connected to other places through the system of road communications, the more accessible it is and, consequently, the greater will be its tendency to absorb migrants. As can be expected from the available data, Tehran for example, as the most important city of attraction and communication for the whole country, has gained almost half of its population through a continuous flow of in-migrants.

Fig. 4.7 PERCENTAGE POPULATION OF KARAJ BORN IN CENTRAL OSTAN AND OTHER OSTANS OF IRAN, 1966.

Source: Statistical centre of Iran.

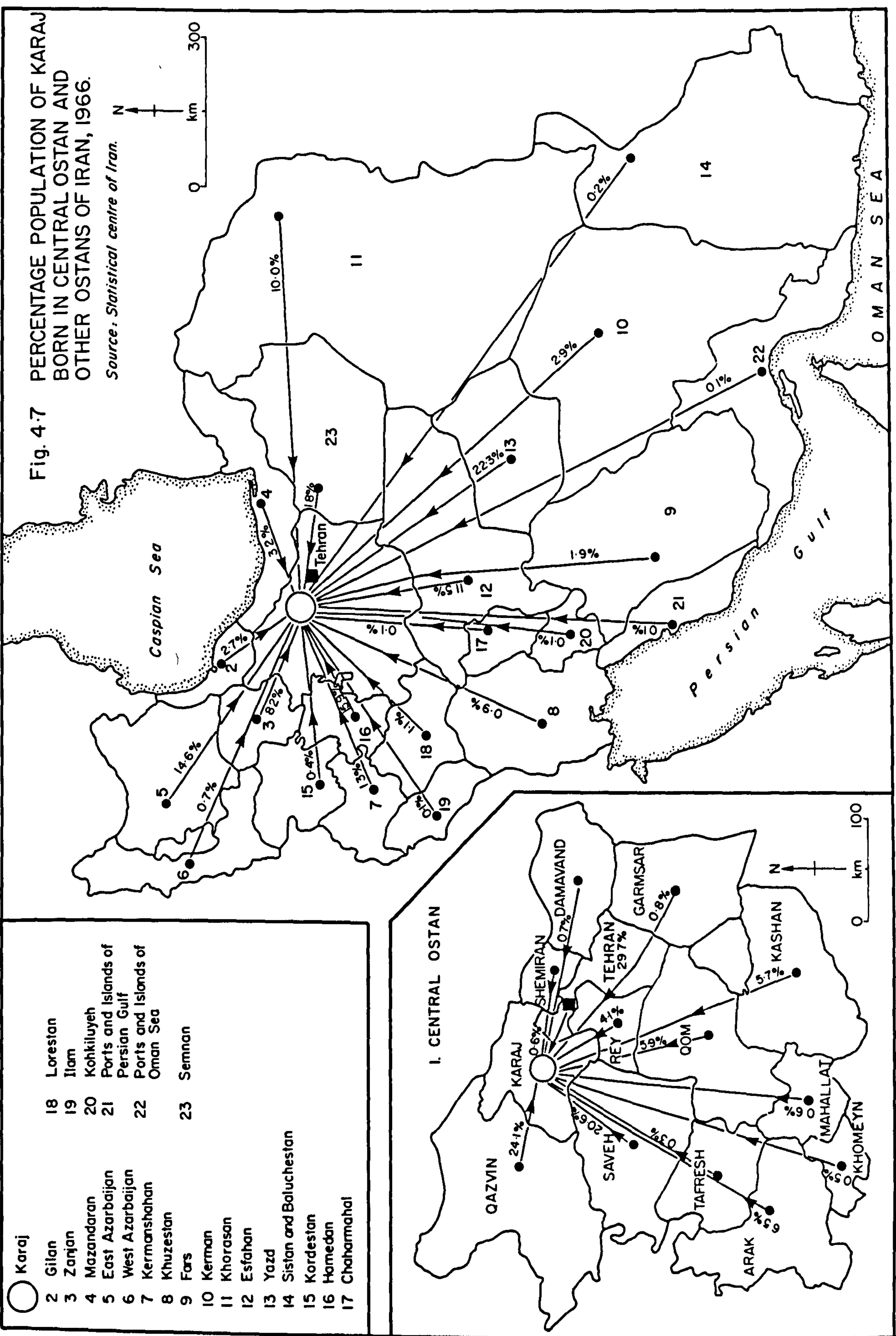


Table 4.12: Urban and Rural Migrants : Their Reasons for Migration, 1964

Reason for migration	% Total	Urban		Rural	
		% Male	% Female	% Male	% Female
Seeking a better job	49.2	25.2	16.1	33.4	25.3
Seeking work	11.2	41.6	36.2	11.0	11.2
Transfer	7.7	16.3	27.7	30.6	25.4
Marriage	10.9	0.1	34.5	0.2	62.9
Joining the family members	8.8	49.2	47.3	0.2	0.2
Education	1.3	63.8	35.9	0.2	0.1
Other reasons	10.9	-	-	-	-

Source: Ministry of Labour and Social Affairs, Manpower Sample Survey, 1964.

The geographical location of Karaj, on one of the busiest routes of Iran linking the Northern, North western and Western parts of the country to Tehran, and the nearness of this city to the capital, are two important factors which should be given due consideration in any migration study of Karaj. Indeed most of the migrants currently living in Karaj are those who have had Tehran as their original destination, but because of the higher cost of living and shortage of accommodation in the capital, have preferred to stay in Karaj, where the overall cost of living is relatively cheaper than Tehran, although Tehran itself is still not too far away.

Karaj city can, therefore, be regarded as one of the best examples in the whole country of a destination for step-wise migrants. It possesses a fairly low quality town-scape in which there are a large number of small premises, low status residences especially in the central area of the city, and a broader general landscape of unbuilt open spaces, orchards and cultivated lands which have similarities with the places or origin of most migrants

especially those from small towns and rural areas. The rapid and ever increasing population of Karaj is a direct result of this migration influx and, as we shall see, has brought about numerous urban problems such as housing shortages, the development of squatter dwellings and inadequate urban services and amenities.

It seems, if the present rate of migration continues, there will be even greater obstacles which will create difficulties for the authorities in administering the city, because even the existing facilities are far below reasonable standards. Therefore, action must be taken not only at the city level, but more importantly at national and regional levels to halt the migration flow to Karaj. A genuine administrative decentralisation would seem to offer one solution to the present situation of migration influx to the Metropolitan region of Tehran including Karaj and this will be discussed in the general conclusion to the present research.,

4.4 Growth and change of population

The First National population census of Iran recorded a population of 14526 persons for Karaj in November 1956. Prior to this date there is no data to indicate the population of Karaj. However, personal interviews and observation and maps and aerial photographs showing the distribution of housing units indicate a population of no more than 2000 up to the reign of Reza Shah in 1925. Development activities taking place during the period 1925-41 (Reza Shah period), would have been able to absorb some population either in the form of highly skilled professionals and advisers or unskilled workers from the contiguous rural areas, although the overall effects must have been very small, particularly because in the same period there were also some Karaji families who moved to Tehran. Consequently, the population of Karaj was not very much more than 5000 by the outbreak of the Second World War. It is, therefore, more accurate to assume that it was only after the war, especially from the early 1950's, that Karaj started to

increase its population not only through natural increase (as a result of the greater excess of fertility over mortality rates), but also by attracting in-migrants. This, as pointed out briefly in the previous chapter (Chapter 3), was firstly due to the establishment of quite a large number of factories inside and outside Karaj and a general influx of migrants towards Tehran, some of whom might have chosen Karaj for their permanent residence. However, what is quite certain is that a voluntary shift occurred of about 200 Yazdi workers with their families to work in the newly established Jahan Industrial Complex by 1955, who were followed later on by more Yazdi families. This had a significant effect on the population of Karaj at that time. Such a collective migration had its own socio-economic impact which will be discussed in more detail in both chapters on commerce and industry (Chapters 5 and 6).

The Second National Census, held in 1966, enumerated 44243 persons in Karaj, indicating an almost three-fold increase or 205 per cent growth during the 1956-66 intercensal period. Such an increase was partly due to natural increase as a result of improvements in health and economic welfare, although it mostly resulted from immigration of population.

During 1956-66, the annual growth of population has been 11.8 per cent of which 7.8 per cent was attributed to migration. In 1973 an intermediate sample survey carried out by the Statistical Centre of Iran, for all the urban centres of the country, estimated the population of Karaj city at 72,000.⁽¹³⁾ Such a figure in comparison with the 138,774 recorded in November 1976 by the Third National Census, has a two-fold meaning. Firstly, there is the possibility that the 1973 figure represents a substantial underestimation of population, which could be due to the nature of the study as a sample survey. Secondly is the fact that if the survey was correct, then it means that within only 3 years the population of Karaj has nearly doubled from 72,000 in 1973 to 138,774 in 1976.

Whatever the accuracy of the 1973 sample survey, the Third National Census shows a three-fold increase compared with the 1966 figure. Indeed, by the very large increase in population from 44,243 to 138,774, Karaj has had an annual growth rate of 12.1 per cent which has been the fastest rate of annual increase of any of the urban centres of Iran during the intercensal period of 1966-76.

In a study projecting the future population of the city, the Master Plan for Karaj⁽¹⁴⁾ applied three different fertility rates of 167, 150 and 135 per 1,000 for the three 5 year periods of the plan for 1976-81, 1982-86 and 1987-91 respectively. The death rates for the above mentioned periods were also calculated as 17, 18 and 19 per 1,000 for females and 18, 19 and 20 for males. It was also projected that life expectancy figures could increase from 60 to 62.5 and 65 years for women and from 58.8 to 61.2 and 63.6 years for males. According to these projections the natural increase for the city will be 28, 26 and 24 during the 15 years of the plan (1976-91). Furthermore, as is shown in Table 4.13, the Master Plan study has suggested a continuous decline in net immigration will occur, so much so that a 4 per cent of net immigration in 1981 will be reduced to 2.2 per cent in 1986 and 0.4 per cent in 1991 respectively. To support such a large reduction in the migration rate, assumptions on the creation of jobs in other urban areas and a general decline in out-migration from the rural areas on a national scale are given.

Table 4.13: Population Projection for Karaj city during the 1976-1991 period.

Period	Population Increase %	Net migration increase %	Total Population
1976-1981	6.8	4	137,000
1982-1986	4.8	2.2	181,000
1987-1991	2.8	0.4	207,300

Source: Master Plan for Karaj, Revised Edition, 1975.

However the overall picture derived from the projections for natural increase as well as net in-migration is reflected in the population projection figures shown in Table 4.13.

Analysis of the above figures as well as the author's familiarity with the area, enforce some major conclusions which are in sharp contrast to the projections made by the Master Plan for Karaj. Firstly, there is doubt as to the accuracy of the survey on which these forecasts are based. This is born out by the fact that whereas the population of Karaj was enumerated as 138,774 in 1976, the figure projected by the Master Plan for Karaj for 1986 was 137,000 which is still below the actual 1976 population.

Secondly, one must consider the nature of the rural population who form the majority of the present population of Karaj, and who are usually thought to favour large families. This desire for large families is likely to continue for at least another decade, particularly because the rural migrants are younger in comparison with the urban migrants. This could be a major factor in increasing the future growth rate of the city's population, a factor which has not been taken into account in the Master Plan projections.

Thirdly, there is a strong possibility of Karaj being absorbed officially as a part of Greater Tehran, a factor which far from leading to a decline in the volume of migration to Karaj, might very well encourage such a trend. Furthermore, as there are visible signs of a population movement from Tehran to Karaj, a trend which seems to be continuing, this factor must also not be ignored in any study of population projection for the city.

In the light of the above mentioned factors, it is not unlikely that the population of Karaj will increase by almost two-fold to reach about 250,000 by 1986. Any population projection for the period after 1986 will depend very much on the policies adopted for population control in Tehran, for which the success of different programmes of decentralization already began, will be decisive.

B. Housing Patterns

4.5 . Housing Types and Distribution

In the study of housing patterns we are usually concerned with a number of key determinants whose effects on the differences in, and distribution of, housing must be taken into account. These determinants are income, occupation, household size, family life cycle, life style and migration history.

Although there is no specific data, for example, to show income differences among the original Karajis or urban and rural migrants to Karaj, nevertheless from the point of view of residential location and the appearance of housing, as well as the size of families, it seems that urban migrants with a peripheral location, enjoy a much higher income compared to the original Karajis or rural migrants of Karaj who live in the central area of the city. As Robson⁽¹⁵⁾ points out "... location reflects social characteristics in that, within such constraints as its income, a household chooses housing and chooses an area so as to give spatial expression to its image of its own social standing."

Occupational differences are also quite apparent between the peripherally located urban migrants and the mostly rural migrants in the city centre. In fact the majority of the dwellers in the northern and western suburbs of Karaj are those who have permanent and mostly administrative or professional jobs either in Karaj or in Tehran, whereas the rural migrants in the central squatter area of Mahalleh-e-Zurabad or pre-slum dwellings of Old Karaj (Deh-e-Karaj) are mainly occupied in lower paid service jobs, retail activities or unskilled factory or construction work, often involving temporary or part-time employment.

Age, constructional materials and size of the building units can also be regarded as criteria to be used in classification of housing patterns. In the absence of an up to date data, the 1966 Census of Population and Housing provides information which can be used for a general differentiation

of the city's housing units by age and constructional materials.

As shown by Table 4.14, in 1966, most of the buildings in Karaj city were made of kiln dried brick and iron (49.1%), kiln dried brick and wood (27.6%), 31.1 per cent of the total buildings were less than five years old, 34.5 per cent 5-9 years and the remaining 34.4 per cent were 10 years old and above. These proportions indicate the degree of rapidity of urbanization taking place in Karaj city during the 1956-66 period with about two thirds of housing units (65.6%) being built after 1956.

Table 4.14: Age and Materials of Housing Units, Karaj City, 1966

Principal materials	Age of structure			All housing units	
	Less than 5 years	5-9 years	10 years and over	Total	%
Reinforced concrete	8	13	2	23	0.4
Stone and iron	16	15	10	41	0.7
Stone and wood	23	17	8	48	0.9
Kiln brick and iron	1136	1072	502	2710	49.1
Kiln brick and wood	359	543	624	1526	27.6
Sunbrick and wood	152	202	691	1045	18.9
Sunbrick and mud	24	40	64	128	2.3
Total	1718	1902	1901	5521	100
%	31.1	34.5	34.4	100	

Source: Second National Census of Population and Housing, November 1966, Vol.1, p.108.

Old Karaj, previously surrounded by a wall, consists of densely crowded "Mahalleh" with networks of twisting "cul-de-sacs" and alleyways. The majority of houses are built of sundried brick in the oldest part of the city still to survive.

With regard to side of dwellings, they vary considerably from the pre-slum houses of the older part of Karaj, and the squatter dwellings of Mahalleh-e-Zurabad of not more than 100 square metres in area to the large houses in the suburbs of Azimiyeh or Jahanshahr which usually exceed

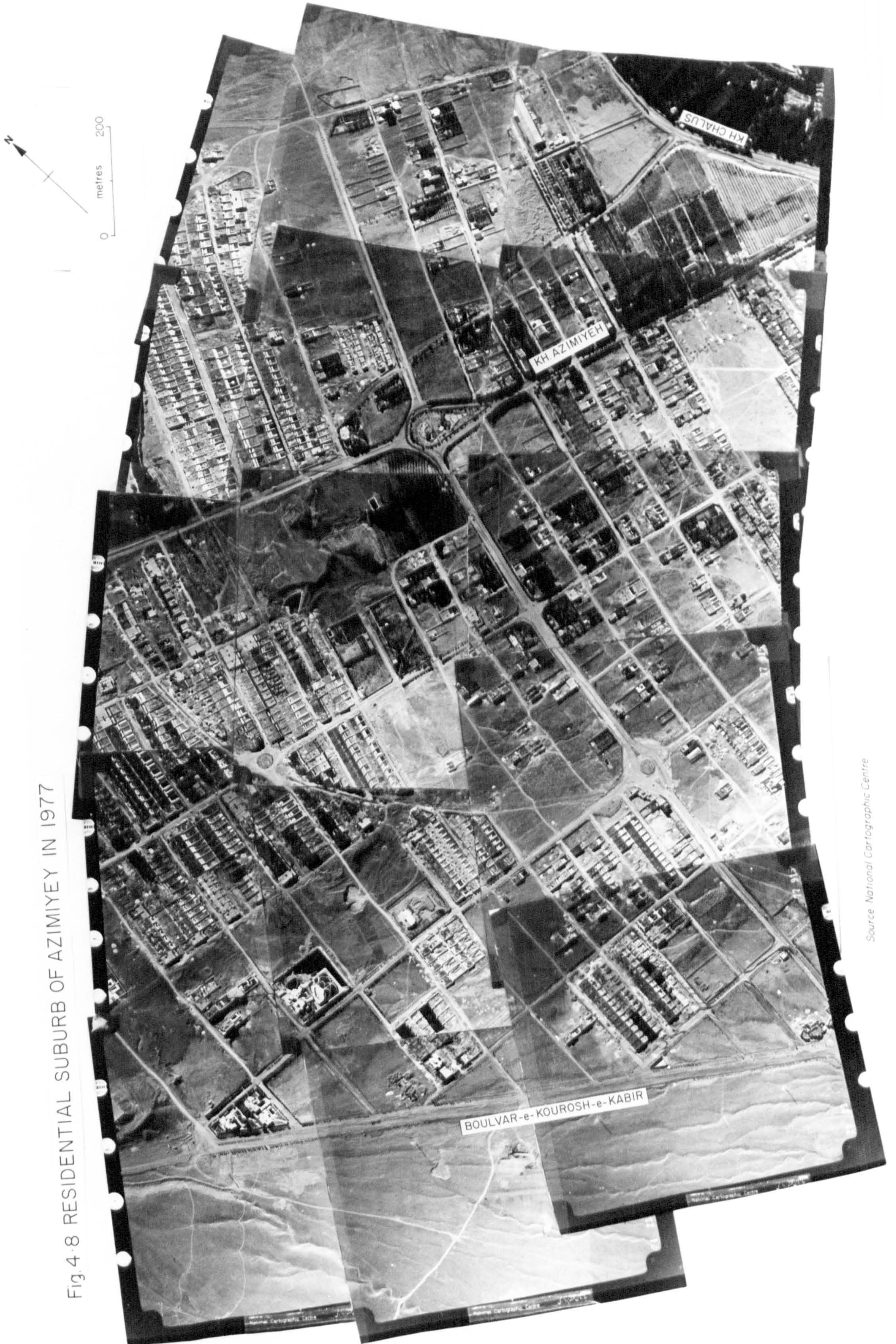
500 square metres in area. (See Figure 4.8, an aerial photograph of Azimiyeh suburb).

Whilst those housing units built by the state or large capital investors are quite uniform in their appearance and enjoy facilities provided by the responsible organizations, other residential quarters developed by individuals or small private investors vary considerably in type, details and constructional materials used and the extent to which they have access to urban amenities. Within the first category, the housing quarters within the Agricultural College built for academic staff, or Housing units of Mahalleh-e-Chaharsad Dastgah (400 Housing Units) built by the Jahan Industrial Complex are good examples; whereas in the second group, dwellings in Mahalleh-e-Khalajabad, Mahalleh Esfahaniha, Mahalleh-e-Torkabad can be mentioned. It is interesting to note that whilst in the first category the similarity of jobs of the residents is the main reason for a common characteristic; in the second case it is mostly the financial situation or the similarity of original home place.

4.6 Housing Utilities

The provision of sufficient utilities is a major prerequisite for any urban development. Their absence or inadequacy will naturally be a constraint on sound planning and development. Taking water as an example, its inadequate supply has been a major reason, as we shall see, for the postponement of building activities in recent years. This example, in fact, emphasises the validity of an old Persian saying, "Ab va abadani" (water and development). Because the provision of piped drinking water is most relevant and has an immediate effect on housing, it alone will be studied in this section and other aspects of housing utilities such as electricity or telephones will not be discussed in any detail, although they will be mentioned where appropriate.

Fig.4.8 RESIDENTIAL SUBURB OF AZIMIYEH IN 1977



Source: National Cartographic Centre

The provision of piped drinking water for Karaj was derived initially from a contract made between the Tehran Regional Water Organization and the Municipality of Karaj in 1963.* This was a consequence of the directions of the Third National Development Plan⁽¹⁶⁾ (1963-67) which took an interest in the creation and improvement of public utilities throughout all the urban areas of the country. However, it was not until 1966 that for the first time the city's system of piped drinking water was made available to a group of applicants in Karaj.

This project consisted, as shown by Figure 4.9, of two stages.⁽¹⁷⁾ The first stage had planned to provide necessary piped drinking water for a population of up to 25000 persons living within an urban area of about 5.5 square kilometres. The second stage which so far has not been completed, was to provide drinking water for 55000 persons - a projected maximum population figure for 1983 - living in an area of 20.1 square kilometres. (See Figure 4.9). Originally, the project was to provide 100 litres of purified piped water per person per day with a maximum consumption range of 150 litres during the summer time.

To understand the water situation during the recent past and the extent of water requirements, a demand-supply study was carried out in which the total annual amount of water required by the city's population was matched against the total water provided annually by the city's purification plant from 1967 to 1976. To estimate demand, an amount of 90 litres of drinking piped water per person per day given by the Tehran Water Organization as the current consumption figure for Karaj was taken and calculated for the population of that year. To calculate the total annual population, the 12.1 per cent rate of annual growth during 1966-76 has been

* According to this contract 80% of the total cost of the project was to be paid by Plan Organization and the remaining 20% to be paid by the Municipality of Karaj. However, in January 1965, based on an agreement, the total operation was transferred to The Tehran Regional Water Organization.

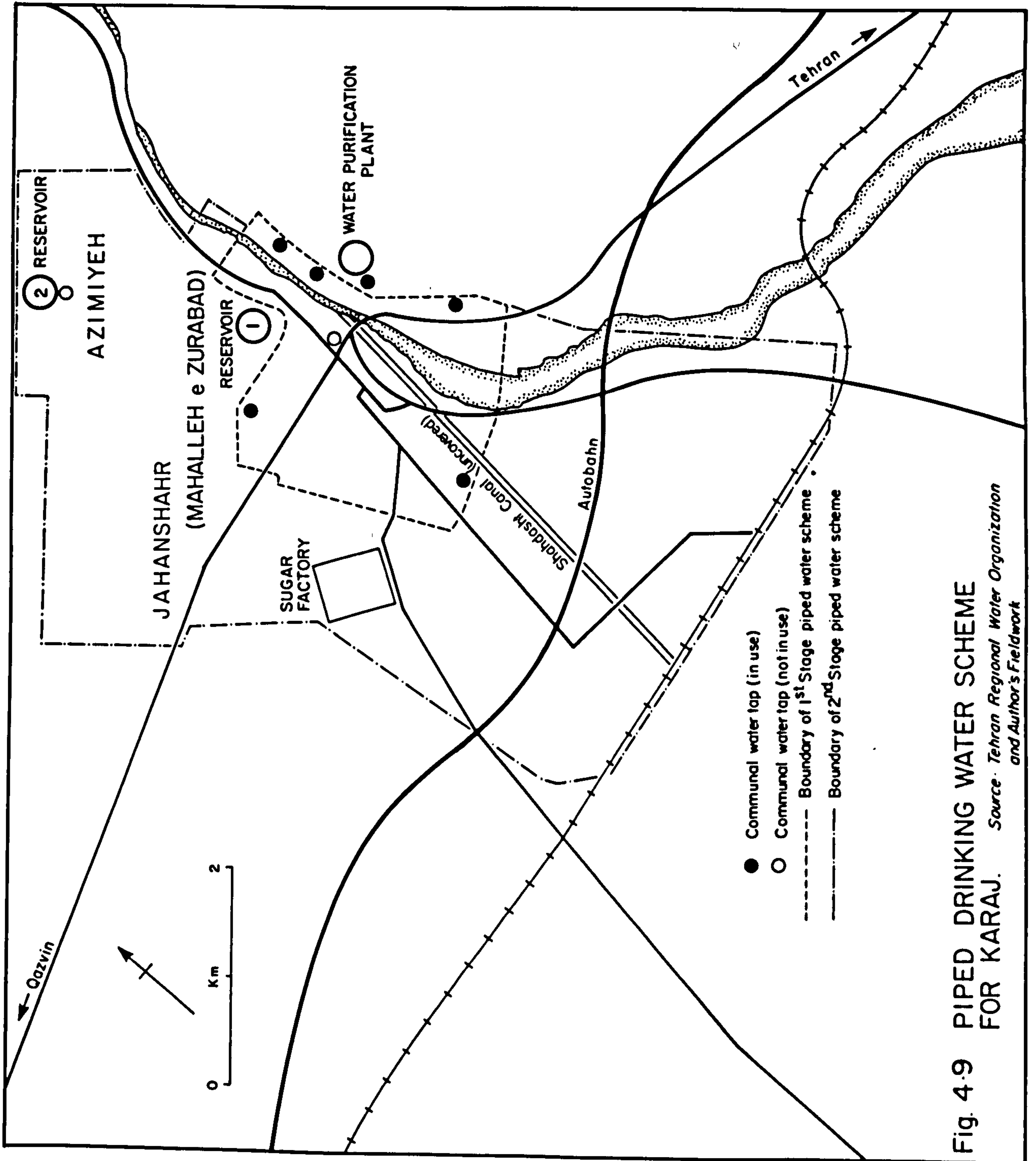


Fig. 4.9 PIPED DRINKING WATER SCHEME FOR KARAJ. Source: Tehran Regional Water Organization and Author's Fieldwork

used and extended throughout the whole 10 year period. In addition, two more consumption figures of 100 and 150 litres of water per day for the low season and high season as considered by the original project, have also been calculated and are indicated in Table 4.15.

As shown by the table, whilst between 1967-76 the demand for domestic water in Karaj increased rapidly, the total supply grew relatively slowly. Although during the period under discussion the total volume of piped water consumed increased by more than 225%, still more than 46 per cent of the population had no direct access to piped drinking water, taking into account a minimum consumption figure of 90 litres per person per day, which has been maintained by the drilling of 3 more artesian wells in 1976. However, this is a gross figure, because as is shown by Figure 4.9, there is only a limited area of the city which is covered by the First Stage of the piped water project, and although Azimiyeh and western suburbs of Jahan Shahr and Kuy-e-Karmandan to the west of the city are now linked with the city's piped drinking water system, most of the areas to the south of Deh-e-Karaj and the Sugar Factory (on either side of the autobahn) have no direct access to the city's piped water.

According to the Tehran Regional Water Organization in 1976 there were only 4,450 subscribers to the piped drinking water system in Karaj. Taking 1.7 household per housing unit as reported by the 1966 Census, there were apparently only 26.6% of Karaj households authorized to use the city's piped drinking water in 1976. It must therefore be assumed that the amount of water taken from communal water taps ($3,600 \text{ m}^3$ per month) and those households especially in Deh-e-Karaj who supply water through unauthorized personal agreements with neighbours, are all helping somehow the 54% of population mentioned above who have access to piped drinking water.

Those southern parts of Karaj bounded by Khiaban-e-Karkhank-Qand to the north and west, the Shahdasht Canal to the east and the Industrial Estate (Shahr-e-Sanati) to the south, have traditionally the right to make

Table 4.15: Relationship Between Demand and Supply of Piped Drinking Water for Karaj City
Based on Three Consumption Categories, 1967-76.

Year	Total annual population based on 12.1 per cent annual growth	Total annual required water based on 90 Litres per person per day. (M ³)	Total annual required water based on 100 Litres per person per day. (M ³)	Total annual required water based on 150 Litres per person per day (M ³)	Adjusted total (1) annual amount of purified water. (M ³)
1967	49,596	1,629,228	1,810,254	2,715,381	-
1968	55,597	1,826,351	2,029,290	3,043,935	764,334
1969	62,324	2,047,343	2,274,826	3,412,239	651,392
1970	69,865	2,295,065	2,550,072	3,825,108	789,237
1971	78,319	2,572,779	2,858,643	4,287,965	889,867
1972	87,796	2,884,098	3,204,554	4,806,831	1,016,574
1973	98,419	3,233,064	3,592,293	5,388,440	1,212,691
1974	110,328	3,624,274	4,026,972	6,040,458	1,378,395
1975	123,677	4,062,789	4,514,210	6,771,315	1,865,496
1976	138,774	4,546,998	5,065,251	7,578,330	2,485,619 (2)

(1) Figures in this column refer to the amount of purified water delivered to the city water reservoirs of which a total amount of 105,900 m³ used annually for washing the filters is deducted.

(2) The rapid increase in the 1976 figure is due to additional water from three artesian wells operated in this year.

Source: Tehran Regional Water Organization and Preliminary Results of 1976 Census of Population and Housing.

use of water in irrigational canals derived from the Karaj river. An annual sum of 300 Rials for every 1,000 square metres of garden and 200 Rials per housing unit is paid to an elected "Mirab" (Water distributor), who is responsible for the fair distribution and continuous monitoring of the proper use of water. Although not especially healthy or hygienic, in the absence of piped water, it is a cheap source of domestic water supply. Water provided in this way is kept in "Abanbar" (underground private reservoirs) and used after usually adding some cooking salt or lime stone.

To the south of Deh-e-Karaj and east of the Shahdasht Canal, with some exceptions, there is neither piped water nor water direct from the Karaj river and therefore water has either to be bought from mobile tankers or taken from the nearby factories or city slaughter house.

As explained earlier, shortages in the piped domestic water supply have become a growing problem in the contemporary urban development of Karaj and therefore deserve the particularly urgent attention from the city authorities. It is interesting to note that despite the city's location beside the Karaj river and only 25 kilometres away from Amir Kabir Dam, it still has to suffer seriously from a shortage of drinking piped water. It is therefore worth making some recommendations which could help to reduce the severity of the problem. The following are some suggestions for improvement.

(i) The installation of further communal water taps in the densely inhabited areas of the city, and especially the creation of new taps in the areas outside the present boundary of piped water supply.

(ii) New sources of water supply should be found. Construction of a dam on the Kordan river to the west of the Karaj region is one alternative, and the transferring of water from the Kharagan Dam, to be constructed on Shahrud river, to the east of Qazvin is another possibility for a new water supply source.

(iii) The repurification of water is also suggested, because it can be a much quicker method of water supply and in the present situation is more realistic. Water accumulated underground on the southern fringes of the city can be a reliable source of supply for this purpose. Therefore it is suggested that some deep wells should be sunk out near the southern section of the Tehran-Tabriz railway line. However, for economic reasons, the water discharged can only be purified physically and can be used only for domestic uses and the irrigation of gardens.

4.7 Residential Segregation and Social Mobility

The spatial separation of social groups in urban areas has attracted a great deal of attention in recent years from geographers and sociologists alike.⁽¹⁸⁾ Much of this research effort has been directed towards identifying the basic dimensions of differentiation in urban society, and understanding the patterns of areal differentiation which they produce.

The segregation concept is extremely complex, involving the spatial pattern and degree of clustering of groups, unevenness of distribution and homogeneity of sub-areas.⁽¹⁹⁾ Indeed, it is impossible to produce a single index to cover all these aspects. The larger the settlements it seems the more the possibility of diversity and differences in the pattern of life and residential segregation. However, it must be realized that in the case of Karaj it is not mainly the quantity, but the quality of population derived from its role as a step-migration city, that has resulted in the appearance of some segregated quarters. In the absence of phenomena such as minority groups, namely racial or religious minorities, the differences in residential segregation are determined mainly by economic differentiation and the origins of migrants from different parts of the country.

From the point of view of residential distribution there is a fairly clear division between the rural and urban migrants; the northern and western suburbs of Karaj have become predominantly occupied by urban migrants

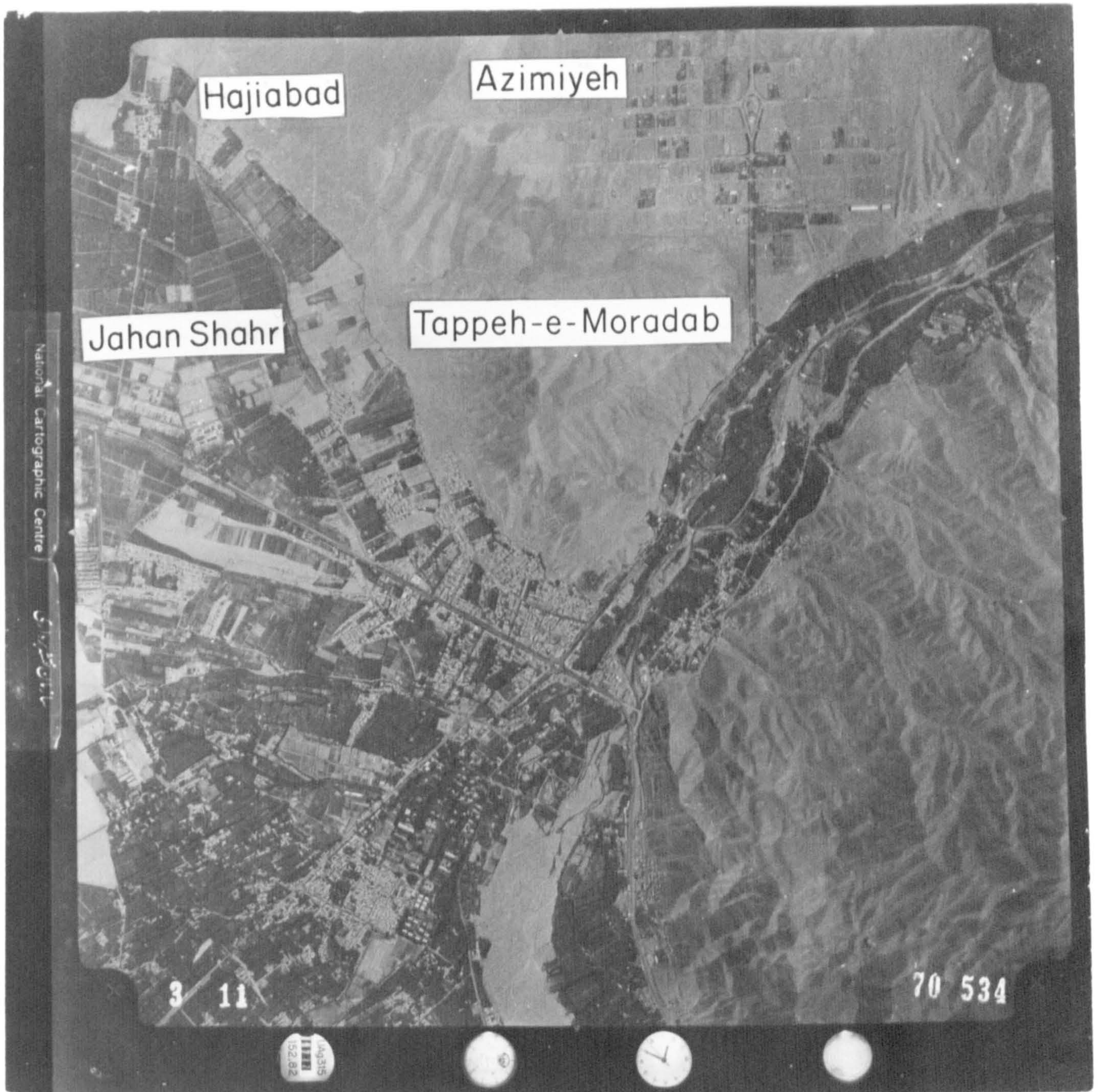
whereas the central area of Karaj and to some extent the southern peripheries are mostly occupied by the rural migrants. This pattern of migration settlement is becoming increasingly apparent and resulting in something of a dual life-style in the city. Because urbanization is both a rapid and recent phenomenon in Karaj, the life-styles of rural migrants and non-migrants are fairly similar. Therefore the greatest differences seem to be between the life-styles of rural migrants and urban migrants. This suggests that the urban migration pattern is one of the main dynamic forces for modernisation and socio-economic development in Karaj, especially in the western suburbs of the city.

4.8 Mahalleh-e-Zurabad : A Social Area

The rapid development of the squatter area of Mahalleh-e-Zurabad, close to the city centre of Karaj is a unique phenomenon which deserves to be studied as a social area case study. The size and the rapidity of the expansion of squatter dwellings in this area has been so considerable that it is currently one of the most important urban problems of Karaj and therefore of great concern to the city authorities. Not only has it created enormous potential pressures for the extension of urban amenities and services, but also its present degree of concentration is leading to the emergence of a poor and unhealthy environment in which many illegal activities may arise.

The rapid growth of dwellings in this area can easily be realized by comparing two different sets of aerial photographs taken in 1970 and 1977 (Figure 4.10A and B). Despite the introduction of restrictive controls by the Karaj authorities, well over 3,500 such low quality houses with one or two rooms, have been constructed since 1974. These squatter areas are therefore a good index of the ever-increasing population of Karaj, which deserves careful study.

Fig. 4·10 A TAPPEH-e-MORADAB IN 1970



Source: National Cartographic
Centre

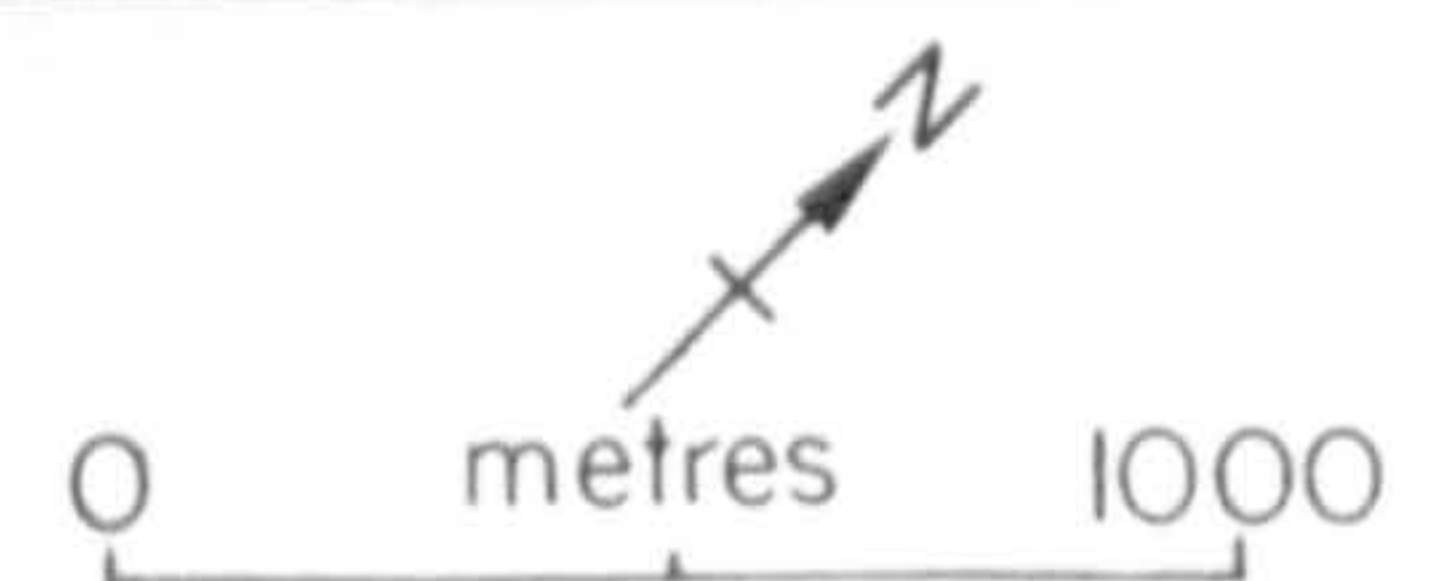


Fig. 4-10 B TAPPEH-e-MORADAB IN 1977



Annual Cartographic

In this section an attempt will be made to discuss the development pattern, the reasons for their emergence and the existing and projected condition of these squatter dwellings, followed by some criticisms and suggestion for improvement.

Before going into detail, there are several points worth mentioning on the general condition of squatting and shanty dwellings in the whole country which can be stated briefly as follows:

(a) Unlike many developing countries, Iran does not suffer to any major extent from the so-called problems of "bidonvilles" experienced, for example, by some South American, South East Asian and even some Middle Eastern cities; although so far no comprehensive study has ever been carried out of the slums and over-populated conditions of the inner areas of Iranian cities.

(b) Studies and investigations dealing with the existing squatters and shanty towns in Iran provide only preliminary data and information and on the whole do not deal with the subject in a systematic or comprehensive way. Such studies are not widely available and are often regarded as confidential.

(c) Because of the potential political and socio-economic problems of these particular social areas, any attempt to examine them is watched carefully and indirectly restricted by police or security authorities, even though evidence of a bona fide research permit is provided.

In these circumstances the findings of this part of the study must be regarded as a preliminary attempt on which hopefully much more comprehensive study may be built in the future.

In explaining the origin of the word "zurabad" (built by force), it was found that it has some common meaning with the equivalent Turkish word, "geçekondu" (built overnight).⁽²⁰⁾

Furthermore, to define the criteria by which these dwellings may be recognized use has been made of the criteria employed in a preliminary study of Tehran's squatters⁽²¹⁾ as follows:

- (a) Housing whose construction materials are either already used or natural (e.g. palm leaves).
- (b) Housing whose inhabitants are not the owners of the land on which they are settled.
- (c) Housing which is constructed by its tenants themselves or previously constructed by other squatters.

The same source has also mentioned that if the first criterion is fulfilled, the other criteria follow almost automatically. The only difference in this classification when used in Karaj is that the squatter dwellings in this city, although using low grade building materials, often use new rather than old materials.

The major reasons for the initial settlement of Mahalleh-e-Zurabad was the availability of a site at a central location where there was dispute over its ownership. Also the cheap price of land and its proximity to public transport and permanent and part-time work were among other important reasons. Such characteristics were found to be very similar to those determinants which have resulted in the appearance of similar conditions in other parts of the 'developing world', as in the case of Turkish cities.⁽²²⁾

Mahalleh-e-Zurabad almost coincides with the site of Tappeh-e-Moradab which is almost 500 metres to the north of Maidan-e-Pahlavi and covers a total area of about 1.25 million square metres. As shown by Figure 4.10B, it is bounded to the east by Khiaban-e-Chalus, to the north and north west by the residential suburb of Azimiyeh and to the south by Khiaban-e-Aryamehr which runs parallel with Khiaban-e-Farah.

During the 1950's the ownership of this site, which was partially used for a long time as a cultivated area, was subject to a long and serious

dispute between the inhabitants of two nearby villages of Bilaqan and Sarjub. Finally by about the early 1960's some Bilaqani succeeded with the help and political support of some influential Tehranis and Karajis, in acquiring the land and sub-divided it into 50 shares of 25,000 square metres, of which 36 shares were given to eight people who supported their claim, with the remaining 14 shares being divided amongst about 50 people from Bilaqan (for location of Bilaqan and Sarjub see Figure 3.7 in Chapter 3).

By about 1969 some of these Bilaqani small land holders found it very profitable to sub-divide and sell small plots of land of 40-60 square metres. Furthermore, because of the death of some large land holders and the subsequent dispute between their relatives and the remaining large land holders, who all used to live in Tehran, there was confusion as to the exact location of each holder's share, during which time some middle-men entered this confused land market. It was through their speculative activities that the price of land in this area soon increased by nearly ten-fold to reach about 500-600 Rials per square metre. A place to live in a very central location and at a low price - in comparison to neighbouring authorized areas for development which were at least eight to ten times more expensive - as well as the easy access to both job opportunities and public transport links to Tehran, were among the main reasons why this area very soon attracted many newcomers from both rural and township areas as well as some migrants rejected by Tehran. Whatever the origins of these pioneer residents were, the Tappeh-e-Moradab was virtually ignored by the city authorities until 1974, when the growth of the area began to mushroom. During this period, the ever-increasing volume of immigrants, mainly from rural areas raised the price of land by another five-fold, so much so that the applicants were prepared to pay up to about 2,500 Rials per square metre of land, a transaction which was not recognized legally.

Such a rapid increase in land prices gave a good reason for those large land holders, who were also very influential, to consider the potential economic importance of their land and consequently they started to put pressure on the Karaj Municipality. Although all of the present dwellers had paid for the land on which they built their houses and all of them hold a written document for these transactions to the major land owners, however, this amounted to squatting on land legally belonging to them.

As a result of these debates, a grant of 200 million Rials guaranteed by the government was to be paid to these original large land holders and it was also approved by the "Majlis" that a large plot of land in an area called Chenarak, 10 kilometres west of the present site, be allocated for the construction of housing units to which the present dwellers of Mahalleh-e-Zurabad might be transferred. So far there has been no sign of any development activity, up the late summer 1977 when the author visited the new area (for location of Chenarak see Figure 7.2 in Chapter 7).

Due to the ever-increasing number of immigrants, and the subsequent demand for housing, the development of squatter dwellings has continued until the present time, despite these housing activities not being legally recognised, and there have been various attempts by the Karaj authorities to halt the process by demolishing some of the dwellings here and there.

At the present time, as is shown by Figure 4.10B, most of the site of Tappeh-e-Moradab is built on and it accommodates about 30,000 people. The extent of these housing developments, as mentioned before, is indicated by the fact that almost 22 per cent of the urban population of Karaj has become concentrated here during the last 9 years. Indeed, by plotting the exact location of dwellings from the two existing aerial photographs taken between 1970 and 1977, it was possible to arrive at an estimate of the changes which had occurred in the number of these dwellings as well as in the ranges of gross and net residential densities. This was quantified

by using both graphic techniques and unpublished enumeration district data for 1976. For example, according to calculations based on the existing aerial photographs for 1977, it was found that the housing density in Mahalleh-e-Zurabad is about 100-120 dwellings per hectare, which is a fairly high density deriving from dwellings standing wall to wall. Similarly, it was found that during the 1974-77 period the number of these squatter houses increased from about 2,500 to about 6,000. Fieldwork confirmed a continuous trend in this pattern of development when the area was seen in September 1977, and this was checked against the aerial photograph dated May 1977 (Figure 4.10B).

Most of the building plots in Mahalleh-e-Zurabad vary between 40-60 square metres in area and dwellings usually comprise one or two rooms of different sizes of about 4 by 1.5 and 4 by 3.5 metres in dimension. Every house, especially those in the centre and northern parts, has a small "Hayat" (yard) or open private space which is about 10 to 15 square metres in size. This indicates the continuing interest of the migrants in having a separate private yard. Bricks, together with stone and sundried bricks are the major construction materials used for these houses (see Plates No. 1 and 2). The use of iron posts for the roofs and cement to cover the sides, especially in the case of new houses to the north of this "mahalleh" has resulted in the majority of buildings being quite sturdy in construction in comparison to the usual standard of similar squatter houses in other parts of the world. In the northern part, where the houses are of more recent origin, there is often a separate w.c. inside the house, but almost none of them has a separate kitchen. In this part, because it is some way from the city's communal water tap located on Khiaban-e-Farah, almost all of the houses have an "abanbar" (water reservoir) located under the yard with a capacity of 10-12 cubic metres, and this provides water used for drinking and domestic purposes. Water usually delivered by mobile tankers for a sum of 100 Rials per cubic metre



PLATE 1.

New housing units to the north of Mahalleh-e-Zurabad



PLATE 2.

A street looking to the south in Mahalleh-e-Zurabad

which is about 12 times the price of the city's piped drinking water. To keep this water in a relatively hygienic and drinkable state for a period of 30 to 60 days (depending on the size of household), a large amount of cooking salt or lime must be added. In the central and southern parts of this Mahalleh, the only communal water tap is located about 500 metres to the south on Khiaban-e-Farah which, together with the water from the irrigation canal of Nahr-e-Rostam, provide for the water requirements of these dwellings and large metal barrels are used to store the water for different purposes.

Since there is no sewerage system in the area, the used water running out from the houses creates a steady flow of dirty water downwards along the steep alleys and footpaths of the settlement.

In Mahalleh-e-Zurabad, the new comers start building almost immediately after the purchase of land, and they usually receive very substantial assistance from their own family and friends from their home villages or towns.

Congregation of migrants from specific regions of the country is quite apparent. For example, whereas the majority of residents in the north east of Mahalleh-e-Zurabad are from Gilan, the dwellers in the north west are predominantly Azari speakers, especially from Sarab in East Azarbaijan. Therefore, newly arrived migrants seek the assistance of relatives, friends or fellow villages already in the city and, by and large, this determines where they settle and, to a lesser extent, the occupation they enter; a process which preserves features of rural culture in the environment of Karaj city.

Personal observation in Mahalleh-e-Zurabad by the author revealed a high proportion of nuclear families, comprising parents and children, of an average size mostly ranging from 6 to 8 persons. Since the children under 18 years old form the dominant age group, dependency ratios were also found to be very high and consequently put great pressure on the

family income. However, it must be noted that not all of the residents of this Mahalleh are rural migrants, new to urban life and the money economy by any means. There are quite a number of Karaji and Tehrani families who have no place to live except this squatter area. On the other hand these dwellers are not necessarily poor, some of them use a dwelling here as their second home whilst they let their first house somewhere in Tehran. As is shown by plates No. 3 and 4, most houses have television aerials, indicating the financial ability of their occupants to acquire television sets. A good majority of household heads are also employed or self employed.

The present situation of residents of Mahalleh-e-Zurabad very much supports the results of Madavo⁽²³⁾ or other similar studies that the dreadful condition of many squatter settlements reflects more the insecurity of the occupants, their resulting unwillingness to invest in homes, and their inability to procure services, than actual universal poverty. Indeed, the fact that they are living under the constant threat of demolition is a general feeling which affects all the residents of this area. The extent of this feeling can be gauged in the way, for example, most of the "Kutchehs" and narrow streets of the area are named after the members of the Royal Family; this shows loyalty and patriotism, they believe, and is one way of protecting and maintaining their present status.

The most serious problems associated with these squatter settlements relates to the general lack of normal urban facilities and utilities. For example, neither water nor electricity is provided by the city authorities, therefore both of these necessities must be provided by the private sector at a much higher price, often as much as 3 to 12 times (for electricity and drinking water) the price of public provision.

Access to the settlements are almost wholly by un-made tracks, which because of their steepness are sometimes dangerous and slippery, especially during the winter time.



PLATE 3.

A typical street of Mahalleh-e-Zurabad



PLATE 4.

Housing congestion and poor accessibility are emphasized in this north-easterly view from Mahalleh-e-Zurabad

Having studied the reasons behind, and the background to, the development and the present situation of squatters in Mahalleh-e-Zurabad, it is now possible to assess the current and future trend prevailing in this major social area of Karaj city.

Since the emergence of these squatters is a very new phenomenon, no particular law or official bill, such as that approved for gecekondu settlements in Turkey,⁽²⁴⁾ has been issued with regard to the renovation or improvement of these dwellings. Indeed, only in the Master Plan for Karaj is it stated very briefly that these squatter dwellings should be demolished and the inhabitants transferred to some other place, so that the present site may be replaced by a park or regarded as a preserved area (see Figure 7.3 in Chapter 7). No mention is made of the time scale or the ways and means of such action. To the best of the author's knowledge no study has ever been carried out so far to find out for instance where exactly these dwellers have come from, why they have migrated from their original home place, why they have chosen to come to Karaj. Has Karaj been their final destination? Have the squatters bettered their situation economically? Are they employed full time or part time? Are they really satisfied with their migration to Karaj? Are there any conditions under which they would have preferred to stay in their original home? If these conditions were met, would they be ready to go back to their places of origin? These are only some of the questions which should be asked by the authorities through a detailed survey. Whilst programmes for the complete settlement of squatters have never been fully implemented in other developing countries,⁽²⁵⁾ the central question becomes obvious: how can officials of Karaj plan effectively if they have insufficient information on the movement pattern of these migrants? On the other hand, the squatter population in most cities, as Jackson⁽²⁶⁾ suggests, shows few signs of declining, despite the implementation of resettlement schemes.

For the following reasons, the present author believes that a large scale demolition and resettlement operation is not the right approach, economically, politically nor practically, to the problem of squatter settlements in Karaj.

(i) As mentioned before, the dwellings of Mahalleh-e-Zurabad are relatively new (no residence is more than 9 years old) and is built of fialry good and resistant constructional materials. Therefore, the majority of dwellings can still be used for quite a long period of time. Assuming a sum of 4,500 Rials per square metre of built-up area suggested in 1977 for a similar class and category (category 4 out of 8) of construction materials by the Karaj Department of Economy and Financial Affairs,⁽²⁷⁾ could be made available for the purpose of Renovation Tax, it is possible to estimate that through a demolition programme a large capital investment of not less than 300 million Rials involved would be destroyed and lost. The cost of demolition and levelling must also be added, and the side effects such as the social problems taken into account. As Turner⁽²⁸⁾ points out, "... It was by no means certain that the value of a dwelling could be measured by the quality of its structure without reference to its geographical location, its tenancy, and its investment value."

(ii) In response to the question on the hypothetical choice of housing location there were quite a large number of squatters who disliked the idea of cheap peripheral public housing. Instead they opted for a free housing market by saying that, "If the government gives us the money, then we know how to find a suitable house for ourselves." Indeed, one of the most important difficulties in public planning, as Eisemon⁽²⁹⁾ argues, is ensuring that the design of individual units reflects the preference of the population to be served.

(iii) Chenarak, the area considered by the Karaj authorities to take the proposed housing project, has two major disadvantages. Firstly, there is distance, as it is 10 kilometres from the present site which is in a very central location, and secondly, is its geographical location to the west of the city at the edge of the city's 25 year boundary, in the direction from which Karaj has always received its largest proportion of rural migrants. Both of these negative factors are likely to make for the development of another poor quality residential area as suggested by Turner⁽³⁰⁾ "... then they will naturally tend to produce many urban functions, such as the market which provides casual labour for the very poor.... these settlement areas will, therefore, attract the very poor - especially rural migrants with established settler residents."

(iv) As a model for large-scale low price public housing projects in Iran, Kuy-ye-Nohom-e-Aban, to the south of Tehran, with 3,800 cheap price housing units, has always been referred to and regarded as successful. However, it should be considered as a rather exceptional case, because firstly it was built in the mid 1960's when the cost of labour and construction material were at least 2 to 3 times lower than at present; secondly, after the site clearance of Behjatabad, one of the former shanty areas of Tehran, it was replaced immediately with a profitable housing project including some 17 high class apartment towers which sold very quickly; and thirdly, prestige has been an important factor apparently in the development of the total project, especially at this present site.⁽³¹⁾

It must be realized too, that even in the case of Kuy-ye-Nohom-e-Aban there are very few families remaining from the original occupants and many houses have changed hands 3 to 4 times.

Recent studies concerned with urban renewal in both developing and developed countries indicate a rising trend away from comprehensive redevelopment towards a process of comprehensive improvement. As

McKie (32) argues, comprehensive redevelopment has been widely criticized because it is slow and clearance are socially demoralizing and physically degrading; it breaks up communities, 'decanting' them from inner areas into peripheral prairie states ... it imposes costs by relocating them from easy reach of their city centre work place.

So far it has been argued that the proposals for Mahalleh-e-Zurabad drawn up by the Municipality of Karaj within the framework of the City's Master Plan are unsatisfactory. In the following section we will outline some alternative proposals based on a rejection of the City's Master Plan approach and consider some alternatives which are hopefully more appropriate, meeting the popular requirements of Karaj city. But before explaining these alternatives, it must be emphasised, as mentioned earlier, that no plan, either for the improvement or development and re-settlement of the residents of this area, can be carried out properly, unless a detailed and comprehensive study is undertaken by the authorities of Karaj. A better result can be expected if the suggested survey involves the co-operation of related researchers and experts. This preliminary effort seems to be very necessary and will undoubtedly help greatly any future decision taking and policy making. The suggestions for Mahalleh-e-Zurabad are as follows:

(i) Improvement of the existing area, rather than demolition and resettlement. Such an improvement programme can be executed through a self-help development plan by residents of the area and by the provision of a long term state loan of 15 to 20 years repayment period at an interest of 2 to 3 per cent. This seems feasible if payment of a loan covers up to 80 per cent of the actual price of the house after taking it as a guarantee for the return of loan. The major portion, for example up to 75 per cent, of the loan can be used for the completion and construction of necessary requirements such as an inside w.c. or one extra

room or perhaps the provision of a kitchen. By the creation of facilities, similar to those enjoyed in other parts of the city, the municipality can expect to raise a sum of money annually through the urban renovation tax.* It is suggested that up to 20 per cent of the loan, to be deducted at the beginning, together with a government subsidy, would provide sufficient funds for a simple but essential project for the provision of urban facilities such as roads, water sewerage systems or tree planting. Part of the 20% amount taken from the residents' contributions can be accounted for by their exemption for a period from their annual tax for urban renovation.

The location of the city's main water reservoir (Reservoir No.1, shown by Figure 4.9) to the east of Mahalleh-e-Zurabad, may to some extent help to reduce the cost of the water piping project to supply water for drinking and domestic use. The existing network of electricity may also be helpful in extending the city's electricity system to this area. Provision for these two major amenities, especially piped drinking water, may help to improve the quality of life of the household in the area both from the point of view of their health and their living standard.

(ii) An investigation should be carried out to discover the exact location of work place of the household heads. By doing this, it is possible to provide accommodation close to their work place, a process which can be achieved through agreement between the government and the employers of this group of residents.

(iii) By finding out the actual reason for the migration of the present residents, appropriate action can be taken to halt further immigration. Furthermore, by creation of job opportunities and financial support, there could be some families, as was found during the field study, who were prepared

* This is a sum of tax introduced through the Law of Urban Renovation which was approved, for the first time, in 1969. According to this Law, every year a sum of money, equal to 0.5% of the current assessed value of a building (including site value and building construction) is collected by the municipalities to be used for the provision of different urban services and infrastructures.

to go back to their original home places, if provided with a permanent job.

(iv) If, after a very detailed and careful investigation, the resettlement of the dwellers of Mahalleh-e-Zurabad was found to be inevitable, it is suggested that in planning the new site, high priority should be given to providing a minimum level of services on a basis which can allow for improvement at a later time. The spatial characteristics of such infrastructure will be a major determinant in the modes of aggregation of housing clusters, to provide greatest flexibility for the distribution of nuclear and extended families. This should then enable families to change from one type of house to another during various phases of the family-cycle without sacrificing the benefits of a convenient location.

It must be remembered, however, that the existing squatter settlements of Mahalleh-e-Zurabad clearly illustrate the resourcefulness of their inhabitants and indicate the potential for improvement that could be released if realistic programmes were implemented. Failure to recognize this could have tragic consequences for Karaj city as a whole.

C. Population Increase and Housing Problems : a Demand and Supply Study

A serious housing problem is developing along with rapid urbanization in Iran. The estimated housing requirements (new houses and renovation of existing housing) vary considerably according to the evaluation criteria adopted. It is suggested, however, that just to meet the present situation Iran will have to built 200,000 houses a year.⁽³³⁾ Whilst in 1974 for example, 80,000 housing units were completed (i.e. 3 units per 1,000 inhabitants) which was equal to only 38% of the revised 5th Plan targets.⁽³⁴⁾

The housing shortage in Iran is rapidly worsening and the measures taken up to now have not produced any satisfactory results. However, the solution of this problem is a prerequisite for the success of any planning policies.

Turning to Karaj city, as has already been noted, rapid increase of population is the major reason for the city now having to face such grave problems of housing shortage.

In 1966, 36.7 per cent of the households in Karaj owned both the land and the building, 0.9 per cent owning the building only, and 45.3 per cent renting their living residences. The remaining households (17.1%) lived in endowed, 'rahni' (mortgaged), and rent-free houses. The fairly high proportion of rental housing (45.3%), may be taken as an indicator of the need to create more housing units, especially for low class and lower middle class people with the financial support of the government.

According to the 1966 census there were 9,113 private households living in 5,521 housing units, making an average of 1.7 households per housing unit. By 1976, the total number of households in Karaj increased to 28,484 - an absolute increase of 19,371 household units. In the absence of up to date data on the numbers of housing units - if the 1966 figure of 1.7 household per housing unit is applied - it seems that there ought to have been a need for the establishment of 11,412 new housing units. But as is shown by Table 4.15, during the 1967-76 period, there have been only 7,265 building permits issued by the Municipality of Karaj.

Due to problems such as water and electricity shortages, as well as the scarcity of construction materials, the issue of building permits has been strictly controlled and has slowed down relatively in 1976 for example, rather than increased (see Table 4.16).

In these circumstances it seems that one or both of two possible developments may have taken place. The first is an increase in the average size of household per housing unit, which would naturally produce over-crowded conditions, the second is the illegal development of a large number of small squatter units, as we have already seen.

It must be remembered, however, that because of both the general

Table 4.16: Relationship Between the Estimated Housing requirements and Number of Building Permits Issued by the Karaj Municipality During 1967-76

Year	Total annual housing units required based on 1.7 household per housing unit	Total annual number of building permits	Total annual differences
1967	656	218	-438
1968	735	261	-474
1969	824	313	-511
1970	924	329	-595
1971	1036	543	-493
1972	1161	922	-239
1973	1275	1134	-141
1974	1430	794	-636
1975	1602	1446	-156
1976	1769	1305	-464
Total	11,412	7,265	-4,147

Source: 1. Preliminary results of the Third National Population Census of Iran, November 1976.
2. Municipality of Karaj.

rise in living standards and the possibility of the further reduction of extended families which naturally increase the pattern of nuclear families, the average size of 1.7 households per housing unit in 1966, could have been moderated and reduced for 1976; a factor which further emphasises the need for the provision of more housing units.

Moreover, as Robson⁽³⁵⁾ indicates, the demand for housing and for the whole array of urban amenities in a town can no longer be calculated in terms of the households who live or work within its administrative bounds, and this has obvious consequences for plans for the provision of urban facilities, for the financial basis of such provisions, and for the costs and benefits of what is built and provided.

In the absence of any large scale urban renewal programme in the central area of Karaj, those housing units in Deh-e-Karaj and those located close to Maidan-e-Pahlavi are characterised by slums and semi-slum areas.

On the other hand, houses in the peripheral areas which are mainly the product of the 1970's housing activities have used much better constructional materials and enjoy far better facilities.

Whilst the disadvantages of houses in the central part of Karaj are numerous, the greater density of housing in the old part of Karaj means that the cost of demolition and rebuilding are higher than in the peripheral areas since more households have to be rehoused.

It is therefore suggested that whereas every attempt must be made to halt the population migration to Karaj, new housing quarters subsidised by the government must also be constructed in some peripheral locations not far from the city centre.

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CHAPTER 5

COMMERCE

The function and form of the commercial establishments of Karaj will be examined in this chapter so as to make clear their influence on the socio-economic life of the city. This will necessitate a detailed investigation of the following factors.

1. The distributional patterns of commercial premises and the numbers of persons employed.
2. The factors determining the supply of goods as well as the type and volume of products and modes of marketing.
3. The overall effects of these land-use phenomena on the urban environment of the city.
4. The effect of planning and policy making on the locational patterns of the existing and future development of these establishments.

The data

A field survey carried out by the author is the major data source for this chapter by which almost 700 commercial premises on the main road intersection and the old part of Karaj were visited and shopkeepers were interviewed. In analysing the overall results of the completed questionnaires, the use of a computer proved essential and where it had been possible statistical analysis has also been employed. Furthermore, relevant secondary data already existing have also been used where appropriate. Some of these complementary sources have been published and are listed as follows:

- (i) The Industrial Census Report, carried out by the Ministry of the Interior (1963);⁽¹⁾
- (ii) The results of Census of Workshops and Work forces completed by the Ministry of Labour and Social Affairs (1965);⁽²⁾

- (iii) A joint project by this latter Ministry and the Statistical Centre of Iran, called a Census of Shops, Workshops and Retailers in Karaj City (1975);⁽³⁾ and finally
- (iv) The population censuses of 1956, 1966 and 1976. In this chapter the joint-report of the Ministry of Labour and the Iranian Statistical Centre (1975) has been used extensively, whereas the other sources are used only for comparative purposes. Additional sources, such as the Master Plan for Karaj (1967)⁽⁴⁾ and the Iranian National Development Plans, have been drawn on to some extent.

In spite of the relatively large number of published reports, any attempt at making comparisons between them is made very difficult because of the different functions, aims and classification methods used in the various reports. For the purposes of this study, an attempt at comparability was made although some alteration and combination of figures proved to be necessary.

5.1 Patterns of Commercial Establishments

Because of their economic importance and the wide range of activities they embrace, commercial functions deserve particular attention in studies of urban geography. As a general rule, in the urban areas, there is a close inter-relationship between land values and the function to which the land is devoted. Consequently there is site competition which results in a hierarchy of rent paying ability, by which specialized land uses having the greatest need for a central location or one near to the central area will incur the highest rents, with correspondingly high land values. Owing to the nature of their activities, commercial concerns can frequently afford the high land values and rents of the city centre, and therefore they tend to be located in the central parts of the city. The central area of Karaj in fact corresponds an intersection made by the East-West extension

of the Tehran-Pahlavi Khiabans and the North-South line of the Chalus-Daneshkadeh Khiabans with Maidan-e-Pahlavi in the centre. From a business and commercial point of view this is the most important part of the city, for it includes a major proportion of the wholesale and retail premises of Karaj. The field study indicated that more than 46 per cent of the retail shops and 60 per cent of the wholesale premises of Karaj are located in this relatively small part of the city. It is also a fairly compact area, and serves as the centre for finance, insurance, banks and government administration. Consequently it is also the area of greatest employment. Here is the highest density of pedestrian and motor car traffic, and the concentration of the main branches of the major banks and insurance offices marks it out as an area of considerable functional significance exerting a functional pull over the entire city.

An initial investigation of the commercial premises of Karaj led to the identification of a number of important features which are summarised as follows:

1. The absence of a compact Bazaar which has usually been regarded as the fundamental socio-economic institution of an Islamic City.
2. The lack of large scale commercial premises such as supermarkets etc.
3. The frequently occurrence of lower class shops and a relatively limited number of outlets for durable goods and personal services.
4. The low ratio of premises to the numbers of population served.

It would seem that the proximity of Tehran as the most important commercial centre of the whole country is very much responsible for these distinctive patterns. However, other reasons such as the high proportion of inhabitants in low income groups with lower purchasing power, and the lower security of capital investment by comparison with Tehran are also significant in influencing the characteristics of retail and wholesale activities in Karaj.

Having considered the reasons behind the form and function of commercial premises in Karaj, it is of interest to analyse the contrasts that exist between types of shops in different parts of the city. The major source of information for this analysis are the data collected during the field study and are shown in Figure 5.1. (These diagrams in fact are drawn based on the calculation of frequency distribution of 14 variables shown in Appendix No.1. The computer program by which this calculation is made can be found in Appendix No.2). The first two sets of diagrams setting out the age group and birth place of shopkeepers are of particular interest when we consider the social clustering of shopkeepers. Furthermore, by the application of correlation coefficients for the age group of the shopkeepers, a very high correlation of 0.997 was shown between those shopkeepers on the west side of the Khiaban-e-Chalus and the old part of Karaj. On the other hand the lowest correlation coefficient was shown between the west side of the Khiaban-e-Daneshkadeh and Maidan-e-Pahlavi (see Appendix 3.1). The second variable, which is the birthplace of shopkeepers, was found when computed to be significant at the 1% level - a correlation of 0.708 between the southern side of Khiaban-e-Tehran and Eastern side of Khiaban-e-Chalus. The lowest correlation level (0.489) was shown when the northern side of Khiaban-e-Pahlavi was compared with the old part of Karaj (see Appendix 3.2). The next two sets of diagrams, which show separately both general and specific types of commercial premises, are however those of most importance for this part of the study, because they demonstrate the functions and pattern of these premises in the central area of Karaj. A detailed presentation of the data for these diagrams is given in Appendix No.1. As shown by Figure 5.1.3, retailing is the most important form of activity compared with other commercial activities, followed (in order) by services; producer-retailery; wholesale-retailers; and wholesaling activities. The breakdown of these

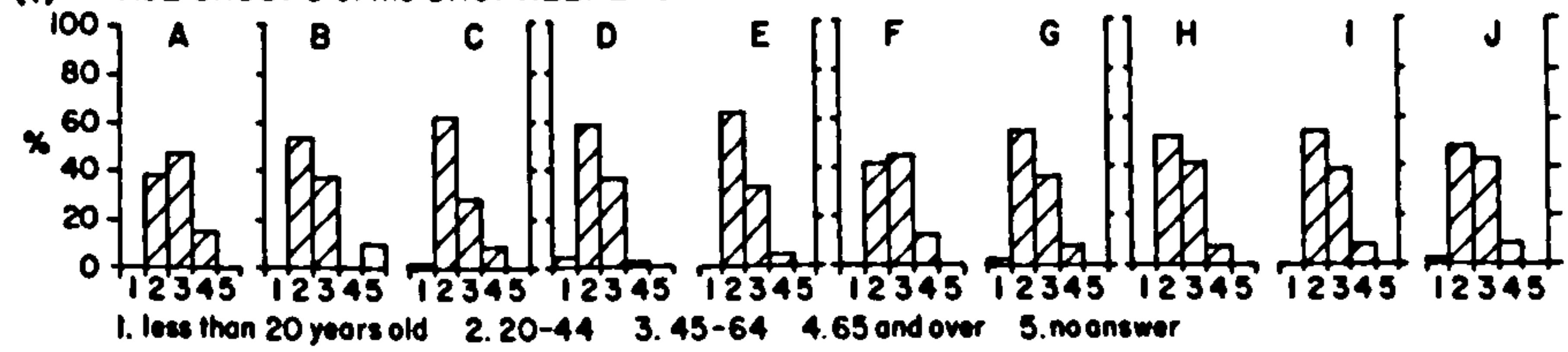
activities shown by Figure 5.1.4 indicates that general grocery and dairy concerns, cloth and clothing concerns, fruit-selling and traditional eating places are the major commercial activities in the central area of Karaj.

The agglomeration of shops offering similar services which is a common feature of large cities such as Tehran has no real counterpart in Karaj. However, a partial approach to this, in that there is a very close relationship between the type of activity carried on and its particular location, as indicated by the gathering together of similar shops close to each other. For instance, the shops selling agricultural seeds and fertilizers are located on the west side of Khiaban-e-Daneshkadeh, which is at the beginning of a route leading out towards the western and southern agricultural areas of the Karaj region. Again on the northern margin of the city centre along the Khiaban-e-Chalus there is a small grouping of car showrooms and automobile service centres typically making use of the ample floor space available in this area and possibly related to the existence of tourism and picnic spots in the northern parts of the Karaj region. If the close clustering of shops of similar activities has not yet developed extensively, it seems, on the other hand, that the social grouping of shopkeepers from similar home town environments is a fairly common feature in Karaj. This was very evident when the field survey was carried out. For example, Tabrizi traders made up the majority of retailers on the southern side of Khiaban-e-Pahlavi, while the shopkeepers on the opposite side were often from Yazd and on Khiaban-e-Chalus, shops were mainly occupied by Karaji Traders (see Figure 5.1.2). Once again the geographical location of Karaj on a major national route leading to Tehran as well as its nearness to this capital city are among the possible reasons for the development of this trend.

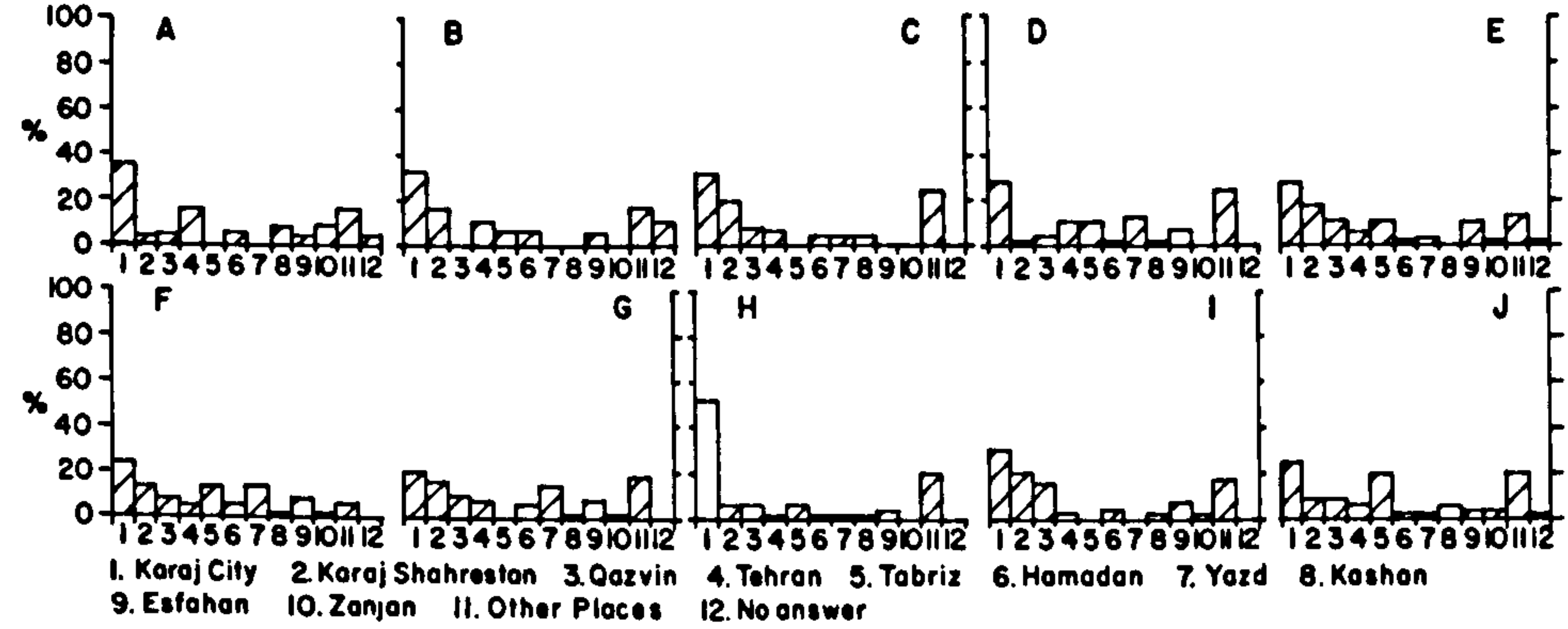
In the following sections major categories of commercial activity, namely, wholesaling, retailing and services will be studied in detail.

Fig.51 GENERAL CHARACTERISTICS OF THE COMMERCIAL PREMISES ON MAIDAN-E-PAHLAVI AND FOUR MAJOR SURROUNDING KHIABANS COMPARED WITH THE OLD PART OF KARAJ

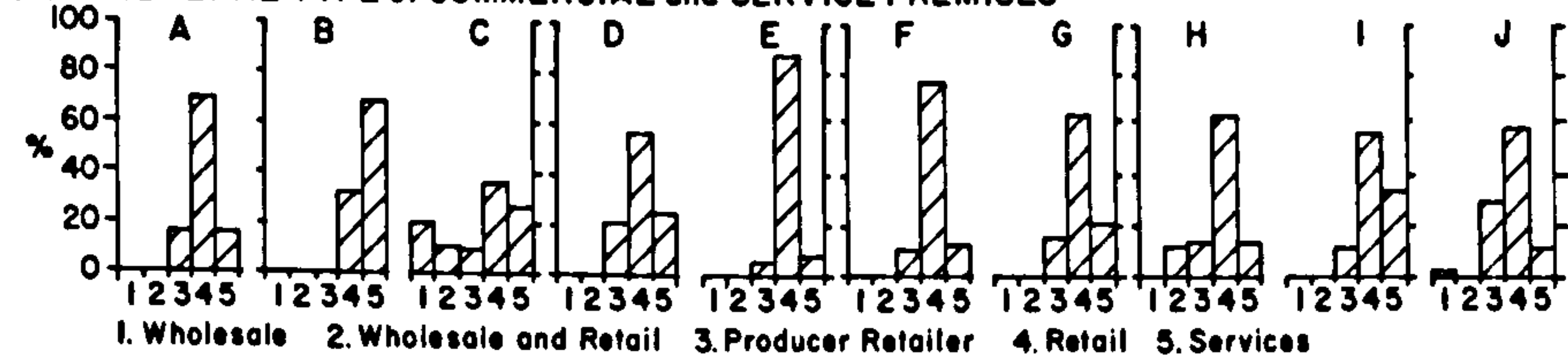
(1) AGE GROUPS of the SHOPKEEPERS



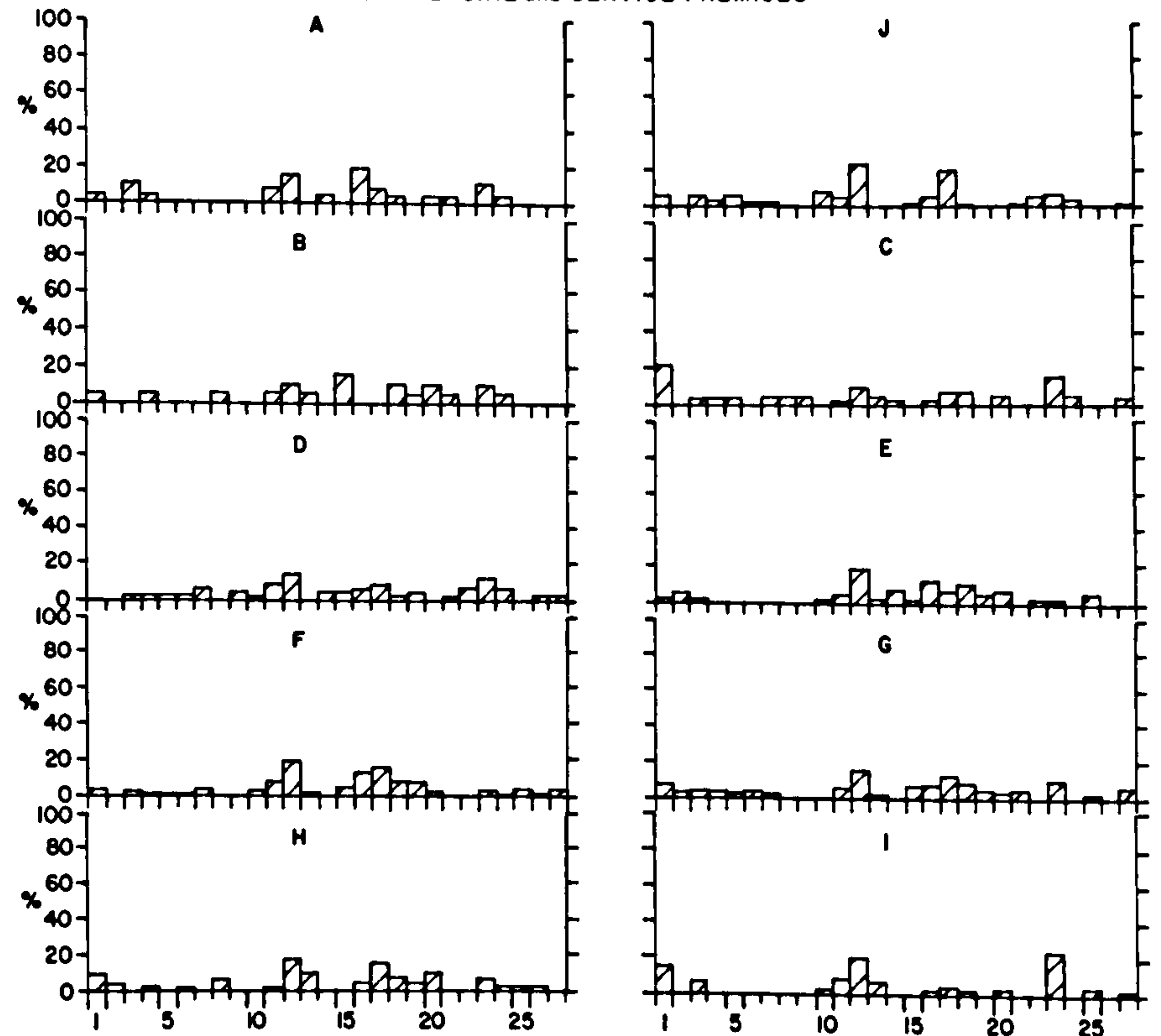
(2) BIRTHPLACE of the SHOPKEEPERS



(3) GENERAL TYPE of COMMERCIAL and SERVICE PREMISES



(4) THE ACTUAL TYPE of COMMERCIAL and SERVICE PREMISES

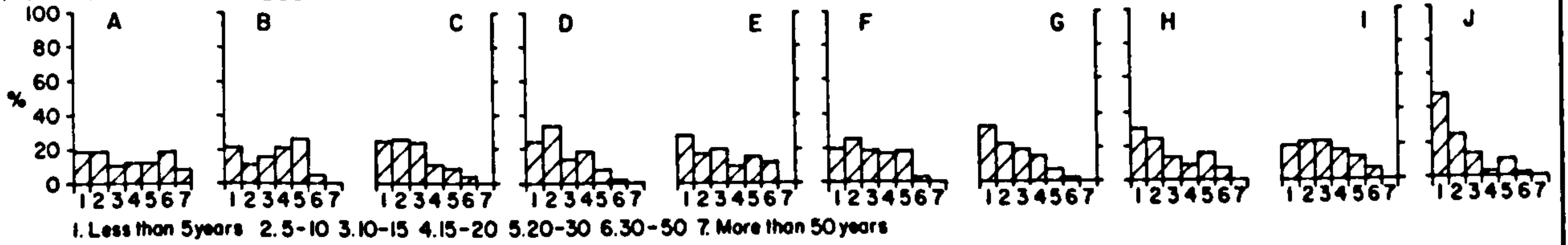


1. Fruits and Greens 2. Other Agricultural Products 3. Bakery 4. Confectioner 5. Tailoring 6. Jewelry and Watchmaker 7. Blacksmith and Tinsmith 8. Auto Repairer 9. Household Goods Repair 10. Miscellaneous Repairs 11. Butcher, Chickens and Eggs 12. General Grocers and Dairy 13. Other Foodstuffs 14. Agricultural Tools and Fertilizers 15. Stationers, Bookshops and Newsagents 16. Cloth and Clothing 17. Household Goods and Electrical Goods 18. Construction Materials and Tools 19. Footwear 20. Car Showroom and Spare Parts 21. Chemist 22. Other Non-Food Retail 23. Inns, Restaurants and Traditional Eating Places 24. Photographic Studios 25. Barbers and Public Bath 26. Laundry 27. Estate Agents

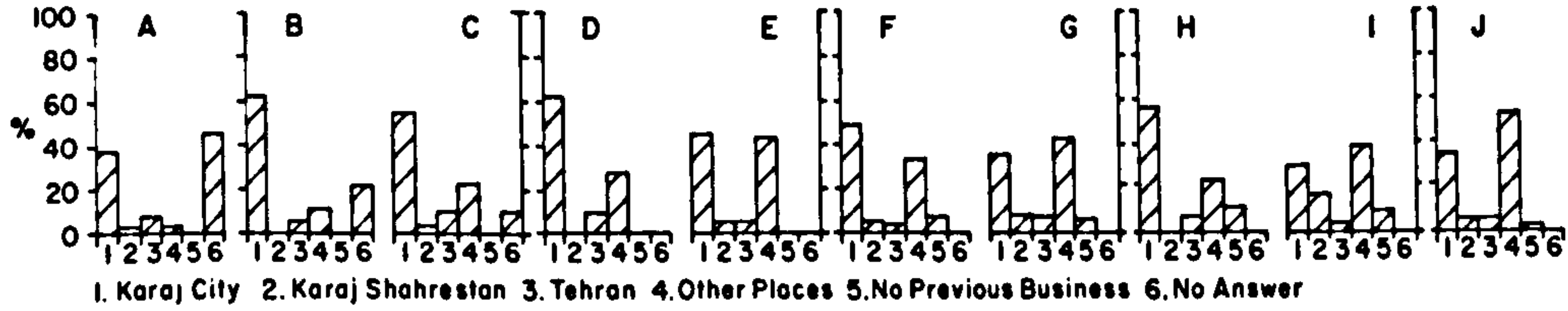
A Maidan-e-Pahlavi
 B Khiaban-e-Tehran (North Side)
 C Khiaban-e-Tehran (South Side)
 D Khiaban-e-Daneshkadeh (East Side)
 E Khiaban-e-Daneshkadeh (West Side)
 F Khiaban-e-Pahlavi (South Side)
 G Khiaban-e-Pahlavi (North Side)
 H Khiaban-e-Chalus (West Side)
 I Khiaban-e-Chalus (East Side)
 J Deh-e-Karaj (Old Karaj)

Fig.51 (CONTINUED)

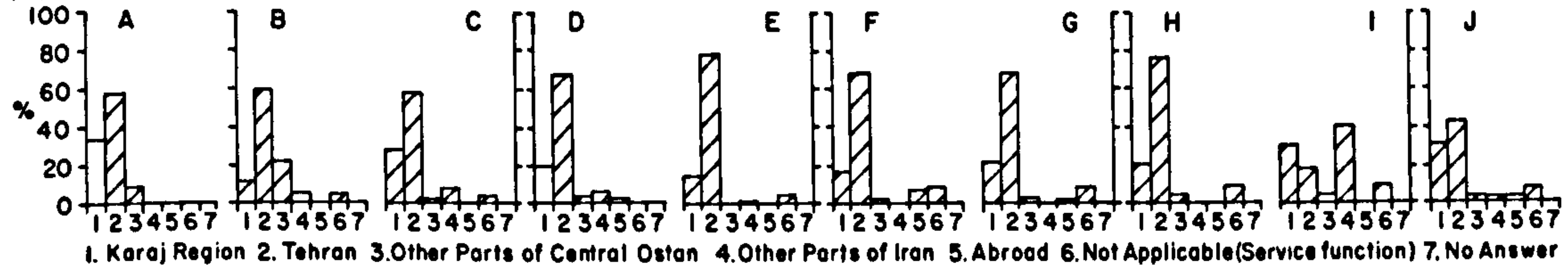
(5) YEARS of BUSINESS



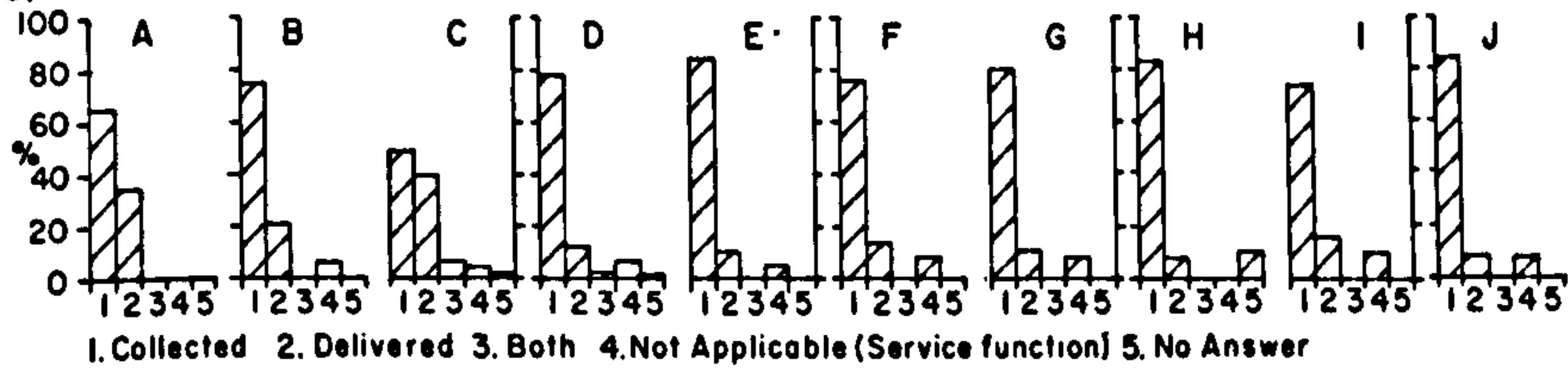
(6) PREVIOUS BUSINESS ADDRESS



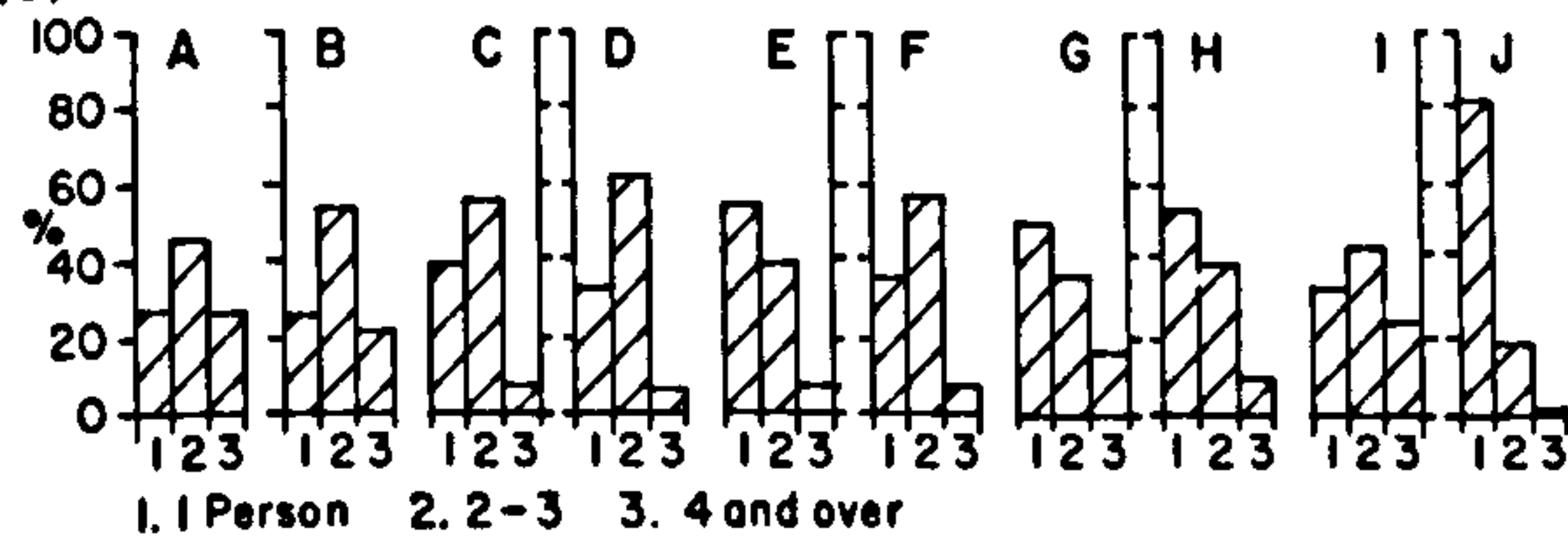
(7) SOURCE OF MAJOR GOODS



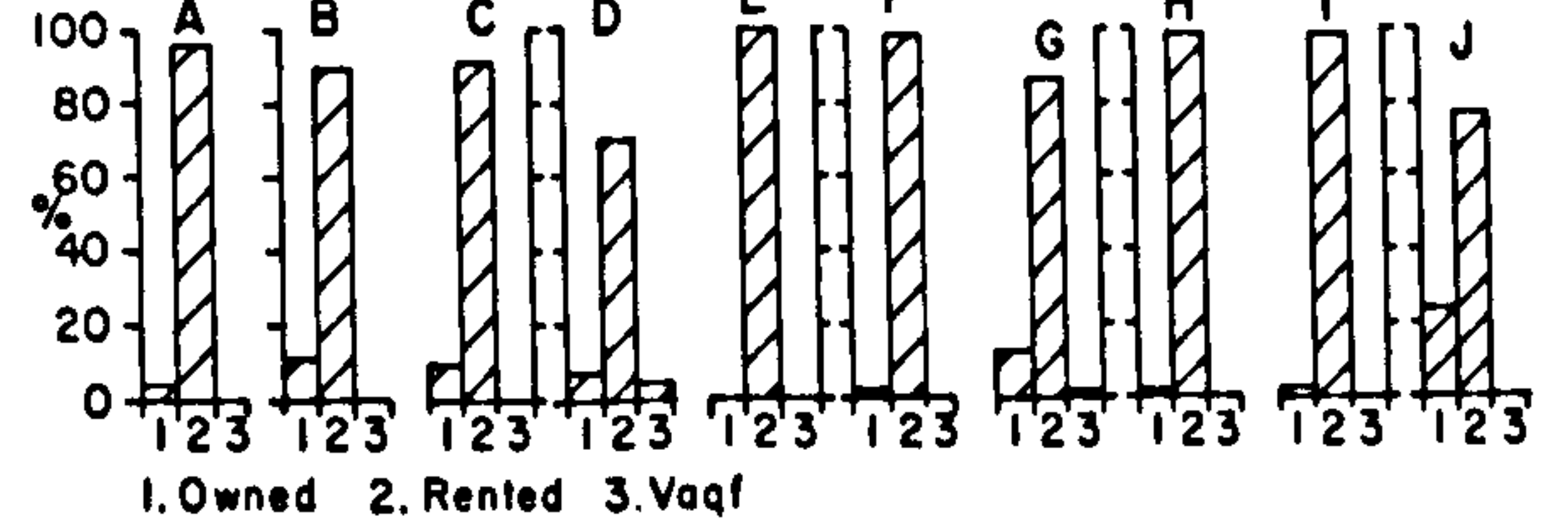
(8) OBTAINING of MAJOR GOODS



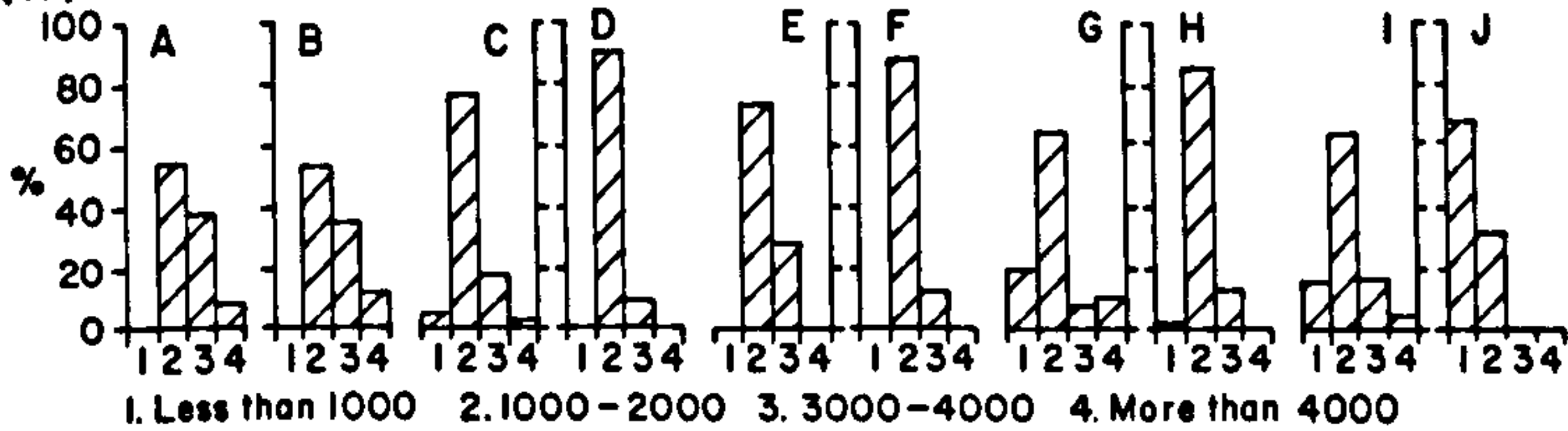
(9) NUMBER of PERSONS ENGAGED



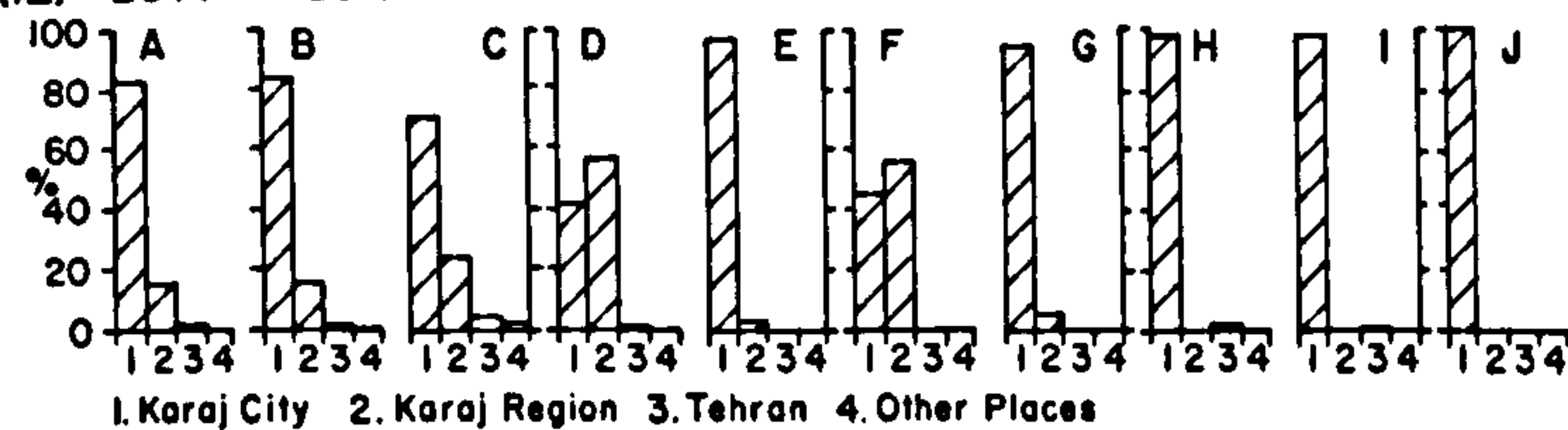
(10) STATUS of PREMISES



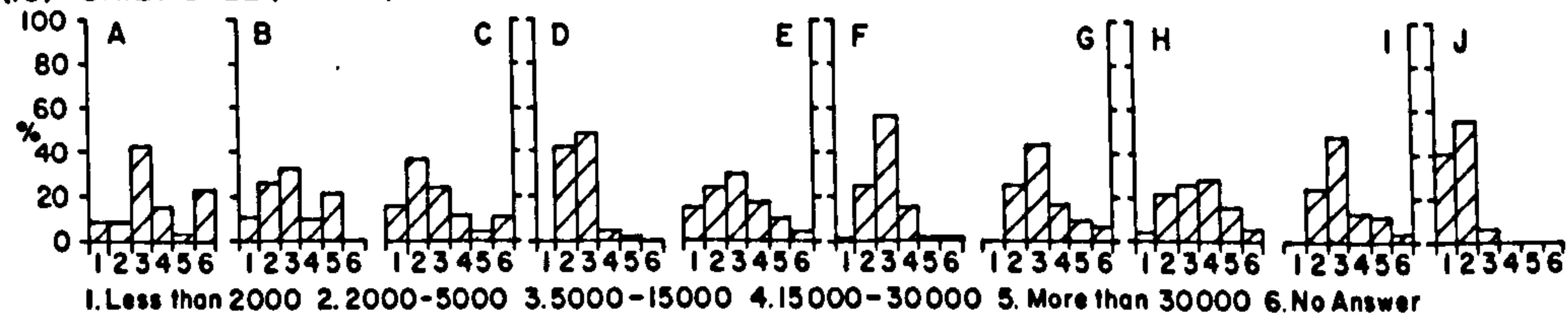
(11) MONTHLY RENT (in Rials)



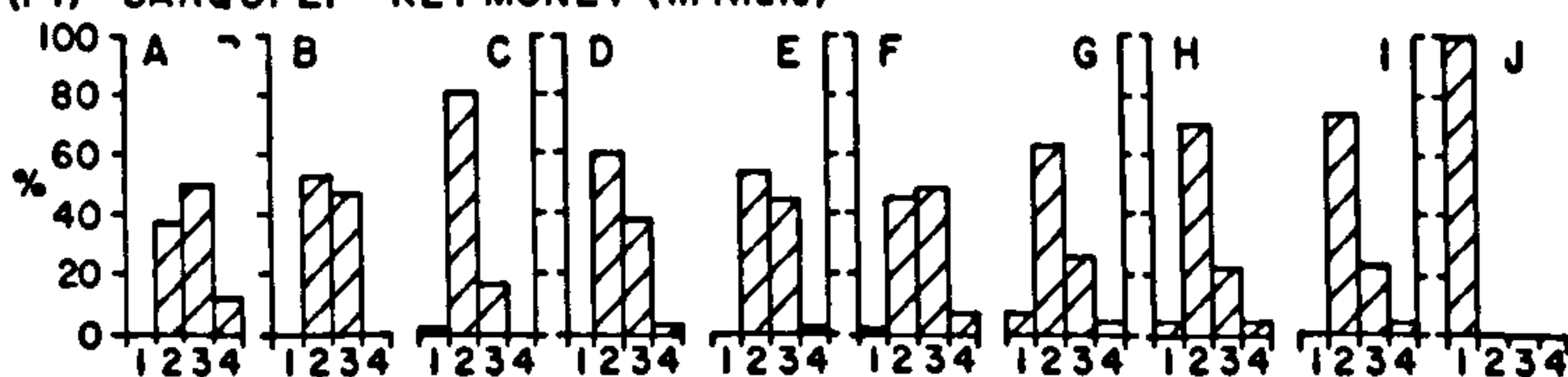
(12) ESTIMATED CATCHMENT AREAS



(13) DAILY SALE (in Rials)



(14) SARQOFLI - KEY MONEY (in Rials)



Source: Author's Fieldwork See Appendix Na1 For The Based Data

5.1.1 Wholesaling

The size and the number of wholesale premises may be regarded as an index of the economic importance of a city, because they are often functions closely dependent on the resources of a region surrounding a city. On the other hand their distributional patterns are often determined by the particular function that they perform. However, in spite of a basic functional relationship with retailing activity, because of the space-demanding nature, wholesaling activities usually tend to have a marginal location. Once again, the proximity of Tehran is responsible for wholesaling premises in Karaj being rather poor and limited in both quality and quantity. The supremacy of Tehran in this respect can be supported by the fact that according to the author's fieldwork, more than 62 per cent of the retailing premises in the central area of Karaj import their goods directly from the wholesalers in Tehran (see Figure 5.1.7).

According to Table 5.1, there were 61 wholesale premises in Karaj with an average 3 employed persons per unit. The field survey for the current study has indicated that about 42 per cent of such premises are located in the central area of Karaj. These wholesale premises, which are engaged with the handling of fruits and greengroceries, have gathered mainly in Sara-ye-Abdollah Khan, off the southern side of Khiaban-e-Tehran, nearby Maidan-e-Pahlavi, where they have formed a specialized area (see Figure 5.2). The existence of such a visible agglomeration in this particular location may also be related to the fact that these premises are associated with some of the retailing premises in Tehran. It must also be noted that the majority of these wholesalers are agents of the main wholesaler in Tehran. On the other hand, most of the gardens in the Karaj region now belong either to Tehranis or to those wealthy "Shahrestanis" who reside in Tehran. The financial capacity of the main wholesalers in Tehran means that they can afford the mass purchase of fruit from one or



PLATE 5.

Entrance gate of Sara-ye-Abdollahkhan



PLATE 6.

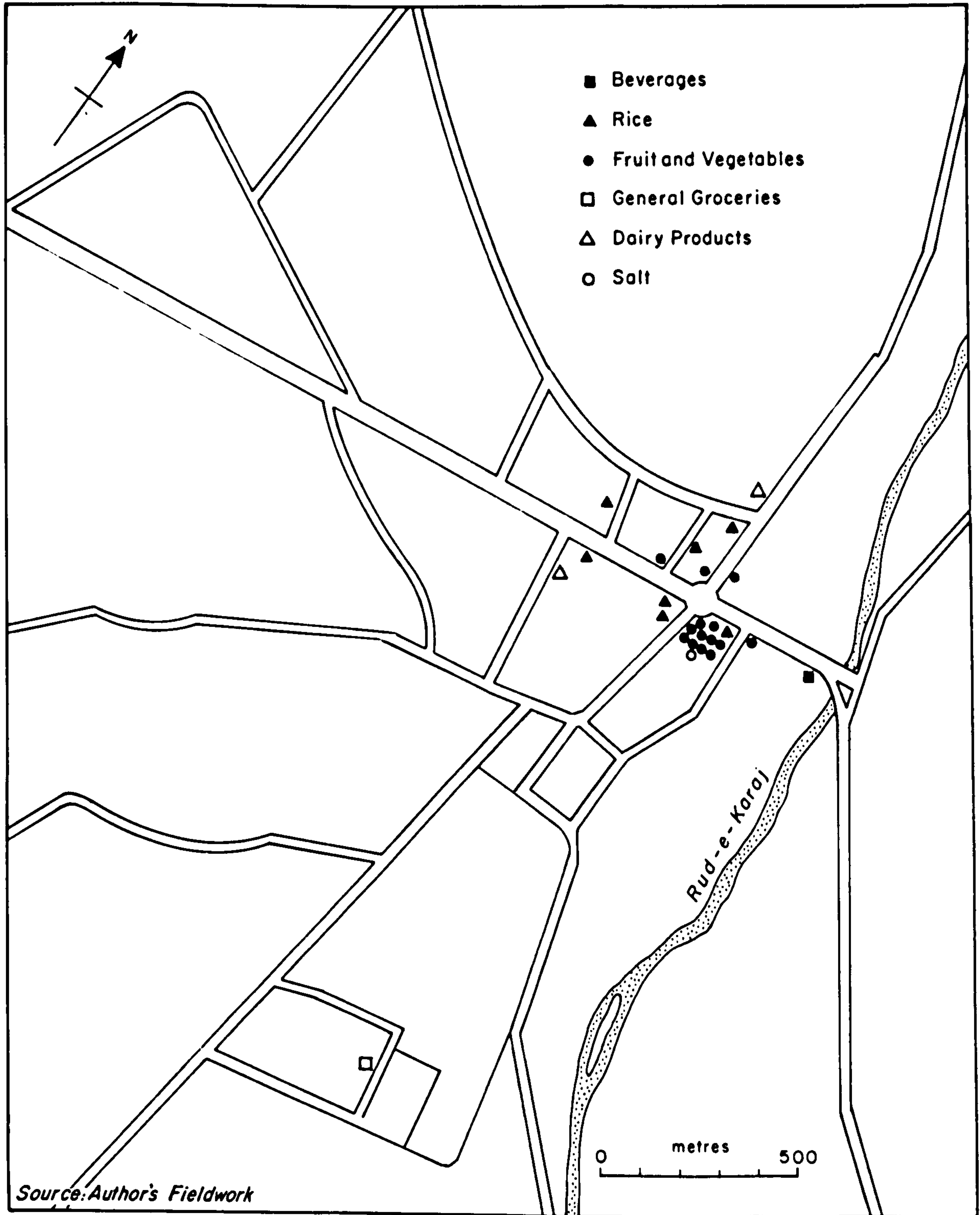
Inside of Sara-ye-Abdollahkhan

Table 5.1: Commercial activities by number of Establishments and Employees

	Type of Activities	1963 ¹			1965 ²			1974 ³		
		No.of Estab.	No.of Emps.	Mean	No.of Estab.	No.of Emps.	Mean	No.of Estab.	No.of Emps.	Mean
1	Wholesale	22	36	1.6	30	49	1.6	61	211	3.4
2	Producer Retailers	119	317	2.7	348	1092	3.1	109	425	4.9
3	Retail	428	709	1.6	526	731	1.4	1170	1746	1.5
4	Personal Services	147	376	2.5	163	407	2.5	380	871	2.3
5	Other Services	67	656	9.9	133	1125	8.4	238	2993	10.6

- Source: 1. Ministry of Interior, Op. Cit. 1963
2. Ministry of Labour and Social Affairs, Op.Cit., 1965
3. Plan Organization of Iran, Statistical Centre of Iran, and Ministry of Labour and Social Affairs, Op.Cit., 1975.

Fig. 5-2 WHOLESale ESTABLISHMENTS IN THE CENTRAL AREA OF KARAJ



several gardens throughout the entire season - something which is not often possible for a Karaji wholesaler with limited capital. Moreover, the "Pish-forush" arrangement with the gardeners is another reason underlying the tight control over the fruit marketing in the Karaj region. The overall result of this process is that the ultimate consumers in Karaj have to buy the fruits produced in Karaj at a price sometimes 20 - 30 per cent higher than in Tehran itself. The rapid increase in the number of wholesaling premises, shown by Table 5.1, may well be related to the ever increasing population of the city.

5.1.2 Retailing

A retail establishment has been defined as a commercial unit in which the chain of production and distribution comes to end and the process of consumption begins.⁽⁵⁾ Indeed it is the place where goods are usually purchased by the ultimate consumer. In 1974, there were 1,170 retailing units in Karaj. This figure shows an almost twofold increase upon the 1965 statistics and a threefold increase upon that for 1963. If the adjusted population of the city in 1974, i.e. 110,328 is divided by this figure, then the minimum average population served by each retailing unit is 94 persons. The increase in the number of retailing premises may be attributed to factors such as the rapid growth of population and the high proportion of low income groups in the city. An outstanding factor in the pattern of retail distribution in Karaj is the dominance of shops selling foodstuffs and traditional eating places. One common feature of the commercial centres of the Iranian cities is the presence of a large number of pavement sellers. This is very much the case in Karaj, where hundreds of such retailers are scattered on the pavements of major Khiabans of the Central area of the city. Whilst this form of retailing is an important source of employment for immigrants



PLATE 7.

A pavement fruitseller in the vicinity of Maidan-e-Pahlavi

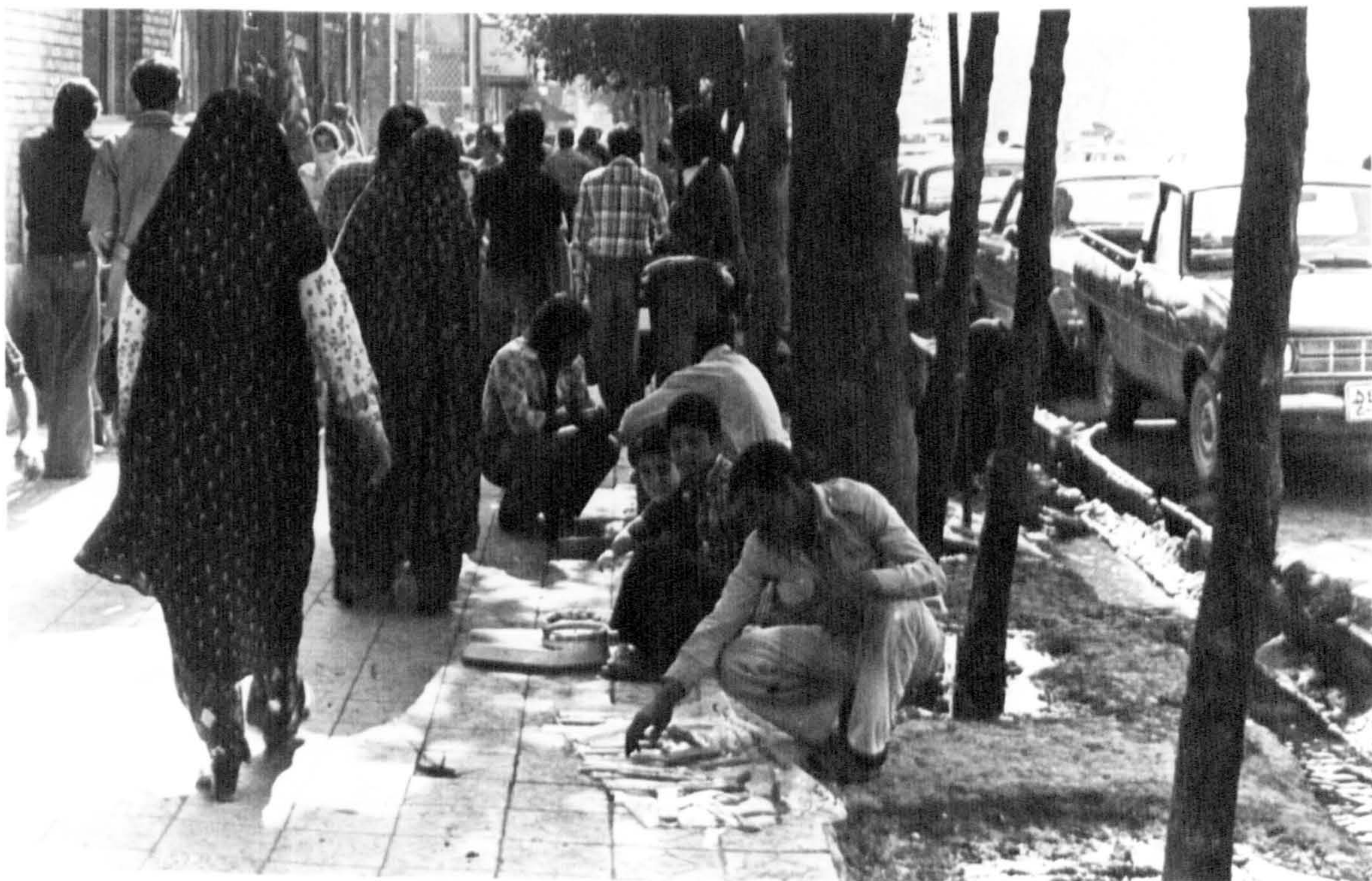


PLATE 8.

Pavement seller on the northern side of Khiaban-e-Pahlavi

to the city, it is also a serious obstacle to pedestrian flow, especially on either side of Khiaban-e-Pahlavi. (See Plates No. 7 and 8).

5.1.3 Commercial Services

In order to examine the role of Karaj in the provision of different services, the growth and spatial pattern of commercial and personal services such as banking, estate agents and medical services will be studied. As a general rule, the commercial services tend to have a central location, and Karaj is no exception in this respect. As shown by Figure 5.3, these services have developed predominantly along the major East-West thoroughfare of the city. Here they can enjoy the advantages inherent in proximity to the other commercial business activities. However, such a tendency is more applicable to the banks and insurance offices: in spite of the general westerly extension of the city, the insurance offices are increasingly occupying the first floor of the buildings in the city centre, and the new branches of banks are using the reconstructed corner sites of this central location. (See Plates No. 9 and 10).

As headquarters of these commercial services are in Tehran, their functional activities in Karaj are confined mainly to the payment of the salaries of administrative employees, of limited sums in loans, and of day to day monetary transactions. A similar state of affairs prevails in the insurance offices which deal mainly with car insurance and payment of car accident claims. Consequently, any demand for services of a higher order has to be referred to the main branches in Tehran.

The large number of estate agents is a very common feature of Karaj, which is an expression not only to the profitability of this service, but also of the growing sophistication of the economic and occupational structure of the city, starting with a very small amount of capital and poor facilities, it is something of a shortcut to gaining large sums of



PLATES 9 & 10.

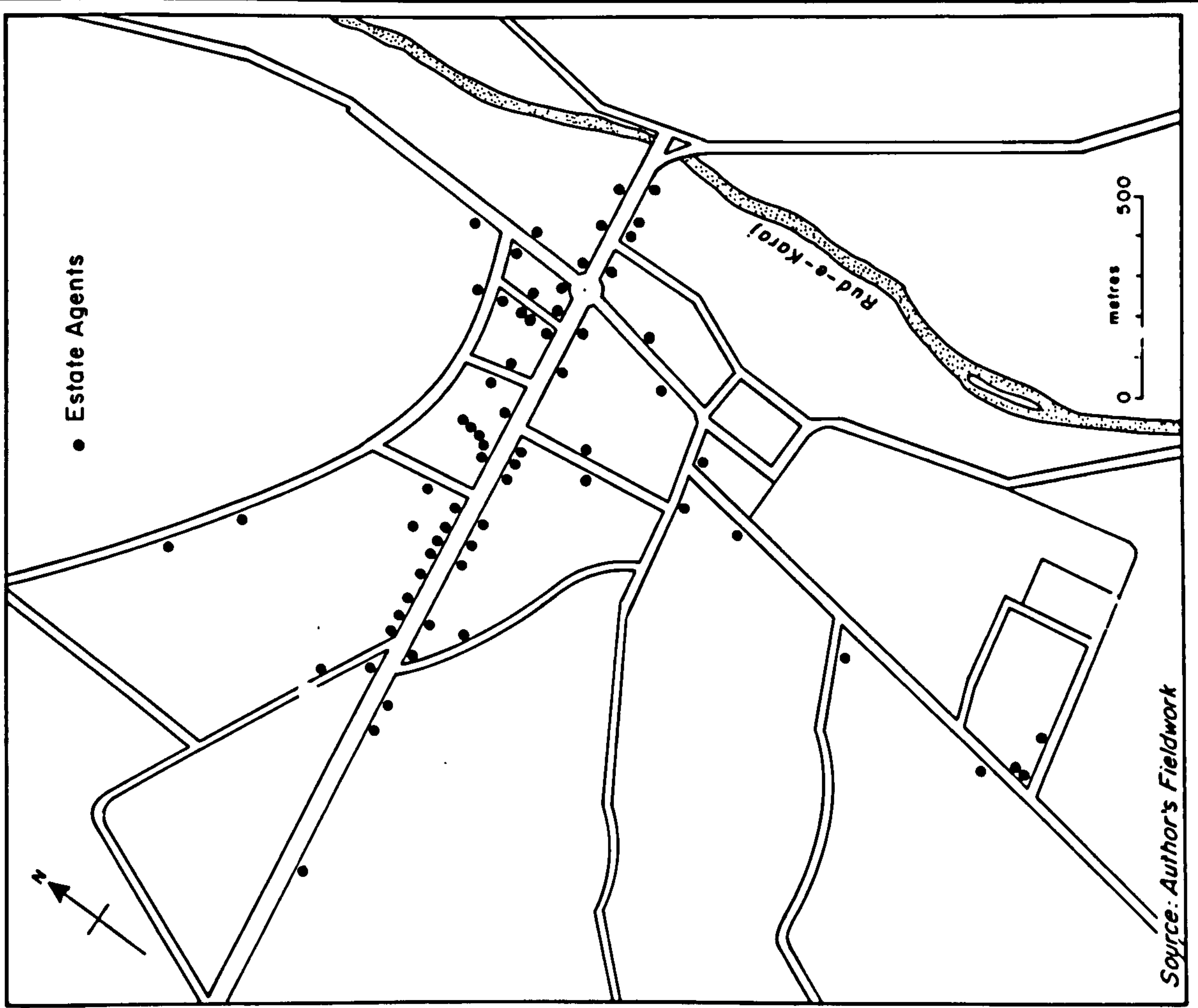
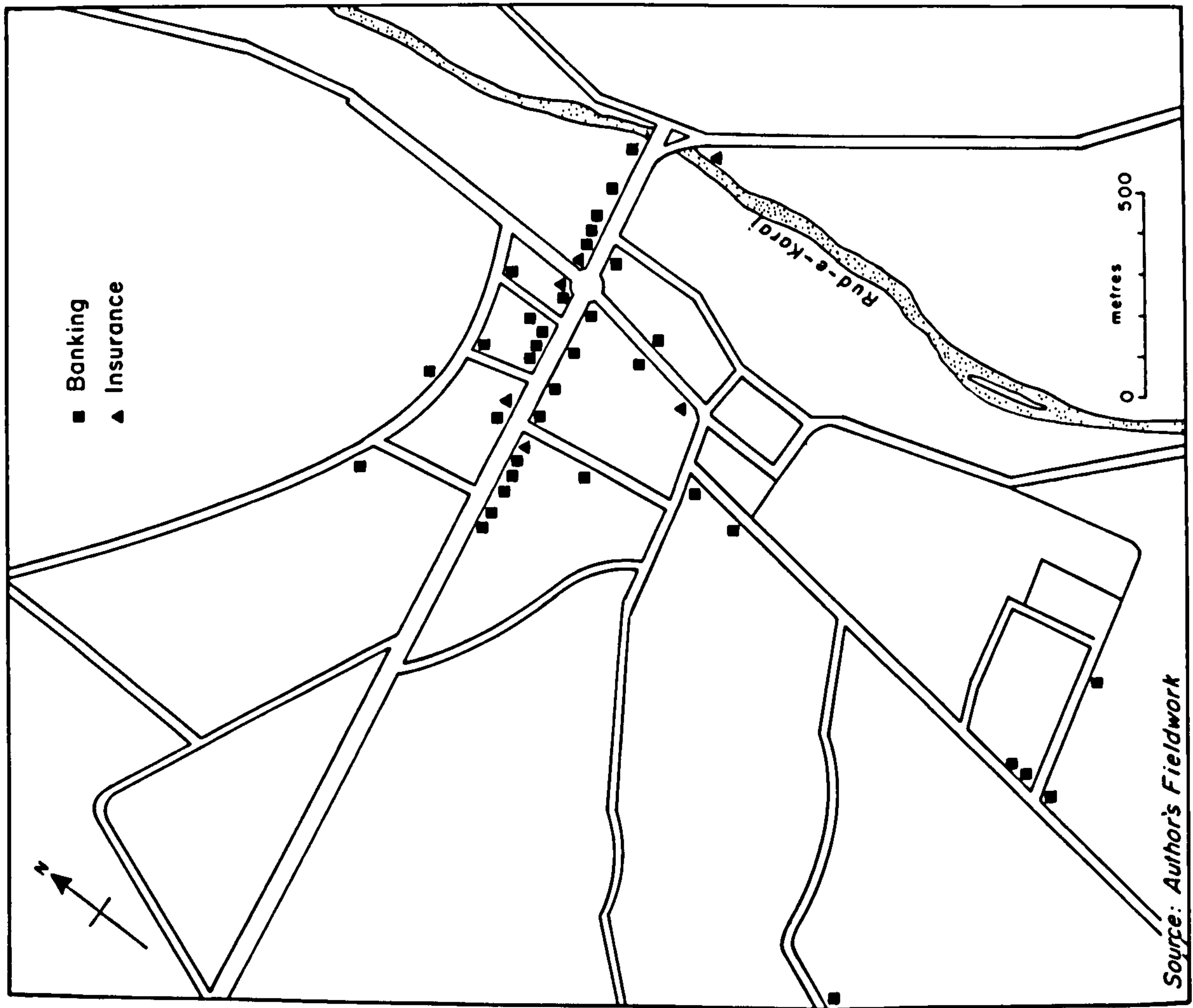
Corner sites in the central area of Karaj ; a suitable location for the establishment of Banks

money through speculation of land and housing. The rapid increase in population, producing a constant demand for housing, is the factor which above all has promoted the expansion in the number of these estate agents. Furthermore, the shortage of housing in Tehran, resulting in the outward movement of the population to reside in the satellite suburbs around Karaj, has been another reason for the mushrooming growth of estate agents in Karaj. The number of these agencies has almost doubled from 48 in 1970 to 91 in 1976. The main function of these estate agents is to deal with sale transactions rather than with actual properties, and they have concentrated particularly on land speculation. As shown by Figure 5.3, this service function is predominantly located on the western part of the city, especially along the northern side of Khiaban-e-Pahlavi. Such a pattern is obviously influenced by the modern suburban housing projects to the west of the city, as well as by the development of satellite settlements which are mainly in the western part of the Karaj region. Up to 1976, before the approval of new legislation concerned with the sale of land, the role of these agents in land and housing speculation was extremely influential. For instance, a high profit of 20 - 30 per cent on reselling a plot of land within one week or so was not unusual. However because of the introduction of legislation controlling the expansion of satellite settlements and land speculation, the growth in the number of estate agents has slowed down.* The closing of six such premises in the central area of Karaj, which were recognised during the field survey, could well be a response to these recent enactments.

The personal and medical services of Karaj, and the number of the persons they serve, are shown in Table 5.2. A very large gap between the

* According to this legislation a plot of land cannot be sold more than once unless it is going to be built over.

Fig. 5.3 DISTRIBUTION OF SELECTED COMMERCIAL SERVICES IN THE CENTRAL AREA OF KARAJ



sides of demand and supply indicates how far Karaj is from having a reasonable provision of such services. One immediate explanation for this situation must be in the proximity of Tehran. This is particularly true in the case of medical services, whereas by 1974 there were, for instance, only 12 dentists and 28 doctors in Karaj (see Table 5.2). Considering the rapid increase in population (almost 28,000 between 1974-76), the present provision per head of population must have deteriorated. Furthermore, the population from the surrounding rural and nearby township areas which uses these facilities has not been taken into account. In the light of this information one can appreciate how greatly the facilities of Tehran are under the pressure from its surrounding areas; and subsequently any population increase in the metropolitan area of Tehran means more pressure upon the existing services and facilities of Tehran.

Table 5.2: Relationship between a number of selected service establishments and the total population served - 1974*

	Type of services	Number of Establishments	Min. of Pop. served
1	Laundry	32	3,448
2	Barber shop	86	1,283
3	Photographic studio	20	4,086
4	Doctors offices	28	3,040
5	Dentists	12	9,194
6	Clinics	14	7,880
7	Hospitals	4	27,582

Source: 1. Plan Organization of Iran, Statistical Centre of Iran, Op.Cit., 1975
 2. Preliminary result of the third National Population Census, Karaj City, 1976.

* Since the data for this purpose were collected in 1974, therefore the adjusted population figure for 1974, i.e. 110,328, has been used.

When the general type of premises in the central area of Karaj, including wholesaling, retailing and services, was computed the correlation coefficient between the west side of Khiaban-e-Daneshkadeh and southern side of Khiaban-e-Pahlavi was very high (0.996) and was significant at the 1% level. The correlation coefficient between the southern side of Khiaban-e-Tehran and west side of Khiaban-e-Chalus was 0.946 although this was not significant at the 5% level (see Appendix 3.3).

5.2 Hierarchy of commercial centres

Having examined the growth, distribution and general characteristics of wholesaling, retailing and selected services, it is now possible to assess whether there exists a hierarchy of commercial centres within the city. The following classification was derived when the field data were examined.

1. Isolated shops
2. Local commercial centres
3. Suburban/highway oriented centre
4. City centre

5.2.1 Isolated Shops

These are single shopping units scattered throughout the city. The very high incidence of such shops makes any mapping of their distribution very difficult. However, they are closely associated with the residential areas. In the modern parts of the city they appear mostly in corner sites, whilst in the older parts of the city they usually occupy part of a house, and are run mainly by one or more members of the household. The major function of these premises is to supply convenience goods such as groceries, greengroceries, etc. Depending on the location, whether in the old or the modern part, or whether they occupy a corner site, such premises may have a range of clientele from as few as 50 to as many as almost 500 persons

per day. In the latter case, however, the range of goods tends to be of a higher order and better quality.

5.2.2 Local Centres

By contrast with isolated shops, the shopping units in the local centres sell a higher order of goods, with a greater proportion of durable goods; being sold from mixed and service shops. These local centres usually consist of about 20 to 60 commercial units. They are fairly well scattered throughout the city because they also follow the pattern of the residential quarters. The size of the population they serve and the quality of the goods they offer therefore depend on their location. However, in both the old and the modern parts of the city, the site competition with other land-use functions has resulted mainly in a linear development of these centres, along the major route passing through a particular centre. Further investigation into the patterns of evolution of these local centres has revealed that in their emergence two major factors have been decisive; namely the historical and the socio-economic. The impact of historical factors can be explained in two different ways: firstly, through the normal development and expansion of the existing settlements, such as Deh-e-Karaj and Mahalleh-e-Hesar, and secondly through the creation of major industrial establishments such as the Industrial Model Town of Karaj, or the Sugar Factory, during the 1930's. At a later stage these establishments became nuclei around which some of these local centres developed. This pattern was also repeated when the Jahan Industrial Complex came into existence in the mid 1950's. Local centres which have developed in this way usually contain larger shops with goods of a higher quality by comparison to those shops in the local centres of the older parts. As shown by Figure 5.4, the majority of these local centres are located to the south of the Tehran-Pahlavi-Qazvin road. Socio-economic factors have also had their own effects

on the emergence of local centres in Karaj. Essentially, such factors apply mainly to the new shopping units in the modern parts of the city. Factors such as the higher rate of private car ownership have been influential in their development. On the other hand, planning legislation has also been responsible for their extension along the thoroughfare used by commuters through these centres. A better-quality and range of goods and a visible change from convenience goods towards consumer durable goods and personal services can be seen, when, for example, the shopping units in Azimiyeh or Jahanshahr are compared with the shops in Deh-e-Karaj or Mahalleh-e-Hesar. In order to understand the general form and function of local centres, Deh-e-Karaj was chosen for a case study and a detailed survey was carried out. As Deh-e-Karaj was considered a subsection of the central area of Karaj, its commercial characteristics were mapped and compared with the major commercial intersection of the city (see Figure 5.1). The detailed data base for this figure can also be found in Appendix 1. Furthermore, the types of commercial establishment found in this local centre were compared with those of other centres with higher order functions (see Table 5.3).

5.2.3 Suburban/highway oriented centre

This is a unique and comparatively recent phenomenon in Karaj. In fact, only since 1967, when the Tehran-Karaj Autobahn was completed, did it come to existence. The particular location of this centre, that is along a route connecting the westward extension of the Autobahn with the Karaj-Qazvin Highway, has been the major reason behind its development. A relatively wide catchment area, including the dwellers in nearby satellite settlements as well as those travelling along this route on their way to Qazvin, and those people who use these parts of Karaj as their week-end picnic area, results in this shopping centre being well patronised

Table 5.3: Type of Commercial Establishments in different hierarchical centres of Karaj

Type of Establishment	Local Centre (Deh-e-Karaj)		Suburban/ Highway Oriented Centre		City Centre	
	No. of Estab.	Per Cent	No. of Estab.	Per Cent	No. of Estab.	Per Cent
1 Bakery, Confectioner and Flour	4	5	-	-	24	6
2 Footwear	3	4	-	-	16	4
3 General Groceries and Dairies	14	19	-	-	52	13
4 Butcher, Chickens and Eggs	3	4	2	4	24	6
5 Cloth and Clothing	6	8	-	-	41	10
6 Household and Electrical Goods	10	14	10	18	40	10
7 Fruits and Greengroceries	3	4	-	-	18	4
8 Other Agricultural Products and Fertilizers	1	1	-	-	12	3
9 Construction Materials	1	1	8	15	22	5
10 Stationers	1	1	-	-	13	3
11 Jewellery and Watchmaker	2	3	-	-	4	1
12 Car Showroom and Spare Parts	1	1	1	2	15	4
13 Auto Repair and Garages	-	-	3	5	9	2
14 Blacksmith and Carpenter	6	8	4	7	15	4
15 Chemist	1	1	-	-	5	1
16 Doctors Offices and Clinics	2	3	-	-	12	3
17 Restaurants, snacks and traditional eating places	3	4	11	20	34	8
18 Barbers	4	5	-	-	5	1
19 Laundries	1	1	1	2	2	1
20 Photo Studio	-	-	-	-	9	2
21 Banks	3	4	1	2	7	2
22 Estate Agents	2	3	12	22	11	3
23 Miscellaneous	3	4	2	4	14	3
Total	74	100	55	100	404	100

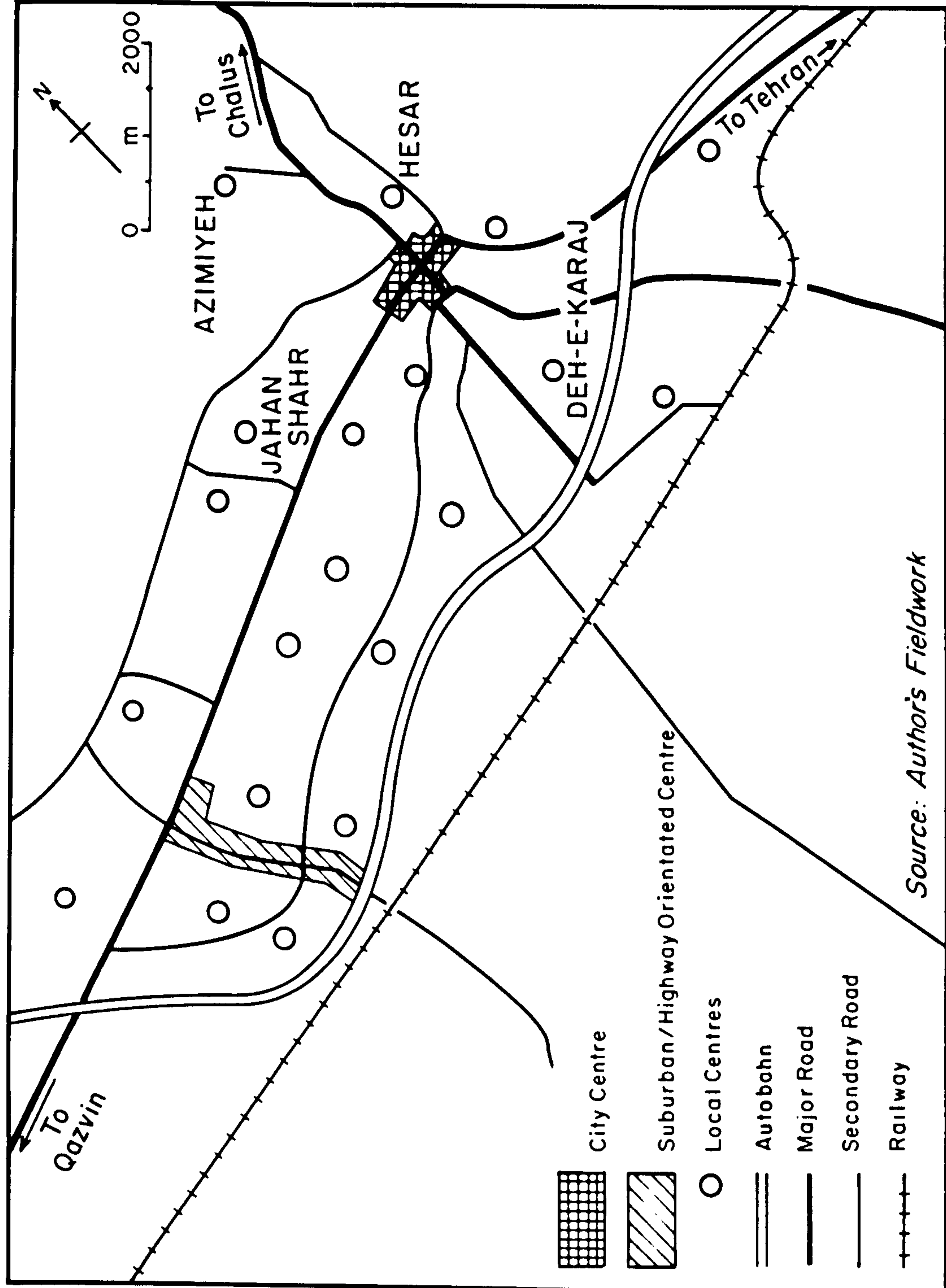
Source: Author's Fieldwork

and is, therefore, assigned a higher place in the hierarchy by comparison with the local centres. Moreover, the type of goods, and the services they offer, are also different (see Table 5.3). Here the retail trade and commercial services have grown particularly because of easier access and provision of parking spaces. However, the main reason behind the development of this centre has been the rapid expansion of the satellite settlements to the west of Karaj City. The qualitative differences between the goods and services they provide are mainly a result of this centre being more accessible to consumers from the higher income groups. Considering the general tendency of the city to grow in a westerly direction, it might be argued that this centre has the potential for becoming a major centre for the whole western part of the city in the near future (see Figure 5.4). As shown by Table 5.3, the type of shop found in this centre provides mainly durable goods and services such as restaurants and snack bars which are usually the major characteristics of the highway oriented centres. Furthermore, a large number of estate agents (12 units) in this centre indicates the boom in housing development in this part of Karaj. However, because of high rate of car ownership as compared with Karaj City, this centre is likely to continue to develop and expand.

5.2.4 The City Centre

In this section, Maidan-e-Pahlavi and the four major Khiabans leading out from this Maidan have been considered as the city centre of Karaj. Hierarchically, it is the highest order centre in the whole city because almost 23 per cent of the estimated customers of this centre come from outside the city, of which about 19 per cent come from the city's immediate hinterland. This indicates the extent of the centrality and attraction of the city centre for these parts of the city region.

Fig5.4.HIERARCHICAL DISTRIBUTION of COMMERCIAL CENTRES IN KARAJ

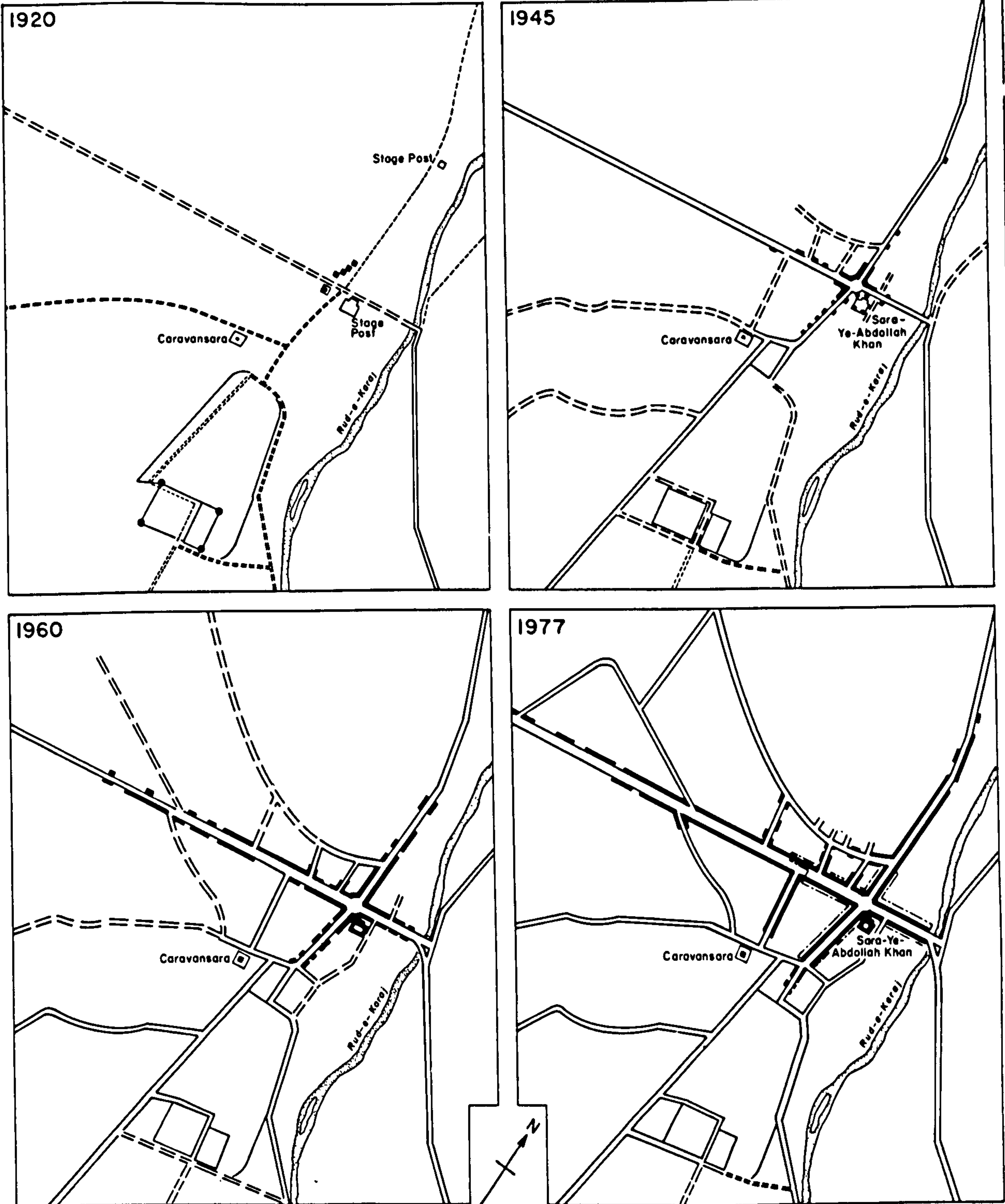


Source: Author's Fieldwork

To examine the type and functions of commercial premises existing in this centre, a complete survey was carried out which covered all the ground floor premises. The overall result of the examination done in this survey is shown in Figure 5.1. Also Figure 5.5 shows the evolution and development of this central location in which the shopping premises follow a ribbon like pattern. The desire for accessibility to Maidan-e-Pahlavi as the peak pedestrian and car traffic flow is undoubtedly the main reason behind this linear extension. The figure also demonstrates the way in which the present central area of Karaj has developed during the last half century. As was explained in Chapter 3, the establishment of new road and intersections during the Reza Shah period onwards has been significant in the growth of commercial ribbon developments in the central area of Karaj. In fact the creation and development of Maidan-e-Pahlavi was very much associated with the change in the position of Karaj from a village to a town in the settlement hierarchy. Parallel with this development the great volume of vehicles using the East-West route of the Tehran-Qazvin Road has been another important reason for the westerly growth of shops in this central area.

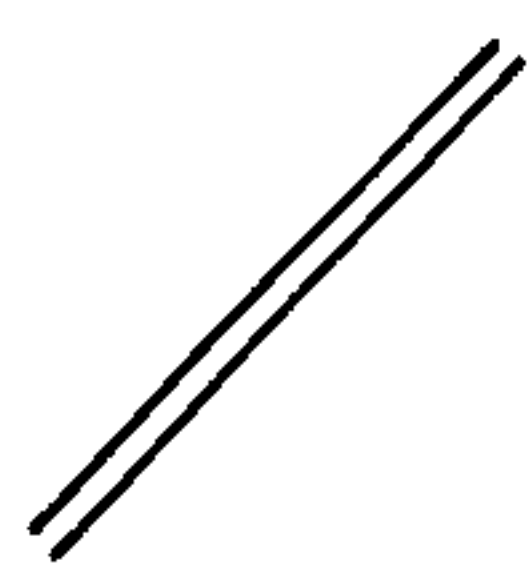
One of the most important parts of every city is its centre. In large cities, this part is referred to frequently as the Central Business District (C.B.D.). The term city centre, corresponding with the C.B.D., has been used in this chapter, because it has been usually applied to the smaller cities. Associated with city centres in the theory or urban geography are various advantages such as accessibility to shops and premises, quality, price competition and wider choice of goods. Such advantages usually attract the population of a city and its hinterland to its centre. Yet in the case of a small city such as Karaj where there are proportionately more shops in the city centre compared with its surrounding suburbs, this feature is even more marked.

Fig 5-5 EVOLUTION AND DEVELOPMENT OF THE CENTRAL AREA OF KARAJ

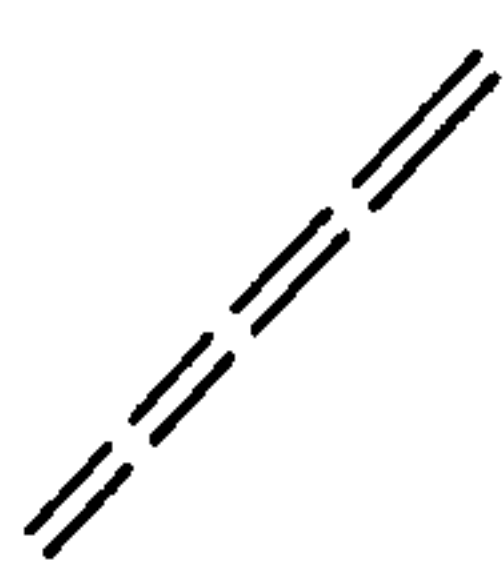


Source - Author's Fieldwork

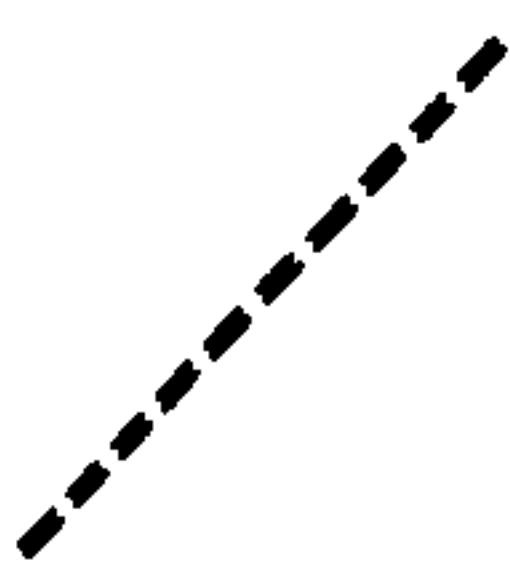
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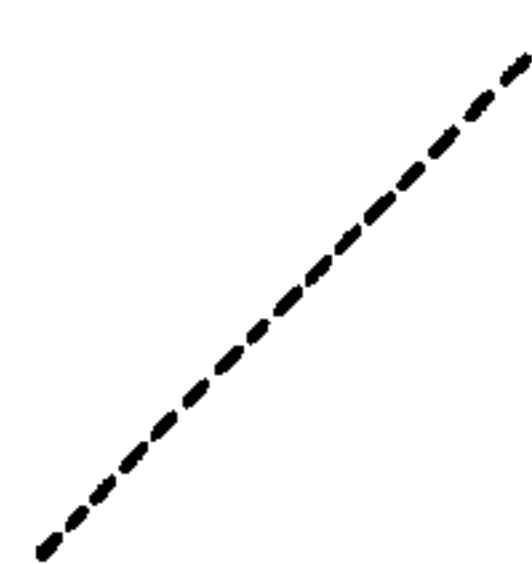
Asphalt Road



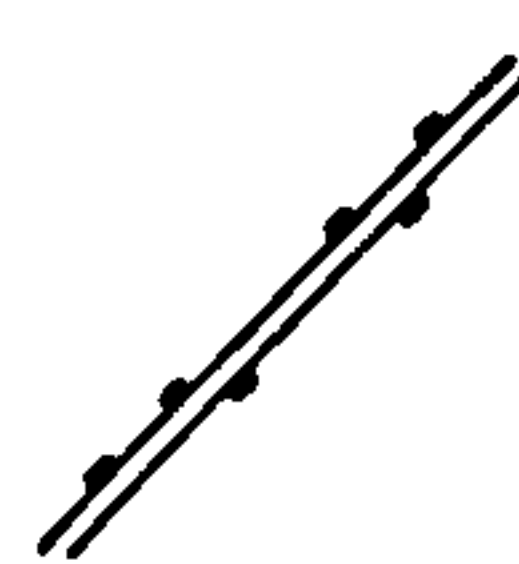
Major Track



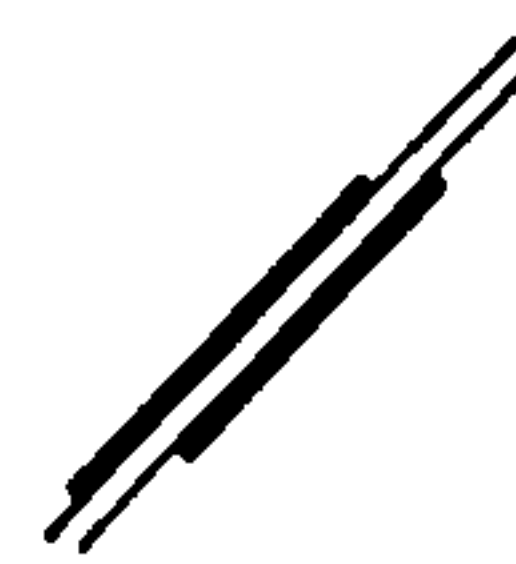
Secondary Track



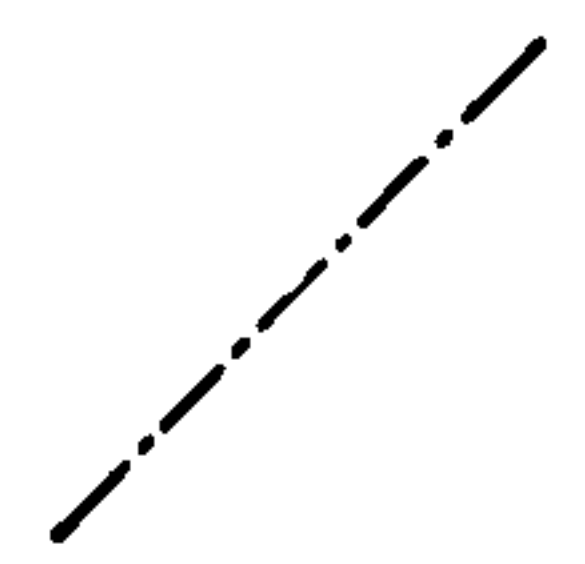
Mule Track



Isolated Commercial Premises



Commercial Ribbon Development



Boundary Of City Centre

The overall advantages associated with the centres of cities have resulted in the fact that a large number of studies dealing with urban regions concentrate particularly on these locations. Such studies have mainly been concerned with methods and approaches by which a definition and delimitation of the actual boundary of a city centre may be reached.

The word city centre, although a commonly used term, also covers a number of differing features. The first step, therefore, is to define the concept. The diversity of definition and approaches suggests that the criteria which are more applicable to a small city such as Karaj must be taken into consideration. In their valuable study on delimiting the C.B.D., Murphy and Vance have considered criteria such as population density, land values and type of land use.⁽⁶⁾ An alternative approach has been suggested by H. Carter in his use of criteria such as appraised or assessed land values, rent and rateable values.⁽⁷⁾

Accepting the fact that any attempt to delimit the city centre is an arbitrary operation and that the boundary cannot be permanent in this study, two major criteria will be examined: firstly, land values and their immediate derivatives such as shop rents, daily sales turnover, as well as the sum of Sarqofli (Key money) as a particular feature of the commercial transactions of Iranian society. Secondly, the land use pattern with particular reference to non-city centre land use functions will be examined.

(1) Land Values

Land values have been considered as a significant indicator of the city; values fall rapidly towards the periphery, "... then it would seem that the most effective tool for delimitation would reside in land values or some derivative."⁽⁸⁾

The land values considered here are values assessed for taxation purposes, required by the "Law of the Urban Renovation and Development."⁽⁹⁾

They are frontage values fixed for a period of five years (1975-79) and are produced by a joint committee of the Tax Collection Office, Land Registration Office and the Municipality of Karaj.⁽¹⁰⁾ The land values of the interior blocks have not been deliberately examined because the assessed values were uniform throughout the blocks.

In a city centre there is an area in which land values reach their highest level. The terms commercial core, peak values, hard core, peak land value intersection (P.L.V.I.) are among the names given to this very limited area of the city centre. In Karaj, Maidan-e-Pahlavi which is the meeting place of four major Khiabans of the city centre, corresponds with the peak land value intersection of the city. From here the various measures of intensity, such as of building heights and land values decline towards the edge of the city, although more sharply in an easterly direction. The frontal land values on Maidan-e-Pahlavi with respect to location vary from 12,000 to 13,000 Rials per square metre. To apply the land value criterion in delimiting the city centre boundary of Karaj, all the frontal land values over 6,000 Rials per square metre, i.e. 50 per cent of the peak value were plotted and the points then connected. The result is shown in Figure 5.6; as a result of which the city centre of Karaj is confined to the frontages of the four major Khiabans for a distance not exceeding 400 metres. Whilst a general correlation seems to exist between the reduction in land values and the distance from the commercial core, at the same time there is a relationship between the frontal land values and the width of the thoroughfares. For instance, as can be seen in Figure 5.6, the land values on either side of Khiaban-e-Homayoun, although closer to Maidan-e-Pahlavi, are lower when compared with Khiaban-e-Jami, 300 metres further away to the west. This can be attributed to the considerable advantages arising from wider roads because of the increased



PLATE 11.

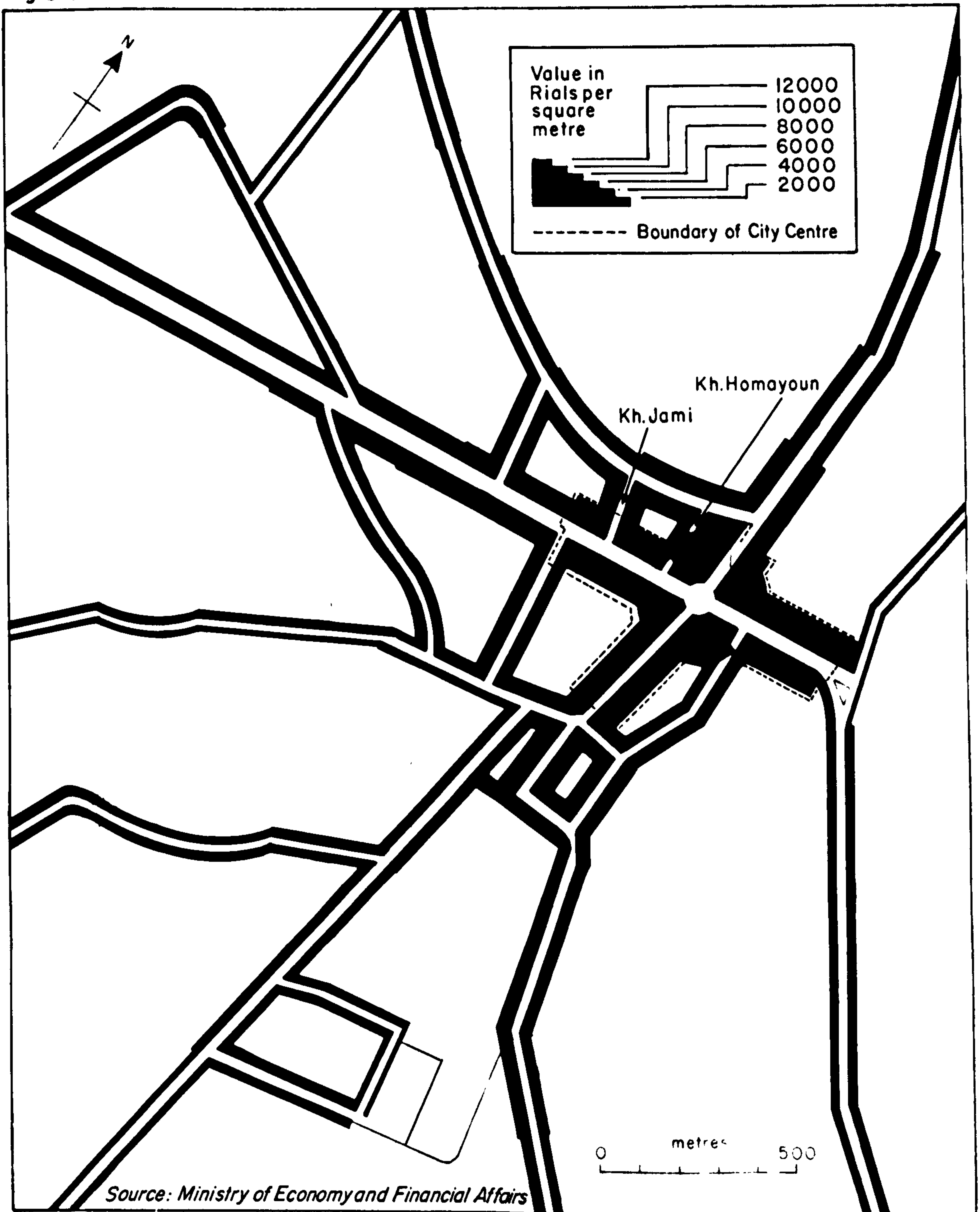
Khiaban-e-Homayoun, off Pahlavi Khiaban



PLATE 12.

Khiaban-e-Jami, a north-south Khiaban in the central area of Karaj

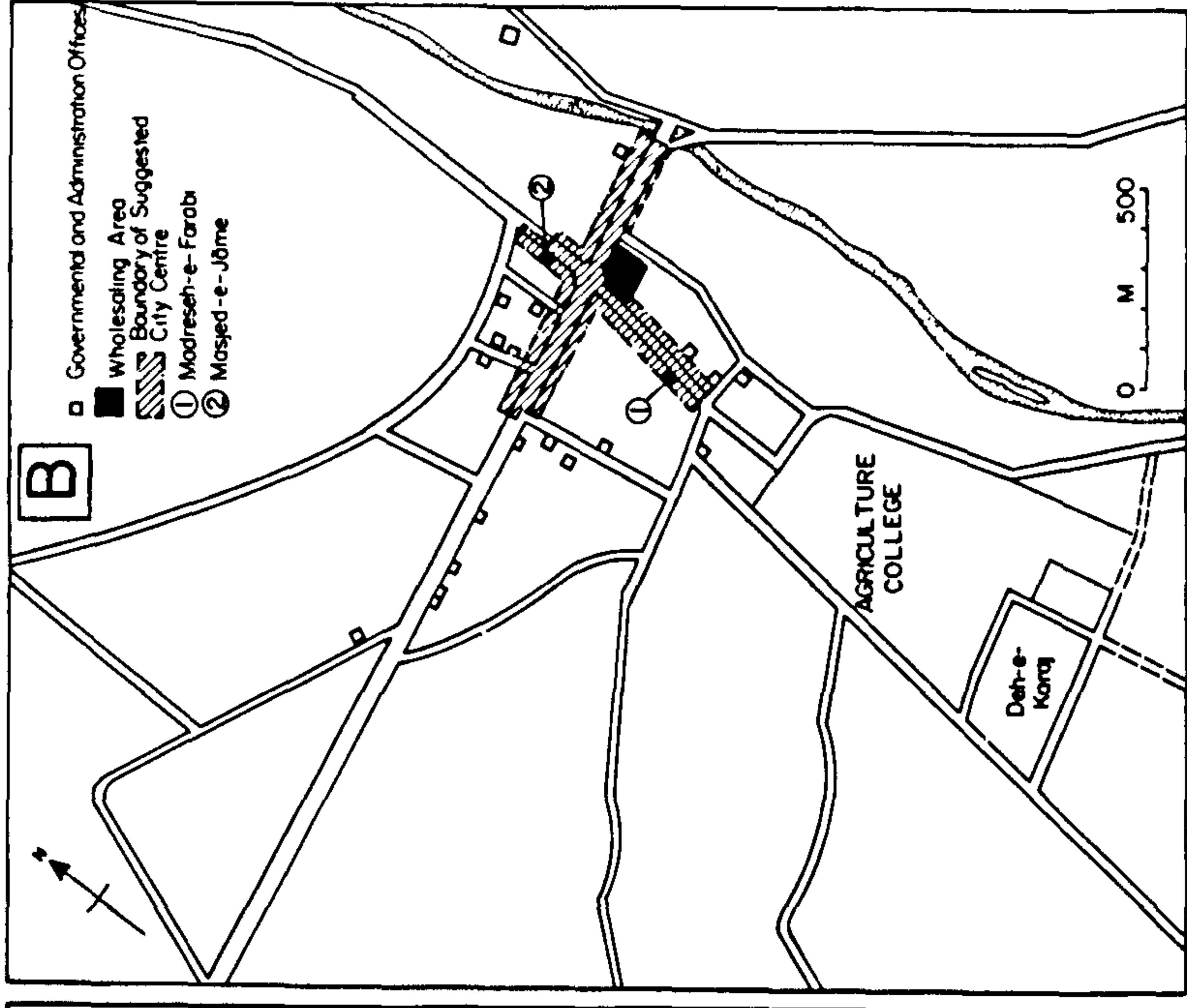
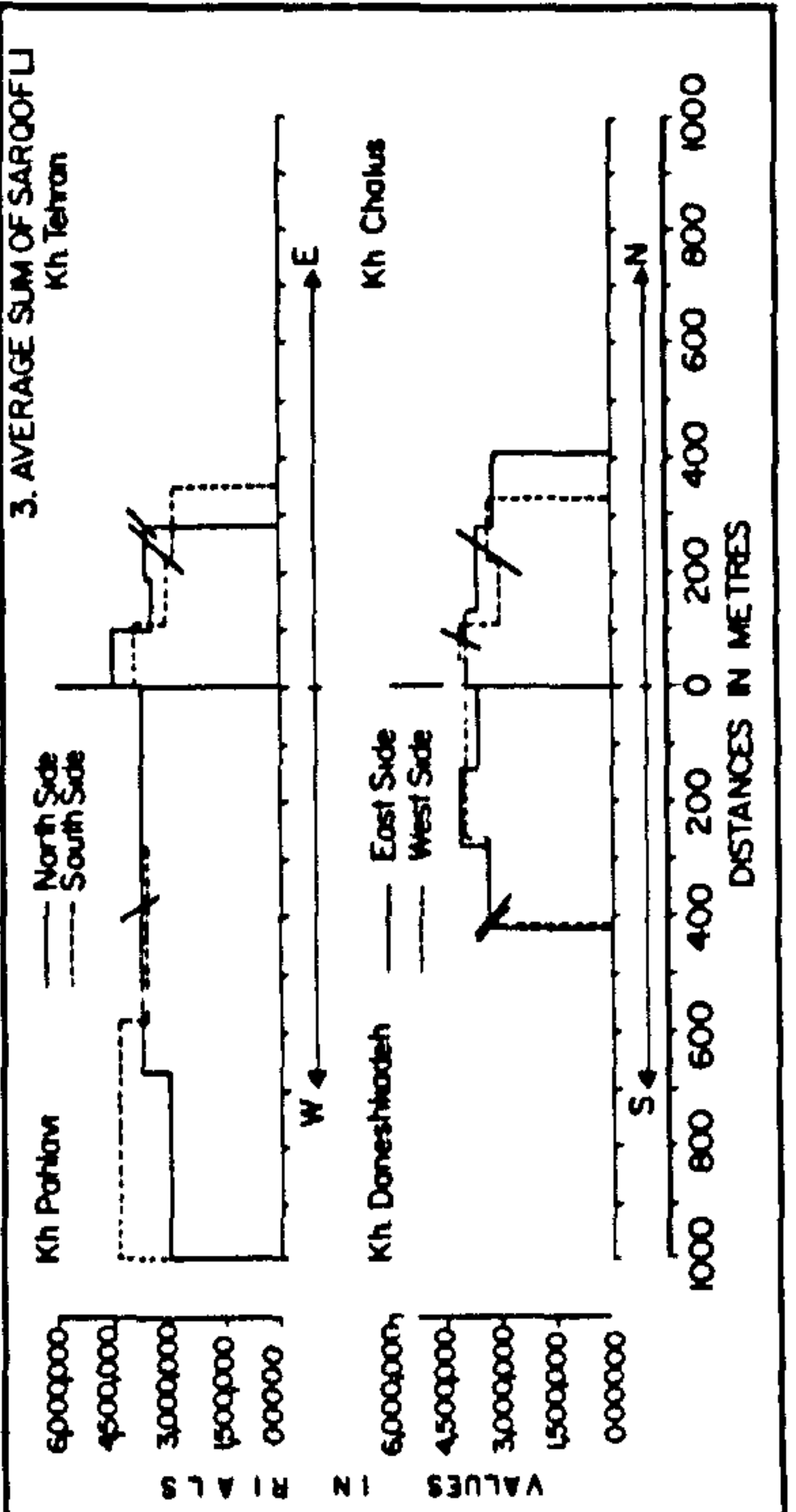
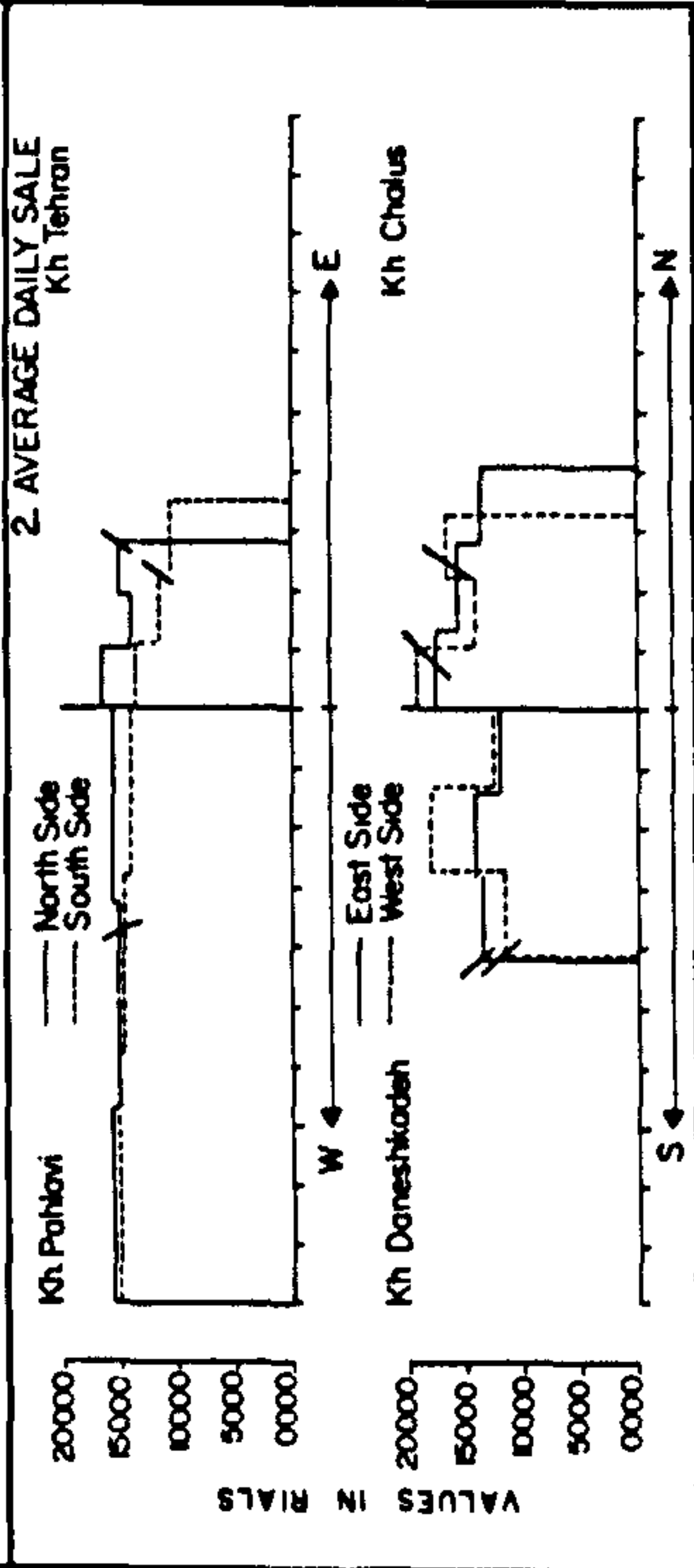
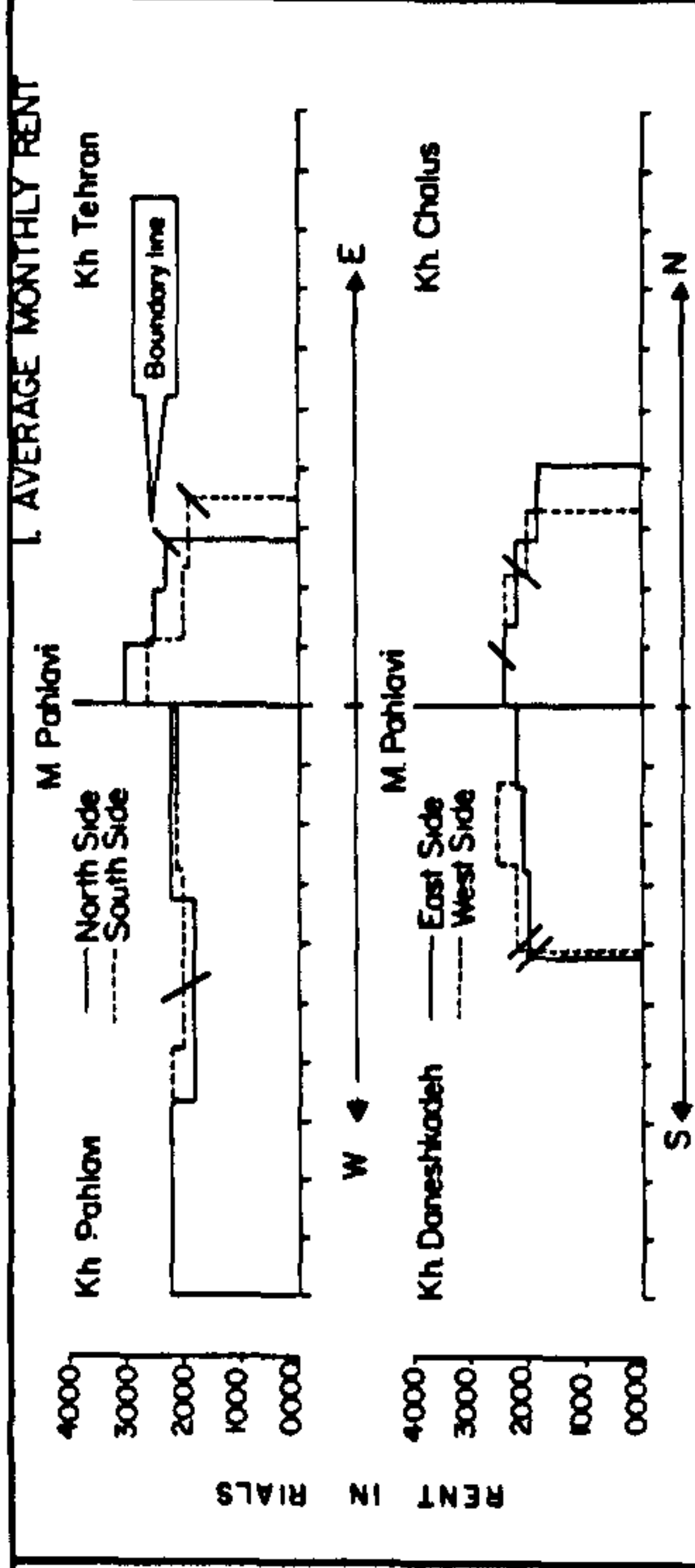
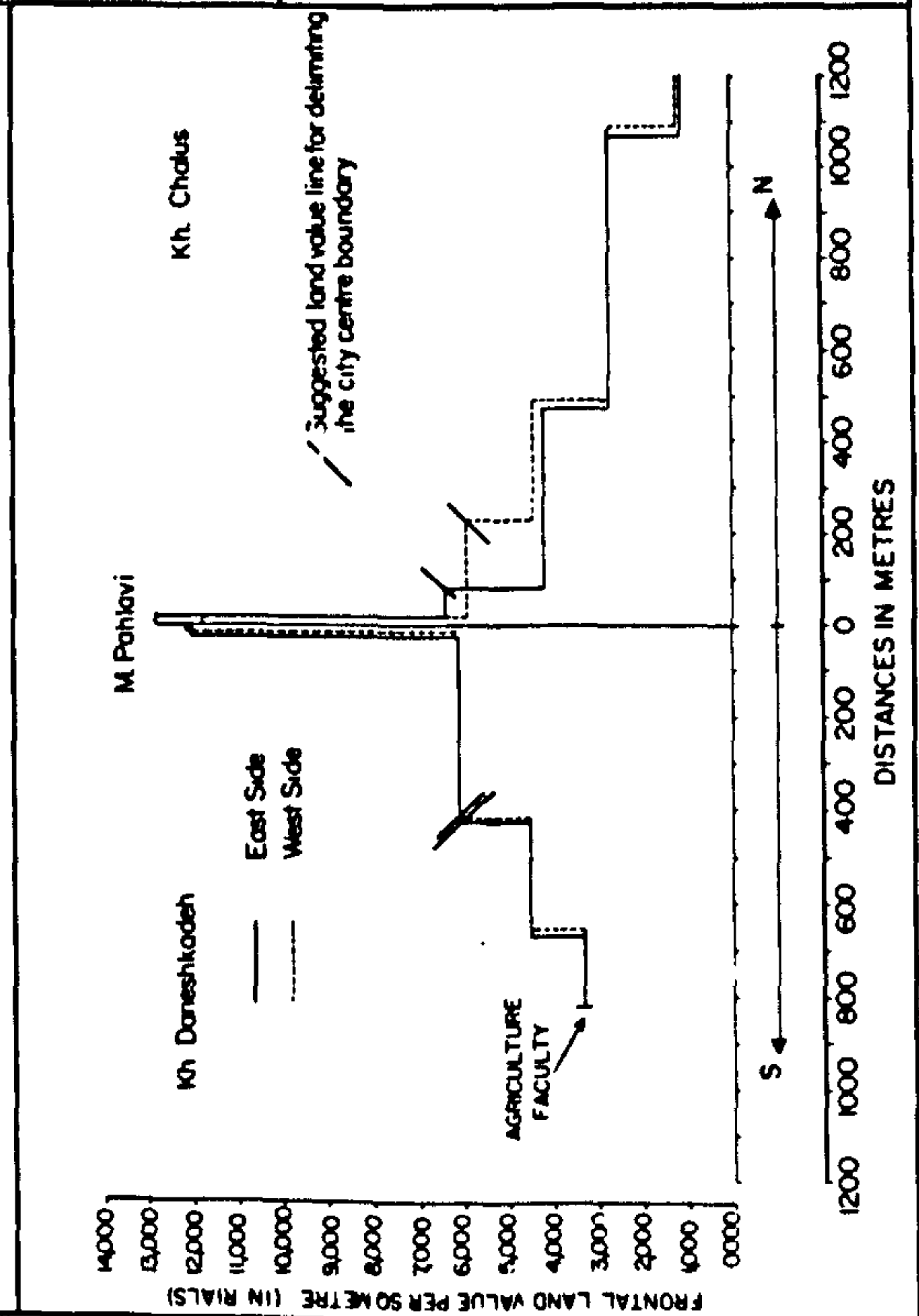
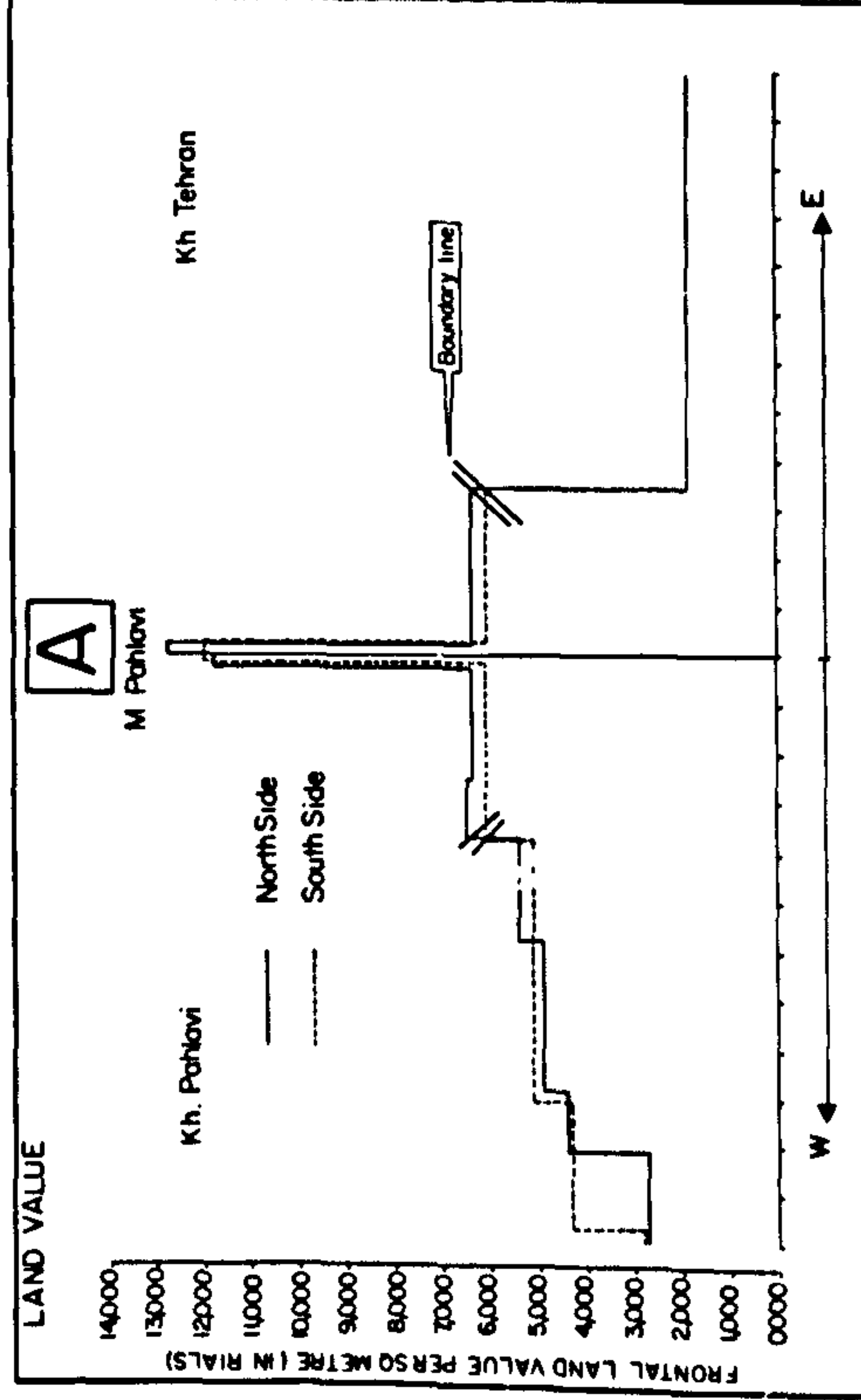
Fig 5.6 FRONTAL LAND VALUES IN THE CENTRAL AREA OF KARAJ



traffic flow and parking space for the shoppers in the city centre. The very linear pattern of development of commercial functions on either side of the four major Khiabans of the city centre also indicates how accessibility to a busy thoroughfare carrying considerable car traffic is vital for the expansion of commercial premises. As shown by Figure 5.7A, the city centre boundary extends further in a westerly direction than in the easterly direction. Owing to the presence of Rud-e-Karaj and Kuh-e-Dashteh, the line of land values shows a sudden drop at this point of 6,000 Rials per square metre to 1,900 Rials.

The development of new shops dealing in a higher grade of goods, such as Jewellers, watchmakers, and carpet sellers is gradually occurring along the western extension of Khiaban-e-Pahlavi. The shops within Maidan-e-Pahlavi and its immediate neighbourhood are relatively old and small, whereas to the west, the grounds are large and there is an increasing movement of well-to-do Karajis and Tehranis to the western suburbs. As shown by Appendix 3.5, the correlation coefficient for the shop's years of business, indicates a very significant correlation of 0.961 between the shops on the southern side of Khiaban-e-Pahlavi and the eastern side of Khiaban-e-Chalus. The lowest correlation coefficient was found between the shops on Maidan-e-Pahlavi and the northern side of Khiaban-e-Pahlavi which was 0.414 and was not significant at the 5% level. This latter result may reflect the very recent growth of shops on the northern side of the Khiaban-e-Pahlavi as compared with those on Maidan-e-Pahlavi.

Rent values, although subjective, have been taken as the other criterion by which the city centre of Karaj may be defined and delimited. It is in fact a flexible criterion and mainly depends on the movement of the market economy and the agreement between the owner of the premises and the person who rents it. Factors such as physical condition, including



A CITY CENTRE OF KARAJ BY DIFFERENT CRITERIA

B LAND VALUES AND SELECTED DERIVATIVE

SELECTED LAND USE

Sources: Municipality and Tax Office of Karaj, The Author's Fieldwork

space, nature of frontage, access and site advantages, together with utilities provided and fittings also come under consideration. Furthermore, the level of rent may also be affected by other factors such as Sargofli, a lower rate of Sargofli sometimes resulting in a higher level of rent. However, since there is usually a positive relationship between land value and rent value in which land value is a rent capitalized function, this criterion is nevertheless of value and has been employed. This seems to be justified considering that 94 per cent of all the shops studied were rented premises. The data for this measure were gathered during field work and the average rent value of the shops was plotted, with respect to their distance from Maidan-e-Pahlavi. Although the relationship is not as significant as expected, in three directions it conforms fairly well with the suggested boundary delimited by land values (see Figure 5.7A1). The lack of conformity shown in the westward direction seems to be related to the fact that the older and smaller shops in the commercial core are gradually losing their competitiveness with the larger and better equipped shops with more parking space on Khiaban-e-Pahlavi, away from the city centre. The correlation coefficient computed for the sum of monthly rent in different parts of the city centre shows a very high correlation between the southern side of Khiaban-e-Pahlavi and the western side of Khiaban-e-Chalus, with the highest correlation level of 0.999. The lowest correlation coefficient was found between the eastern side of Khiaban-e-Chalus and Deh-e-Karaj which was 0.077 and was not significant at the 5% level. (See Appendix 3.11).

The daily sales of shops as the derivative of land values was also studied to see how far it could be useful in delimiting the boundary of the city centre of Karaj. As a general rule the high level of the peak land value intersection (P.L.V.I.) is a determining factor selecting those businesses which can afford the high land value and level of rent. This

means that a function which produces more profit is able to locate in the city centre or very close to it. In a large city such as Tehran, this particular central area is used by businesses such as departmental stores, Jewellers, carpet sellers, etc. In Karaj, owing to the much smaller scale of functions, this area of highest land values consist of retailers dealing in general groceries, textiles, and offices or shops selling constructional materials. Apart from the type and size of establishment other factors such as proximity to the pedestrian peak flow, location at corner sites, and parking facilities are very important as factors affecting daily sales; even minor factors such as the proximity of a mosque or a sun-ward location play a role in daily turnover. Sometimes, delay in completion of road work also reduces considerably the daily sales of a shop, so much so that it was the reason for the closure of three shops on the west side of Khiaban-e-Chalus shortly after they opened for business. The application of the daily sales factor showed a fairly close correlation with the boundary of land values in all directions except to the west. Once again the recently established shops on either side Khiaban-e-Pahlavi, with more traffic flow and more parking facilities, resulted in a level of daily sale far exceeding the land values boundary in a westerly direction (see Figure 5.7A2). When the correlation coefficient for daily sale of shops was computed the highest correlation i.e. 0.994, was shown between the western side of Khiaban-e-Daneshkadeh and the southern side of Khiaban-e-Pahlavi which was well above the 1% significance level. On the other hand the lowest correlation coefficient, i.e. 0.010, was found between the southern side of Khiaban-e-Pahlavi and Deh-e-Karaj. This result indicates the significance and relative prosperity of shops with high turnover on Khiaban-e-Pahlavi (see Appendix 3.13).

Sarqofli (Key money), which is defined as an initial payment of money paid by a person who rents a shop to the owner of commercial premises, is

also used as a criterion to delimit the city centre of Karaj. It is in fact a payment related to a site value, but it would be subject to other different factors such as proximity to an area of peak pedestrian flow, fittings etc. It might be also affected by a private arrangement between the two parties to the bargain, by which a lesser amount of Sarqofli is fixed in return for a higher sum of monthly rent or vice versa. However, it is a relatively reliable measure in the examination of the commercial centrality of an Iranian City and it has been used by many scholars and research workers dealing with the study of Iranian cities.⁽¹⁰⁾

The data of Sarqofli can be obtained from the tax Collection Office and sometimes from the estate agents. However, since there were few transactions actually occurring in the city centre of Karaj, an estimated value was collected by personal inquiry. The field survey indicated a significant increase in the sum of Sarqofli during recent years so much so that in some cases a 10 to 15-fold increase was reported in less than two decades. Consequently, in some reconstructed premises occupied by banks, the amount of Sarqofli has reached over 5 million Rials, which is very much like prices in the major part of the central area of Tehran. Figure 5.7A3 confirms a peripheral increase in the sum of Sarqofli, especially along the western and southern thoroughfares. This indicates the development of a higher class shopping area, particularly to the west of the city. Whilst the correlation coefficient for Sarqofli showed a very high correlation of 0.994 for both sides of Khiaban-e-Pahlavi, however, the highest correlation of all was found between the two sides of Khiaban-e-Chalus with a significance level of 0.999. The lowest correlation coefficient of 0.0297 was shown between the western side of Khiaban-e-Chalus and Deh-e-Karaj (see Appendix 3.14).

(ii) Land use criteria

The pattern of land use has been considered one of the most reliable measures in delimiting the boundary of a city centre. In fact the very high value of land in the city centre leads to an ordered use of such land resulting in a hierarchy of land uses with a gradually declining profitability as one moves away from the peak land value of the city. Therefore profitable businesses dependent on very high turnover such as retailing establishments and commercial services, are the major land users in the city centre. The application of this test is shown by Figure 5.7B, in which a fairly intensive land use is reflected in the ribbon development of commercial activities. Furthermore, the disappearance of a number of residential buildings not being competitive with retail activities, was noticeable while field work was in progress. In addition, owing to the fact that the basis for tax collection established by the "Law of Urban Renovation and Development" differs for commercial and non-commercial use, in favour of the former, it seems that a tendency is growing towards the expansion of commercial land use.* In the meantime, as shown by Figure 5.7B, an attempt has been made through a negative approach, that is plotting non city centre land use characteristics, to define the city centre of Karaj. The non- central characteristics of the city as defined by Murphy and Vance are as follows: Governmental and public buildings, organizational establishments, industrial establishments, wholesaling,

* According to the Index for land value assessment produced by the Municipality of Karaj, two different bases of 10 and 30 metres depth back from the frontage are used depending whether commercial or non-commercial frontage is in question. Behind these depths, land plots or buildings are considered as interior blocks or rear plots whose values are assessed at a 60 per cent cheaper than the equivalent frontal value. Consequently a relatively lower taxable rate attached to commercial uses may result in the development of ground floor shop units as subsections of residential buildings or sometimes as the result of conversions of large properties such as gardens into small shopping streets called "Passage". (See Plate No.13).



PLATE 13.

Passage-e-Amiri, a small shopping centre on the western extension of Khiaban-e-Pahlavi

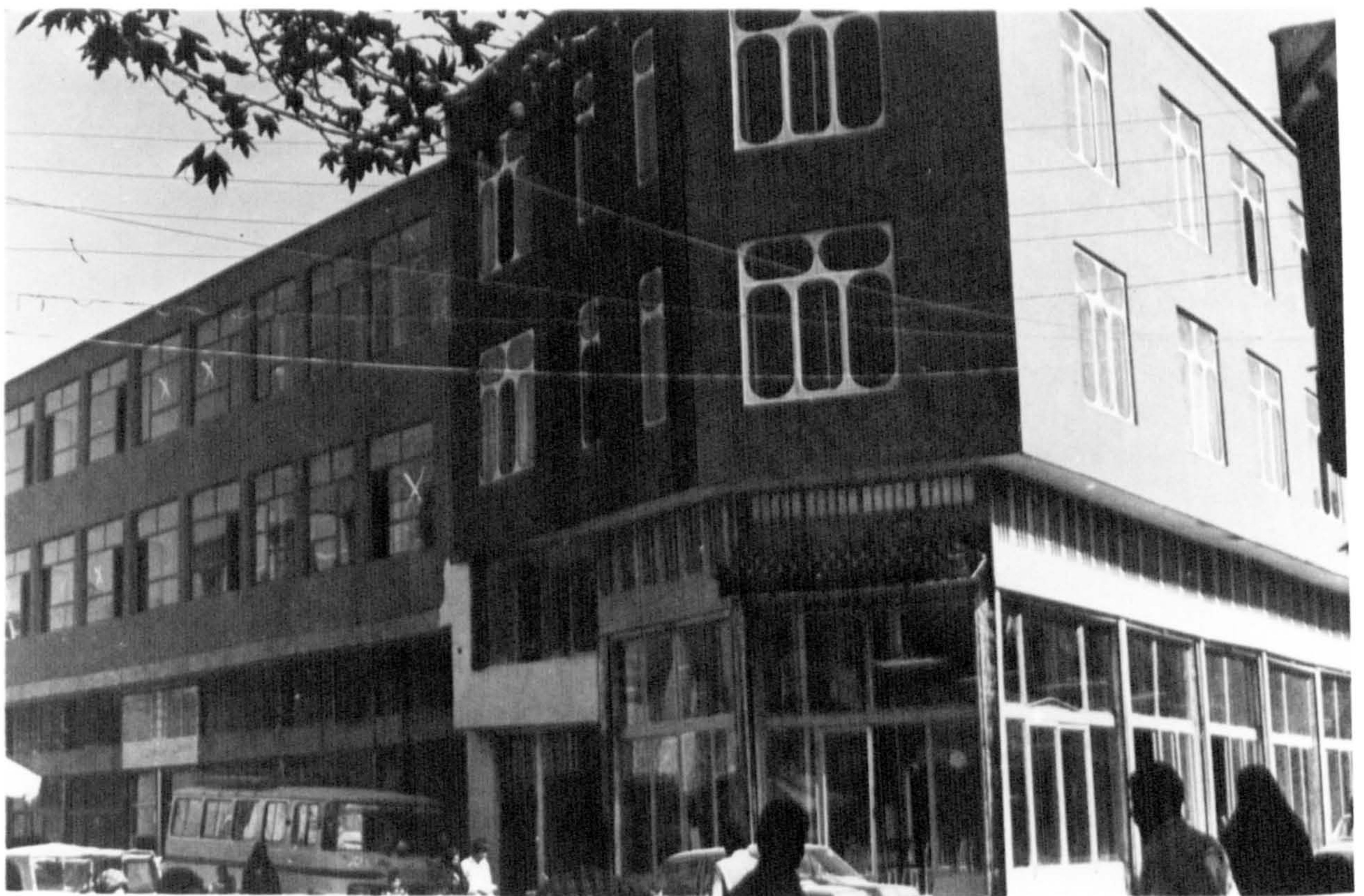


PLATE 14.

Newly established shops on the southern side of Khiaban-e-Pahlavi

vacant buildings or stores, vacant and commercial stores.⁽¹²⁾ However, it must be appreciated that the location of some of these land use functions is so close to the city centre that their exclusion from a compact boundary for the city centre seems to be impossible. For instance, the site of Masjed-e-Jāme on Khiaban-e-Chalus, or Madreseh-e-Farabi on Khiaban-e-Daneshkadeh, which are not more than 300 metres away from the city centre city peak land value and land use areas, are among those non-city centre land uses to be included in the city centre. Figure 5.7B demonstrates the ground floor land use pattern in the central area of Karaj, with emphasis on selected land uses such as governmental and wholesaling premises. As shown by Figure 5.7B, the line separating the city centre land use characteristics and the non-central characteristic, is very similar to the boundary line defined by the land values criterion.

Other criteria, such as pedestrian and traffic peak flows, day time population and the building height index, have also been used to delimit the boundary of the city centre. Although no attempt has been made to examine these criteria, as might be expected, the impression gained was that Maidan-e-Pahlavi as the most important intersection of the city represents the peak point in all above mentioned cases. This can also be corroborated by a traffic study carried out for the Master Plan for Karaj by which the traffic count at the entrance of four major Khiabans near the Maidan-e-Pahlavi was almost 50 per cent above the count at the second place, about 1 Km away along these Khiabans, and the traffic volume at any cross section on this Maidan was more than twice that for any other four Khiabans.⁽¹³⁾ (See Plates No. 15 and 16).

The overall changes in the pattern of commercial activities indicate that, whilst the present city centre of Karaj still retains its relative prosperity, there are a number of socio-economic processes at work to



PLATES 15 & 16.

Maidan-e-Pahlavi the peak intersection of the city for traffic and pedestrian flows (Notice in Plate 15 the squatter-dwelling quarters of Tappeh-e-Moradab are prominent in the background)



create another centre, at a higher functional peak, to serve the newly developed high class shopping areas expanding in the west of the city.

Now that the pattern, form and functional characteristics of the commercial establishments of Karaj have been examined, it is possible to suggest some ideas for the improvement of the existing situation in Karaj City Centre. These ideas may be divided into two major suggestions:

1. The establishment and improvement of external routes connecting Karaj to its hinterland and to other parts of the country, which may result in a better and quicker marketing network and in improving it as a tourist attraction.
2. Provision of measures to improve the overall aspects of the existing city centre. Some of the major requirements in this respect can be listed as follows:
 - a. Reduction in the congestion of the city centre by prevention of car traffic. The creation of some alternative routes to by-pass the centre would therefore be a matter for consideration.
 - b. Establishment of some sufficiently large parking area at a convenient location with easy access to the city centre.
 - c. Creation and expansion of unloading points especially for agricultural products.
 - d. Provision of recreational establishments for both shoppers and visitors in the city centre..

If such suggestions are carefully considered, there is also the chance of increasing the attraction to the city as a whole for the tourist.

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CHAPTER 6

INDUSTRY

Introduction

The spatial patterns and functional organisation of industry in Karaj will be examined in the first part of this section whilst the second part will take a more detailed look at selected industrial establishments.

Like the previous chapter (Chapter 5), personal investigations carried out by the author make up the major data base for the discussion developed in this chapter. As part of this personal fieldwork two separate questionnaires were employed to collect information about (a) selected industrial establishments, and (b) about workers working in these industrial establishments. It must be pointed out that whilst the survey of commercial establishments was fairly comprehensive in its coverage, here, in the case of factories and the workers employed by them, there were difficulties such as refusal to be interviewed, which obliged a rather subjective selection of some factories. Nevertheless where it was possible, an attempt was made to choose those factories which were representative of the city's industrial structure. As regards the labour force, an attempt was also made to interview at least one individual from a separate section of each factory.

The impact of industry on the urban growth of Karaj and the close relationship of its industrial development to the general economic development of Iran requires that we outline, first of all, the salient influences at a National level.

The rise of modern industrial activity started in Iran in the reign of Reza Shah (1925-41). However, the major industrial achievements have been mainly the result of post-war development and particularly since the early 1960's. The ever increasing emphasis on manufacturing industry in the economy can be made clear by a review of the past five national

development plans; starting in 1949. Such a review also helps to clarify how far the present spatial patterns of industry at both national and regional level are the result of planned policies.

The First and Second Development Plans (1949-55 and 1956-62) both attempted in the main to improve the industrial sector and encourage an increase in the exploration and utilization of the natural resources of the country. The government was responsible for a major share of the capital investment during both the First and Second Plans. With the Third Development Plan (1963-67) the basic objective was to develop those industries which would make the maximum contribution to national income. The Third Plan also clearly emphasized that the government should invest directly only in those industries in which the private sector was unable, for technical or financial reasons, to make any commitment. It stressed the development of small and medium scale industries, and in the field of heavy industry began the preliminary phases of setting up the steel, petrochemical, machine tools, aluminium, tractor and pipe manufacturing industries.

At the beginning of the Third Plan the private sector, owing to economic stagnation, did not show much inclination towards making new investments. But from the end of 1964, private investment started picking up at an unprecedented rate. The assistance provided by the Plan Organization and the industrial banks played an important role in this revitalized activity. The policy of the Government in encouraging and protecting the private sector resulted in increased confidence on the part of the private investors who channelled their savings into the industrial sector. The over-all result of these attempts was a remarkable increase in the share of industry owned by the private sector, so much so that out of the total of 70 billion Rials invested during the Third Plan, 46 billion Rials, i.e. 65.7 per cent, were provided by the private sector and 24 billion Rials by the Plan Organization. The contribution of the private sector in the last year of the Third Plan (1967) was 50 per cent more than that originally planned. (1)

During the period of the Third Plan, the Government's policies for industrial expansion included tax exemptions; the encouraging of exports and of foreign investment; the granting of credit facilities and long term loans and equity participation through the Industrial Credit Bank; the Industrial and Mining Development Bank of Iran and the Industrial Guarantee Fund; the establishing of vocational schools and industrial colleges; on-the-job training of workers, technicians and engineers; training in industrial management, industrial accounting and related fields; the providing of technical assistance and facilities by employing Iranian and foreign technicians; the preparing of feasibility studies; and the establishment of industrial laboratories and Industrial Poles. Despite two years of economic stagnation during the Third Plan, the average annual growth in the industrial and mining sector was over 12 per cent. It was during these last three development plans, as we shall see, that the major part of the industrial development of Karaj occurred.

The Fourth Plan (1968-72) was the first stage of a long term programme to industrialize the country as a whole, the objective of which was to make the country self-sufficient in consumer goods and to encourage the manufacture of capital and intermediate goods inside the country, so as to minimize the volume of imports, and to diversify the export of locally manufactured goods to foreign countries. This would have reduced the dependence of the economy on oil revenues. The major achievement of the Fourth Development Plan was the introduction of heavy industries such as steel, aluminium smelting, car manufacturing and petro-chemicals.

As regards investment, because of the large scale of the projects the Government's share in industrial and mining investment was much higher than during the Third Development Plan, i.e. 48 per cent compared with 35 per cent during the earlier Development Plan.⁽²⁾

One of the major efforts on the part of the Government organizations during the Fourth Development Plan which had a direct effect on Karaj was

to make a start on dispersing industrial activity away from areas nearby Tehran. This will be one of the major themes examined in the following pages.

The Fifth Development Plan (1973-77) which had the same major targets as the Fourth Development Plan, attempted to improve the quality of industrial products and encouraged the export of industrial goods to assist the general economic growth of the country.

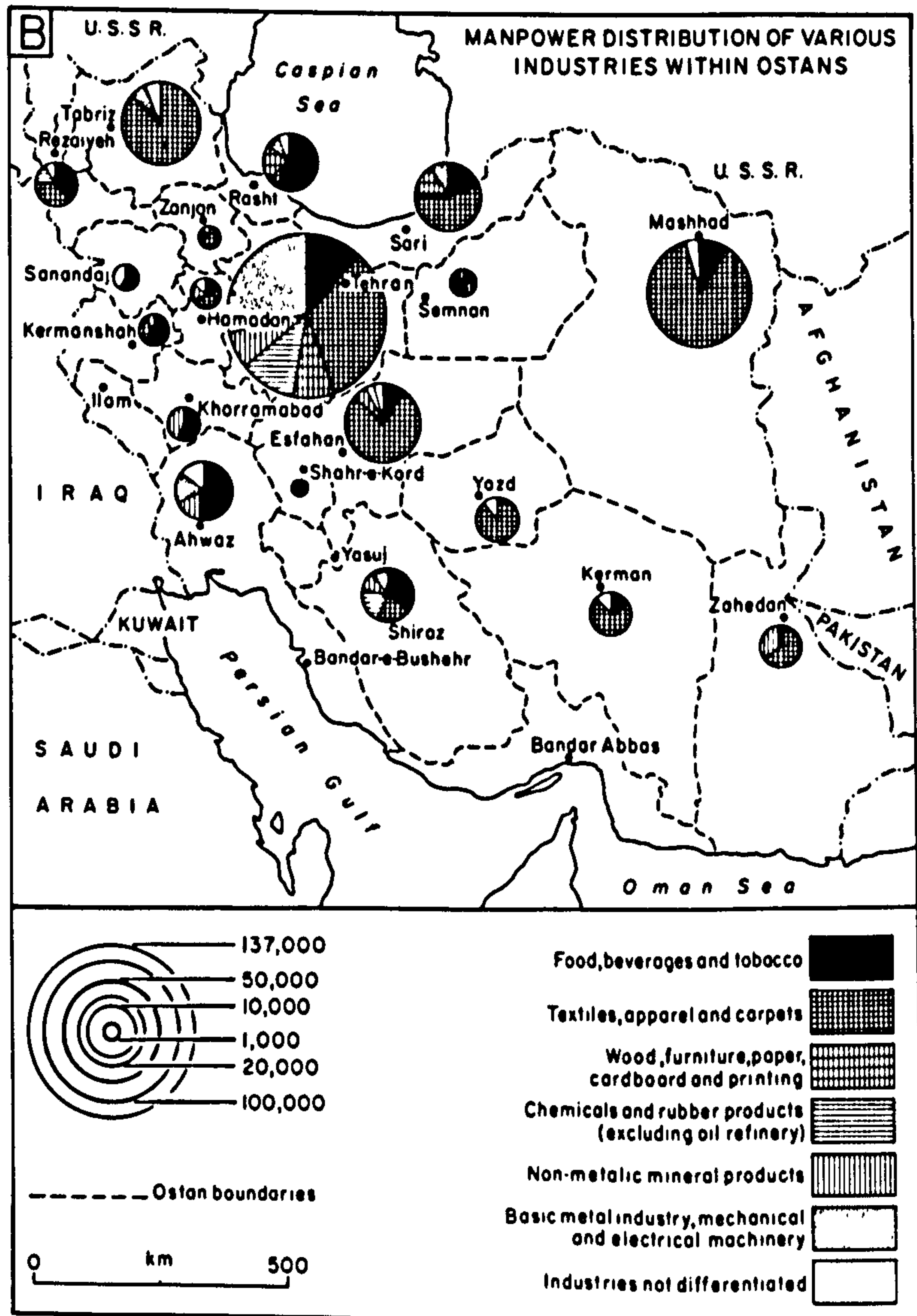
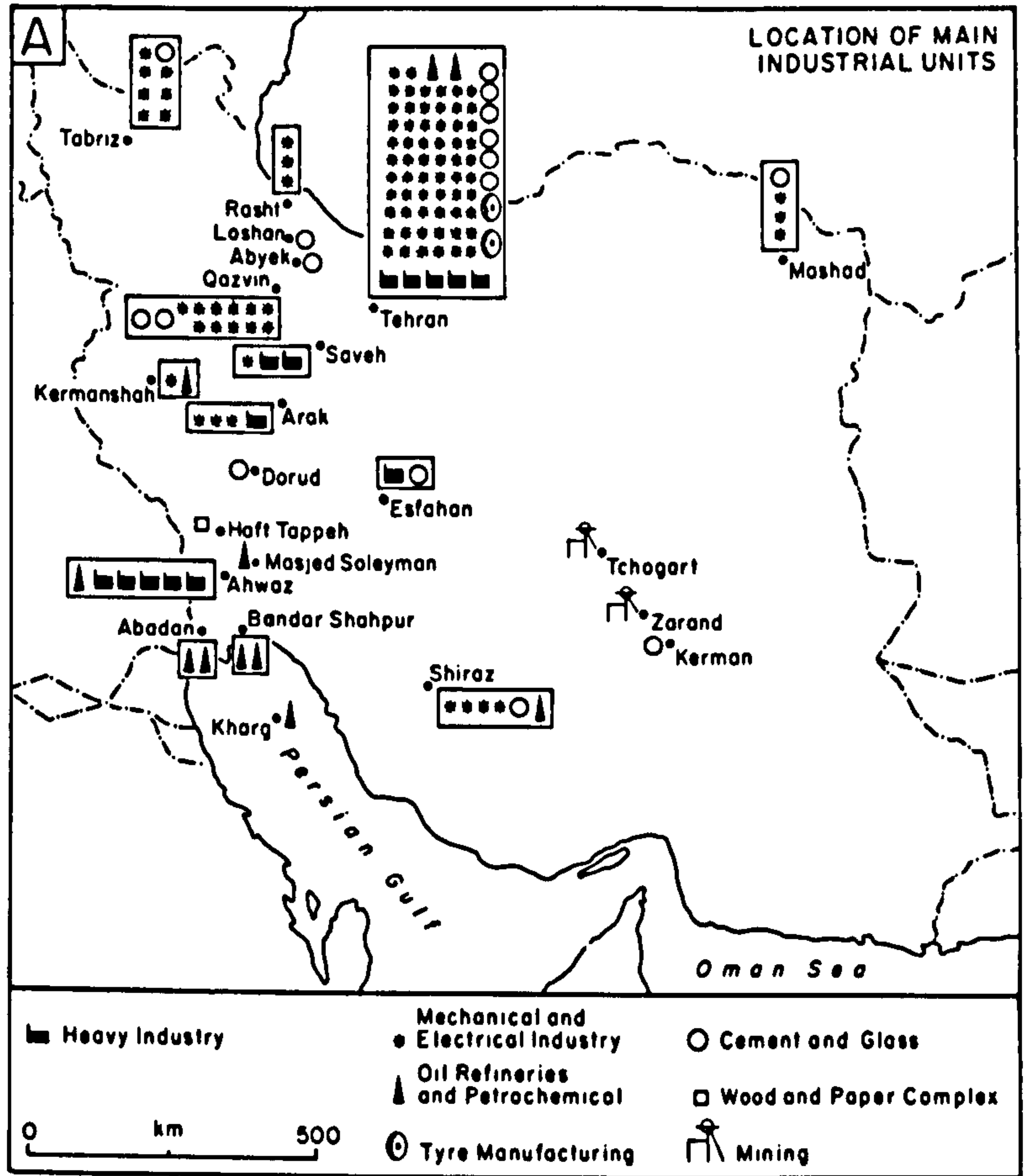
The socio-economic advantages enjoyed by Tehran and the lack of restrictive planning controls were among the main reasons for Tehran's emergence as the only major industrial centre in Iran up to the end of the Third Development Plan. Almost 60 per cent of the total of industrial firms in the country were concentrated in Tehran by the mid 1960's. Since then particular efforts have been made by the Government to decentralize industrial activity. As mentioned earlier, this process of redeployment was started during the Fourth Development Plan, and has been considerably intensified since then. These efforts can be summarized as follows:

- (a) Direct action by the Government through the intermediary of the major state corporations.
- (b) Private initiative, stimulated by legislation (e.g. that there should be no new industrial activity within 120 km of the Tehran urban area; and that tax and financial incentives should be made available in the provinces).

Nevertheless, the dominance of the capital still remains considerable. This is why the contemporary industrial geography of Iran features a high concentration of consumer goods industries in the Tehran region. Figure 6.1 A and B give the totals of industrial units and industrial manpower for the whole of Iran dates in 1971. The predominant position of the Tehran region is immediately evident when the two sets of figures are compared.

This description of the concentration of industry in Tehran and the

Fig 6:1 LOCATION OF MAIN INDUSTRIAL UNITS AND MANPOWER DISTRIBUTION IN IRAN, 1971



Source: P.B.O. Centre for National Spatial Planning

attempts by the Government to decentralise it leads us on to considering the situation of industry in Karaj.

As was stated earlier, the initial development of Karaj was the result of the agro-industrial processes established in the city during the Reza Shah period. The choice of Karaj too as the site for an 'Industrial Model Town' is a good reflection of the locational advantages enjoyed by Karaj in the neighbourhood of Tehran. Nevertheless, the present industrial status of Karaj is a result of much more recent development which dates from the mid 1950's, when the First and Second National Development Plans (1949-55, 1956-62) started to operate.

6.1 Spatial Distribution of Industrial Units

The proximity of the very large and reliable market of Tehran can be said to have been mainly responsible for the growing concentration of industrial activities in both the city and the region of Karaj. In 1974 there were 568 industrial establishments in the whole Karaj Shahrestan, which employed 28,023 labourers.⁽³⁾ An interesting feature of these enterprises is the great difference between the large and small scale establishments in terms of the number of persons they employ. The large scale establishments - having more than 10 labourers - while comprising 263 units or 46 per cent of the total, employed 26969 persons or more than 96 per cent of the total of employees. In contrast, the small scale units - having less than 10 labourers - numbered 395 or 54 per cent of the total and employed only 1054 persons or about 4 per cent of the total of employees. The average number of labourers per unit, therefore, varied from as high as 102 persons for large scale establishments to as low as 3.5 persons for small units (see Table 6.1).

Table 6.1: Industrial establishments, employed persons
and persons per unit in Karaj Shahrestan, 1974

	Total	Large scale Establishments (10 + empl.)		Small scale Establishments	
		No.	%	No.	%
No. of Industrial establishments	568	263	46	305	54
No. of employees	28,023	26,969	96	1,504	4
Employed persons per industrial unit	49	102		3.5	

Source: Plan and Budget Organization of Iran, Statistical Centre of Iran and Ministry of Labour and Social Affairs, op. cit. 1975.

By reasons of their large number and size, the industrial establishments in Karaj Shahrestan form as it were a westerly extension of the main industrial units of Tehran, to which they could be considered in one sense an extended part. Access to a fast highway is one reason for the linear expansion of these large factories along the Tehran-Qazvin road, continuing almost to Abyek 40 Km west of Karaj city. One of the particular advantages associated with this latter location is that while these establishments are at a very convenient distance from Tehran, they enjoy much cheaper land prices so much as that land plots between Karaj and Abyek are sometimes 20-50 times cheaper than the equivalent land plots between Karaj-Tehran.

The fact that there are land-plots on either side of Tehran-Karaj road that are so far unused is mainly due to the restrictive legislation introduced by the Government since 1968, which had the direct effect of preventing the construction of more industrial units along this route.

In general, light industries are the dominant element in the pattern of industry in Karaj, mostly manufacturing such products as textiles, clothing, chemical, food, leather and small machine tools. This pattern is the result of both the nature of industrial development during the first three national development plans and also of the fact that most of these non-basic industries serve the immediate requirements of the Tehran market.

Having described the general distribution of industries in Karaj Shahrestan, the study will now focus in more detail on those establishments located within the urban boundary of Karaj city. Here, particular emphasis has been given to the large scale units, which in 1974 were 30 in number. In order to obtain a better understanding of the actual pattern of these intra-urban industrial activities a personal survey was carried out to examine eight factories (i.e. almost 25 per cent of the total large scale establishments), each representing a different type of activity. Ten labourers at each factory were also interviewed, and the results of these interviews are analysed in a later section.

The distribution, size, type of activity and the pattern of ownership of the large scale factories of Karaj are set out in Fig. 6.2 A & B, and Table 6.2. Since the early 1970's, further industrial development in Karaj has been virtually prohibited, so this figure of 1974 provides in effect a very up to date picture of present industrial activity in Karaj city.

The industrial units in the city show a rather scattered distribution occurring more frequently in the south and west. To study the spatial pattern, the following divisions were used:

- 1 - Western district
- 2 - Southern district
- 3 - Eastern district
- 4 - Central district .

The general characteristics of the large scale industrial units will be discussed in the above district and selected units will be studied later in much more detail.

6.1.1 Western district

The western industrial district consists of a concentration of industrial units represented mainly by the Jahan Industrial Complex. This is a multi-purpose plant created by a private investor during the First and Second Development Plans (see Fig. 6.3). The complex is in fact a part of an agro-industrial project covering a total area of about 12 hectares.

Industrial products in this district vary considerably. The textiles, vegetable oils, and works making bricks, or soap, or ice. This district, originally outside the city boundary, is now gradually becoming engulfed by the westerly expansion of the city's residential suburbs. Owing to the nature of its products, the noise and pollution it produces and its location in relation to the prevailing westerly winds, this

Fig.6.2 A&B GENERAL CHARACTERISTICS OF THE LARGE FACTORIES IN KARAJ CITY.

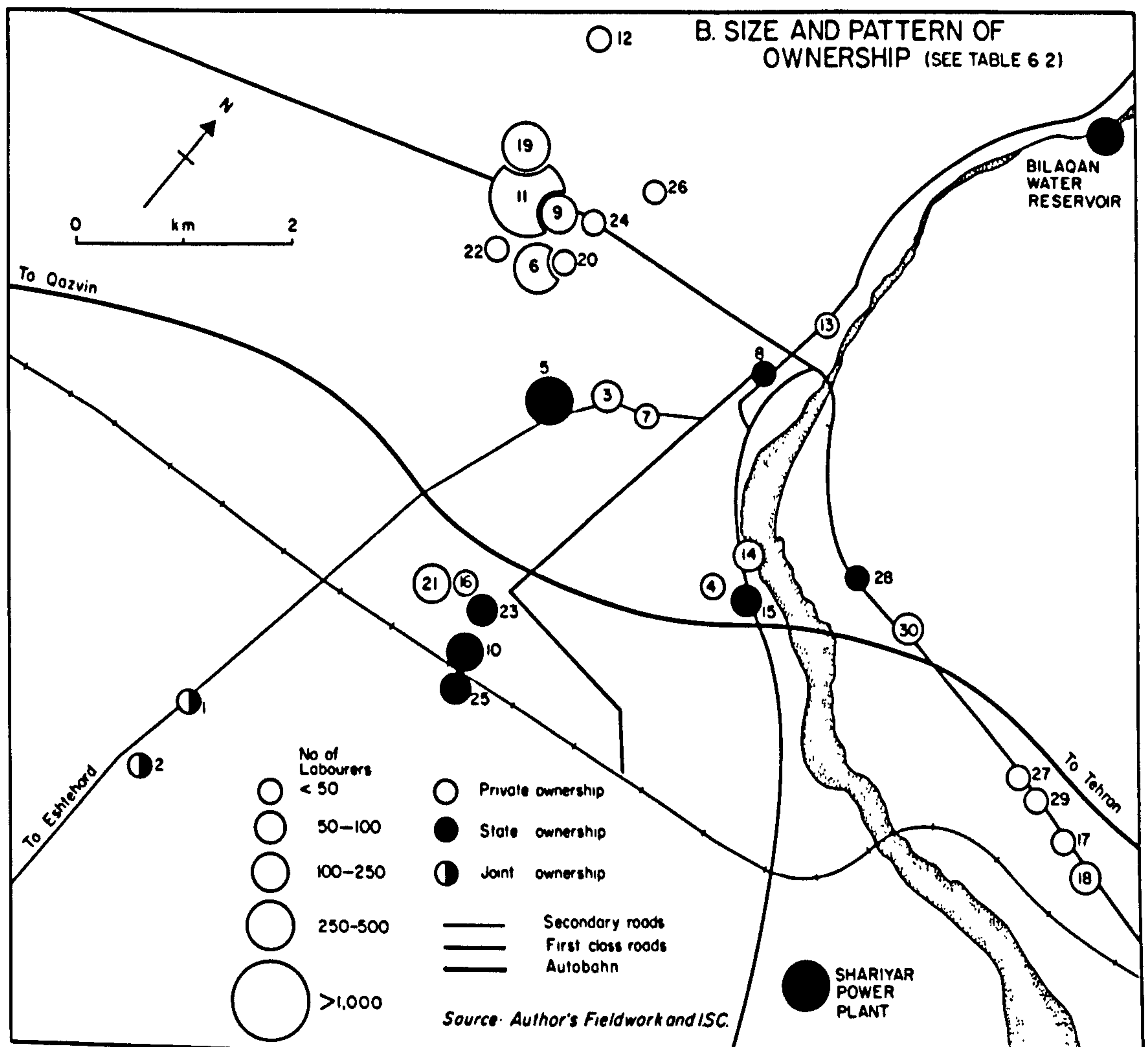
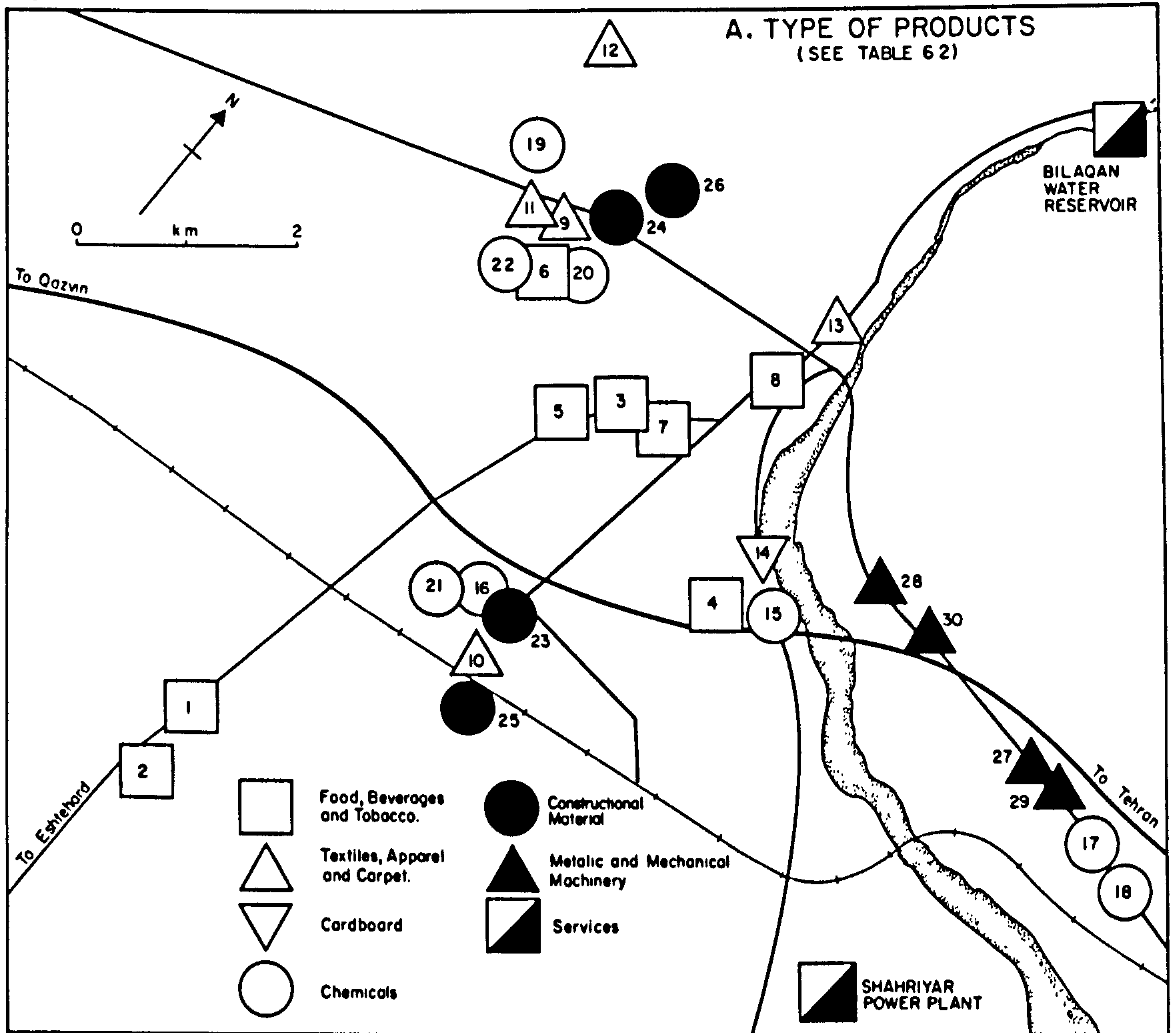


Table 6.2: General Characteristics of the large scale factories in Karaj City

No.	Name of Factory	Type of ownership	No. of Labourers	Location	Type of Products
1	Kadour	Private & State	31	South	Meat stuff
2	Vita	Private & State	30	South	Tinned fruit & vegetables
3	Meykhosh	Private	75	Centre	Tinned fruits
4	Morad	Private	30	Centre	Tinned fruits
5	Karaj sugar	State	287	Centre	Sugar
6	Jahan	Private	264	West	Vegetable Oil
7	Zar	Private	15	Centre	Alcholic beverages
8	Tobacco monopoly	State	10	Centre	Cigarettes & Tobacco
9	Fateh	Private	145	West	Textiles
10	Iran Carpet	State	146	South	Wool washing & Carpet weaving
11	Jahan	Private	1660	West	Textiles
12	Paristex	Private	42	West	Textiles
13	Pardis	Private	15	Centre	Clothing
14	Parsa	Private	70	Centre	Cardboard
15	Karaj Chemical	State	50	Centre	Sulphur
16	Fakhriyeh	Private	22	South	Sodium sulphur
17	Irang	Private	47	East	Industrial Paint
18	Pelican	Private	69	East	Ink
19	Armeh	Private	365	West	Plastic & Nylon goods
20	Jahan	Private	13	West	Soap
21	Sholeh	Private	128	South	Matches
22	Internol	Private	38	West	Motor Oil
23	Polica	State	63	South	Constructional Materials
24	Shokri	Private	14	West	Constructional materials
25	Travers Sazi	State	85	South	Cement sleepers
26	Mehrab	Private	19	West	Building parts
27	Tasfiyeh	Private	12	East	Air filters
28	Boresh	Private	25	East	Metal works
29	Farahmand	Private	61	East	Machine tools
30	Azimi	Private	12	East	Metal works

See Fig. 6.2 A and B

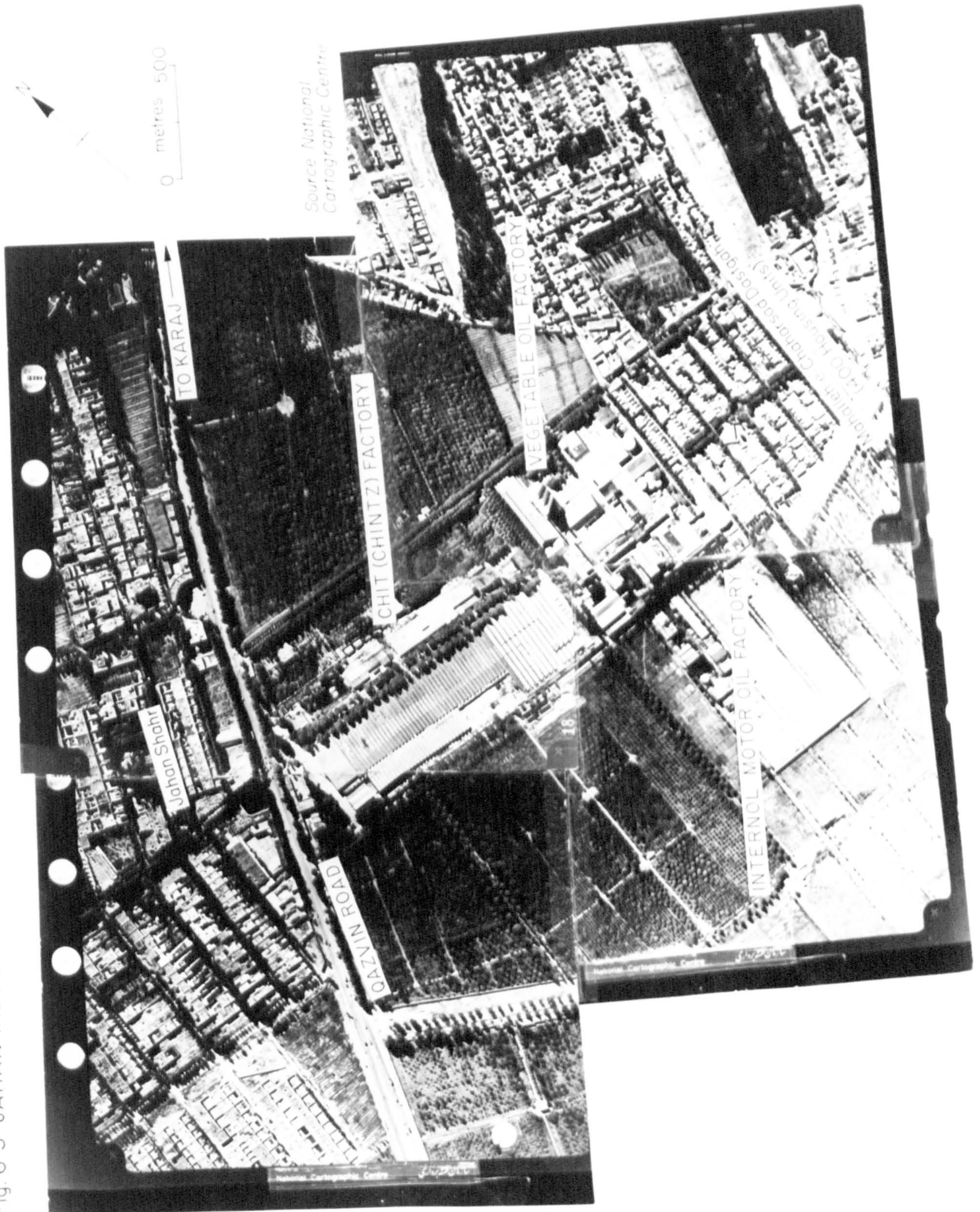
industrial district is becoming gradually less acceptable to the growing populations of the nearby residential areas. However, the area remains very attractive to industry because of its convenient location and the easy access to the Karaj-Qazvin road and also the connection with the Tehran-Tabriz railway.

6.1.2 Southern district

The southern district conforms mainly with the site of the former 'Industrial Model Town', which was planned and partially built during the 1930's, together with some additional land to the south. The total area of this district is about 200 hectares and it is located almost 4.5 Km to the south of the city centre of Karaj. The major industrial activities in this district are production of chemicals, food and constructional materials and carpe weaving. There is also a factory with a total area of 5000 sq. m. run by the State Railway Company, producing cement sleepers for the rest of the country. It is located to the south of Karaj Railway Station. Using annually about 50,000 cubic metres of gravel and sand from the bed of the Karaj river, it has had a rather negative effect on the physical environment of the area. A direct effect of this excessive extraction of sand and gravel has been the creation of very long, deep ditches in the Karaj river bed, resulting in the rapid infiltration of water. This is one reason why the villages to the south of Karaj receive a much lower water supply than they used to have.

In general the district's location away from densely populated residential areas and its favourable position with regard to the direction of the prevailing wind, make it a suitable site for industrial activities. Furthermore, its location beside the Tehran-Tabriz railway line is also advantageous. Easy access to underground water and the Shahdasht (or Mardabad) irrigation canal, which passes through the area, supplying

Fig. 6.3 JAHAN INDUSTRIAL COMPLEX



some of the water requirements of the district, provide other advantages for this area. The availability of further plots of land to the south of this district will also be useful, if the existing establishments in other parts of the city are to be moved out from their present sites.

6.1.3 Eastern district

The eastern district includes those industrial establishments located in a linear pattern on either side of the Tehran-Karaj road. As shown by Fig.6.2A metal works are the major activity carried out by these factories. In spite of their accessibility to a major traffic road, their very location immediately beside the Tehran-Karaj road results in obstacles both for these establishments (e.g. as regards loading and unloading), as well as difficulties for the cargo and passenger traffic road. The congestion they create is a major reason for road accidents in this area.

6.1.4 Central district

Factories in this district are those which are distributed mainly in the central part of the city and include particularly those industrial establishments built during the Reza Shah period. They demonstrate a lower degree of concentration when compared with the factories in other districts, and they can be divided into two groups. Firstly there are those which are located on the western flank of the Karaj river and now lie to the north of the Tehran-Karaj autobahn; secondly there are those factories which are distributed to the western part of the agricultural faculty. The products of these factories are mainly foodstuffs and chemicals.

Owing to the ever increasing growth of housing in this part of the city, the location of these factories is now causing difficulties. The noise, smell and air pollution they create is gradually becoming a

serious problem for the neighbouring residents. It would seem that with the rapid residential development in Karaj the removal of these factories from this central location must be a matter of immediate concern - or attempts must be made to reduce their detrimental impact on the surrounding environment.

6.2 Studies of Selected Industrial Units

Having looked at the distributional patterns and the types of industrial activities of Karaj city in very broadly defined industrial districts, the study can now take a closer look at a number of individual factories. As already mentioned, eight factories of different types were chosen for intensive survey. These factories which were studied as being representative of the different elements of the industrial structure of Karaj are listed below according to the date of establishment.

- a - Sugar factory
- b - Jahan Chit (Chintz) factory
- c - Jahan Vegetable Oil factory
- d - Iran Carpet factory
- e - Kadour Food Stuff factory
- f - Vita Fruit Conserving factory
- g - Internol Motor Oil factory
- h - ArmeH Plastic and Nylon products factory .

Information for this part of the study was obtained from the analysis of two separate sets of questionnaires, one directed at the industrial establishments themselves, and the other to their labour forces. The following discussion has, therefore, been divided into two parts, based on these two separate questionnaires.

6.2.1 Characteristics of the Industrial Establishments

The questionnaire on the industrial establishments consisted of several parts (see questionnaire No.2), the findings from seven of which, covering the physical characteristics of the factory and its raw material and marketing relationships, will be discussed in detail as follows:

- (i) History and location of the factory
- (ii) Size and dimensions of the factory
- (iii) Investment pattern
- (iv) Raw material supply and the type of production
- (v) Marketing of finished products
- (vi) Economic position of the factory
- (vii) Potential and proposed expansion programmes.

In due course reference will be made to a particular factory as an appropriate example.

The date and location of the selected establishments will be looked at first. The date of establishment of the sugar factory goes back to 1932. Constructed during the Reza Shah period, it was in fact the second factory to be built in the whole country. Jahan Chit and Jahan Vegetable Oil factories are the result of the industrial developments carried out during the First and Second Development Plans. Three other factories, including Iran Carpet, together with Kadour Meat stuff and Vita Fruit conserving factories, were established respectively in 1957, 1958 and 1962, during the period of the Second Development Plan (1956-62). The two remaining factories, i.e. the Internol Motor Oil (constructed in 1965) and Armeh factory (built in 1968) are the result of industrial development during the Third and Fourth Development Plans. In general the average age of the establishments is about 21 years.

As to the location of factories, it was found that this factor was closely associated with the date of establishment, the size of the city at that time and the price of land. Consequently, the older the factory the nearer it is to the city centre (e.g. the Sugar factory), whilst by contrast the more recently it was established, the further it is from the city centre (e.g. Vita Fruit conserving factory). Indeed, with the exception of the Internol Oil and Armeh factories, which were constructed on the site of the reserved lands bought during the late 1940's, the distance of all other factories from the city centre increased according to the date of establishment. Consequently, the distances of the selected factories from the city centre of Karaj vary considerably from as close as 2½ Km for the sugar factory as far as about 9 Km for the Vita Fruit conserving factory. All the factories under consideration are linked both to Karaj and Tehran by asphalt roads, and some of them, such as Jahan Chit, Jahan Vegetable Oil, the Sugar factory and Iran Carpet, are either in direct connection with the Tehran-Tabriz railway or located very close to it. However, when we consider the general reason behind the establishment of these factories and for their particular sites, a combination of several factors seems to be responsible. Factors such as state land (Khaleseh) or cheap sites, existing facilities, raw material supplies etc. are all of importance. One factor, however, seems to be especially dominant and this is proximity to Tehran as a major market. Associated with this latter factor are many others such as proximity to the decision taking authorities, greater security of investment and better marketing through faster communications, and better banking facilities.

The size, floor space and dimensions of the factories in question proved to have been determined by factors which are generally common in other parts of Iran: these are namely, distance from the city centre, date of land purchase and factory establishment and the type of activity. However,

one factor more applicable to Karaj is the availability of the state lands (Khaleseh) used for the Government factories. The relationship between the total area of land available to the factories, and the actual floor space of the building in most cases revealed that only a low proportion of land was built on. 55 hectares was the total effective area of the factories studied, and 9.2 hectares the total floor space area, i.e. only about 1 out of every 6 metres² was allocated to actual floor space.

The height of the factories may also change according to the kind of industrial activity it houses. The date of the factory's establishment is another determining factor: the more recent the factory, the more advanced the machinery it contains, the more it has expanded horizontally especially in one storey buildings, whereas the older factories using old machines show a greater vertical extension. This pattern is shown by Table 6.3, in which the sugar factory, built in 1932, is a four storey building while the Armeh Plastic and Nylon factory constructed in 1968 is a one storey building.

From the investment point of view the majority of the factories under study are financed privately. Out of eight factories surveyed, there was only one sponsored by the State and two were run by a joint State-private investment. The latter situation is either to protect a factory against bankruptcy, or is the result of a scheme to promote industrial development that operated during the Third Development Plan. The Plan Organization itself and the Industrial Credit Bank are among the bodies sharing in the investment in the Kadour and Vita factories. Change in the amount of investment is related mainly to the demand factor and particularly to profitability. Other factors such as sound management, the initial sum invested, access to bank credits through personal influence and particularly availability of suitable reserved lands are also very important. For

instance the Jahan Vegetable Oil factory, as a very successful firm, has managed to extend its floor space considerably by an almost 20-fold increase in investment during the 1956-76 period, i.e. an average increase of 100% per annum (see Table 6.3), taking into account the fact that the price of land has not been included in development expenditure. A similar factor (reserved land) also proved to be decisive in the expansion of other units belonging to the Jahan Industrial complex such as Jahan Chit, Armeh and the Internol Motor Oil factories.* By contrast, there have been some other industrial units recording only a slight increase, no change or even a reduction in the sum of investment. In 1976, the Vita factory for instance, had increased its investment by about 15 per cent compared with its initial investment, and the Kadour factory had suffered a reduction of about 32 per cent between 1958-76. Similarly, the Sugar factory was rather static in its investment rate, one reason why it was handed over to the private sector in 1965.

The supply of raw material for the factories is obviously critical. This is particularly true of the food stuff factories, especially the Sugar factory, which owing to the seasonal variation of sugar beet, operates for only about 3 to 4 months per year, from September to December. During the remaining months of the year, labourers are engaged mainly with the repair of machines and in preparation for the following year. Those factories producing food stuffs, as a general rule, tend to rely mostly on the agricultural products of the surrounding region.

* At the present time, the unused reserved land attached to some of the factories, while providing the possibility of further expansion, also actually represents a very considerable capital holding (for example there has been a 116-fold increase, during the 1962-76 period, from 6 Rials to 700 Rials per square metre in the value of the unused land attached to the Vita factory).

However, in some cases such as the Vita Fruit conserving factory, the raw fruit such as cherries is transported from as far as Mashhad and Esfahan. On the other hand, the non-food factories such as Jahan Chit and Internol Motor Oil factories, import most of their raw material requirements from abroad, especially from the United States and the United Kingdom (see Table 6.3), so that flow of raw material is more regular.

One interesting feature noticed in the transportation of both raw materials and finished goods is that almost all are moved by lorries. Since the Tehran-Karaj Autobahn and its westerly extension is prohibited to heavy traffic, the Tehran-Qazvin road passing through Karaj City centre is used for this purpose, and in the absence of any alternative route, it is one of the most congested roads in the whole country. This can be demonstrated by the fact that 45 per cent of the heavy traffic to and from Tehran uses this road. Consequently a very mixed pattern of traffic results in long delays and produces difficulties for the factories in the Karaj region. As an alternative, because most of the factories in Karaj are either connected directly with or are near to the Tehran-Tabriz railway, the raw material can be transported much more easily by rail, extra freight wagons and sub-branch lines being available. Being more profitable, the existing cargo trains are engaged mainly with transportation of oil products, so they are less competitive with lorries.

With respect to the type of industrial product, as mentioned before, the general pattern in the whole Karaj Shahrestan is of relatively light industry and Karaj city is no exception to this. It seems that the food industry is meeting immediate requirements and, being a relatively less risky activity, is predominant. However, textiles, chemical and plastic goods have also had their own effect on the industrial structure of Karaj city.

Marketing of the finished products forms the most important part of these factories' activities. Except for Jahan Vegetable Oil, those factories which produce food stuffs transport almost all their products to Tehran.

(Jahan Vegetable Oil transports only 25 per cent of its products to Tehran). In the case of Kadour meat processing factory which produces different types of sausage, all the production (850 tons per annum) goes directly to Tehran, since sausage meat (beef and pork) is not eaten much in the provinces, obviously for religious reasons. By contrast, other factories producing non-food products, including Jahan Chit, Armeh and Internol Motor Oil, send only 25-30 per cent of their products to Tehran, and the remaining 70-75 per cent goes to other parts of the country. The Motor Oil factory alone exports about 5 per cent of its products abroad to Afghanistan. This general situation could be taken as an index of a great demand for such industrial products in Iran itself. Also lack of competitive price.

When the economic situation of the factories is examined, the answers given in the questionnaire have to be interpreted very carefully. Although the factory authorities seemed to give fairly reasonable and convincing answers one cannot be sure that the answers given were always reliable and, therefore, only tentative conclusions can be drawn from their replies. Moreover, there were three factories which refused to reply to questions about economic output and the sum of annual profits. However, there are means for estimating the approximate annual profits made by these factories, especially for those giving no answer. One simple way might be to examine the changing pattern of investment during recent years. Another way is to calculate the sum of the bonus given to the labourers annually as their share from the net profit made by the factory.*

If the economic condition of the various enterprises is estimated in the way described, it becomes clear that with the exception of the Jahan Chit factory, which managed very quickly, within the first five years of

* This is a sum of money to be distributed among all the labourers in the factories according to the net profit maker scheme devised by His Majesty the Shah of Iran.

operation to raise its productivity to a profitable level, the rest of the factories experienced an initial period of loss or at least of minimal profit. It was only from 1970 that the factories started to make appreciable profits; and some of them such as Jahan Vegetable Oil factory, had a 23% increase in profit compared with the previous year in 1976 (see Table 6.3). Many factors contributed to this latter financial improvement, the most important being the general growth of the national economy, reflected in the per capita income and the increase in purchasing power and the particular emphasis of the Government on industrial development during the Fourth Development Plan. It is thus clear that this period of national prosperity coincided with the period of increased productivity in the factories.

Finally, we must examine the plans made in the various factories for the future and their general prospects.

There is the predictable, but now the less significant situation that a very close relationship exists between those factories with a high rate of profitability and those enterprises having programmes for further future expansion. Of the total list of factories studied there were three (Sugar factory, Iran Carpet and Kadour) that had reached the stage of their maximum intended development and therefore had no intention of any further physical expansion. The other five factories had each a plan for future expansion to be carried out at some time between 1977 and 1980. The Internol, Armeh and Jahan Chit factories having large tracts of land, could apparently expand their floor space required on the site itself beside the already existing buildings, whereas a factory such as Vita would have to expand its activity somewhere away from its present site. If we consider the proposals made for expansion, and the steadily more restrictive legislation in the Tehran region, it seems unlikely that any of the above mentioned factories will under any circumstances succeed in obtaining permission to extend its operations. As a result of the

measures introduced to limit the spread of industrial activity in the immediate vicinity of the capital, several industrial satellite towns have sprung up further away in Qazvin and Saveh, and there has been a rapid industrialization of a number of other agglomerations which are fairly well served by the existing communications network and are near enough to the Tehran market (Arak and Rasht).

However, in spite of the measures taken, industry still remains highly concentrated in the Central Province, especially around Tehran. Private developers still seek to establish their factories close to the Tehran market. A substantial number of factory units were observed under construction on either side of the main road from Tehran near to Karaj when field work was in progress in September 1977 - precise use not yet determined.

This study of the physical characteristics of the factories in Karaj has enabled us to provide a sketch of the industrial land use and to identify some of the influences behind its distributions. It has shown how the process of industrial development has been a consequence of many inter-related factors, historical and socio-economic. The following discussion will concentrate on the characteristics of the labour force, the most important prerequisite for any kind of industrial activity.

6.3 Labour force characteristics

Because of the importance of the labour force it is studied here under a separate heading to the physical characteristics of the factories. The manpower situation in a locality is usually fundamental for any industrial development. The total number of labourers in the eight selected factories amounted to about 2670 persons, the numbers employed varying quite considerable from one factory to another, from units employing less than 50 persons to those having more than 1500 labourers.

Just as they were for the industrial establishments themselves, questionnaires completed by the labourers are the basic data for this part of the study. Despite the differences in the number of labourers in each factory it was decided to select for interview 10 labourers from each, a small proportion which proved acceptable to most of the factory managers. As a result 80 questionnaires similar to questionnaire No.3, were completed. Answers to the major questions listed below form the basis for the following oral discussion. These major questions (used at individual interview) are as follows:

- (a) Personal characteristics
- (b) Educational status
- (c) Employment and earning situation
- (d) Housing conditions
- (e) Journey to work.

A detailed breakdown of the answers given to all the questions asked is shown in Table 6.4. Furthermore, Appendix 4 is provided to show the percentage frequency distribution of factors relating to the labour force.

We shall now turn to an analysis of the data gathered through these questionnaires and other information collected during the field work.

When the personal characteristics of the labourers were investigated, the very high ratio of male to female labourers was immediately evident. The main reason for this is the low female activity rate for the country as a whole; but other reasons such as the type and size of the industry concerned are also important. For instance, the female labourers numbered about 160 persons, i.e. 10 per cent of the large total labour force in the textile factory of Jahan Chit, unusual in textiles, and 70 persons or 70 per cent of the labourers in the fruit conserving factory of Vita. The remaining factories had either no female labourers at all, or only a very small proportion.

Consequently, the total percentage of female labourers at the eight factories was well below 10 per cent.

The age grouping of the labourers is also interesting because it was very much lower than the national average age. Out of the total number of labourers interviewed, 48 per cent were under 30 years of age, 94 per cent under 50 years of age and there were only 6 per cent who were over 50 years of age. Individual factories varied quite considerably in the age pattern of their workers. For instance while 70 per cent of the labourers in the Sugar Factory were above 30 years of age, the corresponding figure for the Jahan Chit was 50 per cent, with 40 per cent under 20 years of age. In spite of restrictive regulations, the child labour force was prominent in this particular factory, which could mean it is not an uncommon feature in Karaj City as a whole.

The birthplace of the labourers indicates clearly that migrants form the majority of the population of Karaj City. Of the total of labourers interviewed, only 25 per cent had been born in Karaj and the rest came from other parts of the country, with a considerable proportion from Yazd (19 per cent). This latter fact was evident particularly in the Jahan Vegetable Oil, Jahan Chit and Internol factories all of which were located in the Jahan Industrial Complex. The proportion of Yazdi labourers in these factories were 60 per cent, 40 per cent, and 30 per cent respectively. This dominant proportion of Yazdi employees is due to the fact that the initial investor in the Jahan Industrial Complex was himself from Yazd, and found it much more advantageous to employ labourers from his home city partly because of better motivation to employment; and thus partly also because of their willingness to accept lower wages. This case proved to be very interesting because it demonstrated that once a group of migrants were able to find employment and settle down, they tended rapidly to inform their relatives and encourage them to migrate also. One consequence of this kind of phenomenon has already been discussed (p.148) as it related to the shop-keepers of the central area of Karaj.

The dependency ratio for the labourers was also investigated by a question asking for the number of dependent persons per labourer. The facts were that 42 per cent of the labourers had to support 4-6 dependents, and 20 per cent had a minimum of seven people dependent on them. This relatively high level of dependency (i.e. 62 per cent with four dependents and more) undoubtedly has a negative effect on the living standards of the labourers and indirectly depresses the state of the city's economy.

Educational status was also investigated by means of questionnaires, this being important because its impact on productivity and income level has already been the subject of many socio-economic studies.⁽⁴⁾ Of the total of workers interviewed, 9 per cent were illiterate. The proportion of illiterates, however, varied greatly with the individual factory, so that for example in Jahan Chit factory illiterates formed 30 per cent of the work force. Those labourers with one to three years of primary school study, including those who had completed two years of 'Illiteracy Campaign Course' accounted for 31 per cent of the total. The proportion holding a primary school certificate was 32 per cent, so that the last two categories make up 63 per cent of the work force. With these categories also, there was considerable variation between different factories. For instance, labourers with 1 to 3 years of primary school studies formed 70% of the total in the Jahan Vegetable Oil factory, while the corresponding figure in Armeh factory was only 10 per cent.

Labourers with 7-9 years of study formed 12 per cent and those holding the secondary school diploma numbered 15 per cent of the total. An interesting feature of the latter category was that of the 10 labourers interviewed in the Sugar factory, 5 or 50 per cent, held a secondary school diploma. This was apparently closely related to the fact that since little

work needed to be done for eight months of the year, they had the opportunity to attend evening classes and complete their secondary school studies.

The proportion of skilled to unskilled workers was also investigated. This is an important factor because it can influence both the type and range of products that can be produced and therefore is certainly one factor many industrial enterprises consider before locating a factory. Out of the total work force engaged in the factories studied, there were 37.5 per cent who were skilled and the remaining 62.5 per cent were regarded as unskilled (a combination of factors such as type of work, technical training and the level of salary were considered in defining a skilled labourer). This kind of disproportionate relationship between skilled and unskilled workers is common throughout the industrial economy of Iran.

If the proportion of skilled to unskilled workers in different factories is compared with the per centages for their education status, a very close relationship seems to exist. For instance, 80 per cent of the labourers of the Sugar factory were classified as skilled workers, and 50 per cent of the labourers in that factory were noted as holding the secondary school diploma. By contrast, the very high proportion of unskilled labourers in the Jahan Chit factory correlates well with the fact that 30 per cent of the labourers in that factory were illiterate.

The employment situation of the labourers whether temporary or permanent, was also examined. With the exception of the Vita factory which, owing to the nature of its activity, tends to employ temporary seasonal workers during the summer, all the other workers were employed permanently. Only 1 per cent of the labourers had temporary jobs and the remaining 99 per cent were employed permanently.

The wage levels and earning situation of employees can be important as there is a close relationship between income levels and levels of skill and education. Of course other factors such as length of employment are.

also of significance.* The wages earned by the labourers were classified into five categories as follows: less than 6000 Rials, 6000-12000 Rials, 12000-18000 Rials, 18000-25000 Rials and more than 25000 Rials. The analysis of the earning situation indicated that labourers with less than 6000 Rials (£50) per month, i.e. the minimum level of monthly wage, formed about 22 per cent of the work force. Yet in the case of a factory such as Jahan Chit as many as 80 per cent of the workers fell into this category. Once again this very close relationship between income level and education level is exemplified by the Jahan Chit factory.

Those labourers earning 6000 to 12000 Rials formed the highest proportion of all, accounting for about 44 per cent of the total. Taking 12000 Rials as a national average wage, it seems that 66 per cent of the labourers under study earned less than the average wage. 24 per cent of the labourers were classified among those earning between 12000 to 18000 Rials. The breakdown of wage earning patterns by individual factories showed that 60 per cent of the labourers in the Sugar factory fell into this latter category, but that no one from Jahan Chit or Vita Fruit Conserving factory came into it. Those earning 18000 to 25000 Rials, three times the minimum wage, made up 4 per cent of the total. Finally those labourers with a monthly wage above 25000 Rials accounted for only 2 per cent of the total of wage earners; and this overall proportion included only 10 per cent from the factories of Kadour and Armeh.

Overtime work to increase earnings was very common amongst the labourers studied. In fact, 75 per cent of the labourers were in some way engaged in overtime work in their own factories. Whilst this practice seemed to be a sign of the factories' prosperity and a way of helping the

* For instance of the total of workers interviewed 82 per cent had been employed for 10 years (1967-76), 14 per cent for between 10 and 20 years and 4 per cent more than 20 years; and it was only the Sugar factory which had 30 per cent of its labourers in the category of more than 20 years of employment.

labourers get higher earnings, the considerable benefit to the factories of such arrangements can be viewed as a form of economic exploitation through the amount of overtime work required. A breakdown of the factories by overtime worked shows that 85 per cent of the labourers in the private factories were doing overtime, whereas only 10 per cent of the labourers interviewed in the State factory, Iran Carpet, were engaged in overtime.

Having explained some of the characteristics of the labour force in relation to their factories, an investigation of their housing conditions also seemed appropriate, because of the fairly close relationship between the work place and the place of residence, both spatially and in terms of quality, and the effect this may have on the economic productivity of the workers concerned. Consequently, under the heading of housing conditions, three major characteristics will be outlined as follows: The pattern of occupancy, number of rooms and the availability of services such as piped water and electricity.

From the view point of housing occupancy, it was found (with some exceptions), that the older the factory, the greater was the possibility that the factory itself would provide housing facilities, and the more recent the factory, the more likely that the labourer would live in his own home or in a rented house. It was an interesting characteristics of the industrial development of the Reza Shah period that living quarters were constructed as part of the factory complex.

As shown by Appendix 4, almost 90 per cent of the labourers of the Karaj Sugar factory lived in factory houses, paying a very low monthly rent, which was of considerable indirect financial help. Jahan Chit factory, being built at an earlier date in comparison with the other factories, also had constructed limited accommodation for its labourers. In general 45 per cent of the labourers were living in their own houses, 26 per cent were in

factory houses and 29 per cent lived in rented houses. The quality and the size of the houses will be better realized when the number of rooms and the kind of services provided are specified. As shown by Table 6.4 and Appendix 4, those labourers with factory houses lived in relatively better conditions when compared with those living in their own homes or in rented houses. For instance, in the case of the Sugar factory, 90 per cent lived in three roomed houses and 10 per cent in four roomed dwellings. This is very much in contrast with the labourers of the Kadour or Vita factories because even though 70 to 80 per cent of these labourers lived in their own houses, 40 to 50 per cent of them had only one or two rooms. On average, almost 88 per cent of the labourers were living in houses with less than four rooms; 14 per cent of these were in one room dwellings, 35 per cent in two roomed and 39 per cent in three roomed dwellings. Consequently only 11 per cent of the labourers lived in houses with four rooms or more.

As regards piped water and electricity, those labourers living in factory houses being connected to the factory power supply, were in no difficulties, but there were in total 9 per cent, especially those in rented houses, who had no access to electricity. Piped water was very rarely found in the rented or self-owned houses. For instance, 60 per cent of the labourers of the Kadour factory, 70 per cent of those in the Jahan Vegetable Oil factory and 90 per cent of the labourers of the Vita factory had no piped water in their houses. Consequently only 64 per cent of the total labourers interviewed were connected directly with the city's piped water system.

Finally the relationship between the number of persons and the number of rooms per housing unit includes the variation in housing density, which is an important criterion for housing conditions. An example of the

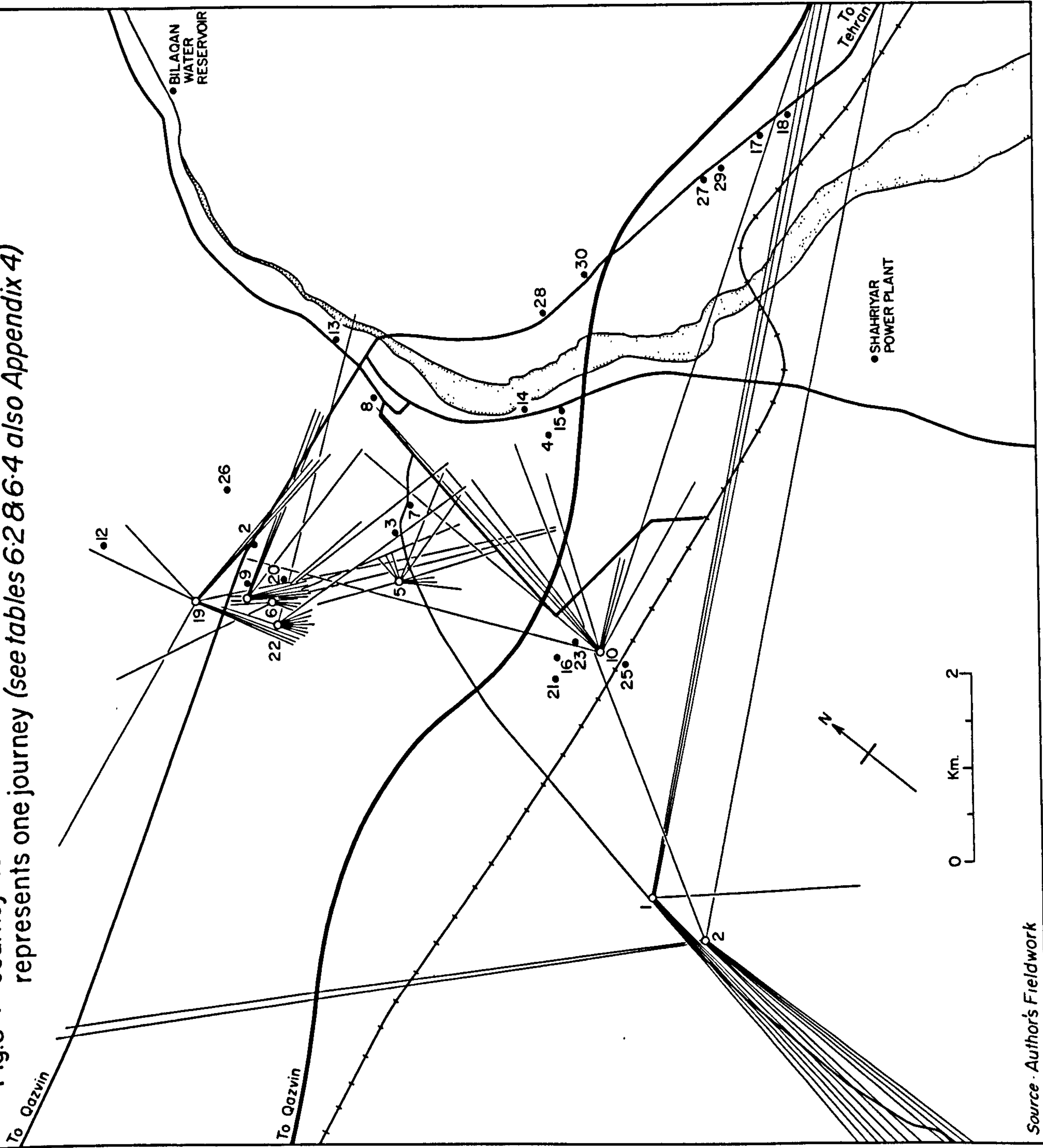
high degree of overcrowding likely to be evident in labourers' accommodation can be seen in the fact that while 62 per cent of the labourers' households consisted of four persons and more, 88 per cent of the houses had less than four rooms (see Table 6.4 and Appendix 4). This phenomenon results naturally in a high density of room and housing undoubtedly affects the pattern of living conditions.

The journey to work as a regular pattern of daily commuting was studied to indicate the relationship between the living places and work-places of the labourers of Karaj. When the residential places were plotted against the work places, it was found that a significantly high proportion of the labourers live less than 1 Km from their place of work (see Fig. 6.4). Nearly one third, i.e. 32% of the labourers live within this radius and they are mainly the employees of those factories which had their own residential quarters (Sugar factory and Jahan Chit factory).

Those labourers commuting 1 to 5 Km per day accounted for the highest proportion, 56% of the total. However, when labourers were considered by individual factories it was clear that with the exception of the sugar factory and those factories in the Jahan Industrial complex, between 70 to 90 per cent of the labourers travelled between 1 to 5 Km. to work. Only 2 per cent travelled between 5 to 20 Km, and no one commuted from a distance of 20 to 40 Km. Beyond this radius, about 9 per cent of the labour force travelled a distance of more than 40 Km. In particular cases (Kadour and Vita factories) there were some labourers who travelled from as far as Shahr-e-Rey, about 50 Km. away.

The means of transport used by the labourers to get to their place of work was also studied. This in fact was determined directly by the distance they had to travel daily and their financial circumstances. Those labourers who walked to their place of work comprised 42 per cent of the

Fig.6.4 Journey to work of labourers in selected factories in Karaj city, each line represents one journey (see tables 6.2 & 6.4 also Appendix 4)



Source: Author's Fieldwork

total. However, this per centage differed greatly from one factory to another, varying from as high as 100 per cent to as low as 10 per cent. Bicycle, as a relatively popular means of transport, was used by 15 per cent of the labourers. Service taxi and taxi was another form of transport which, owing to the cheap fixed rate of fare, (10 Rials per person) was used by 14 per cent of the labourers. Bus services operated by the factories themselves (available to 14 per cent of the labourers) were not very extensive and were confined to three factories. Motor cycles were used by 10 per cent of the labourers and particularly by the workers in the Vita and Armeh factories. Finally, only one per cent of the labourers drove their own private car to the factory, giving the very low rate of car ownership. The time spent by the labourers to reach their place of work depended on distance and means of transport. Although the estimate of time spent travelling could not be entirely accurate, it throws some light on the commuting pattern. The direct relationship between time and distance is clear from the fact that 88 per cent of the labourers were spending less than 30 minutes to get to their place of work, this figure conforming very much with the 85 per cent of the labourers who lived within 5 Km of their place of work. 7 per cent of the labourers spent 30 to 60 minutes and 7 per cent more than 60 minutes to get to work. The latter figure, although not very considerable, indicates the size of the area from which Karaj city attracts its labour force. The very high percentage of labourers living close to their place of work indicates that relatively few workers would be wearied by a long journey.

6.4 Summary and Outlook

Some salient points are worth mentioning in summary and conclusion:

(a) Industrial development in Karaj is a consequence of both state and private enterprise. However, according to the nature of the investment and the policies at various times adopted by the Government, each sector has its own characteristics. The state factories, for instance, being built at an earlier stage (predominantly during the Reza Shah period) are fairly old and face some difficulties such as the growing inefficiency of their machinery. They can be praised, however, for having housing facilities for their own workers. In contrast, the private factories, being established at a later time are better equipped and, therefore, more active and prosperous.

(b) As to the raw material supply and the mode of marketing, the ever-increasing congestion of the Tehran-Karaj-Qazvin road is gradually causing a considerable difficulty. The completion of the Karaj-Qazvin Autobahn (expected in 1979) may, however, to some extent reduce private car traffic on the former road, although the problem of heavy traffic will still remain unsolved. An intensive use of the Tehran-Tabriz railway, as has already been suggested, together with a fast transit road to by-pass the city, seems to be the answer.

(c) The insufficient number of skilled labourers is one of the obvious problems observed in all the factories studied. To meet the ever increasing demand for industrial products, it seems besides the present unskilled but very cheap labour force, a large proportion of highly trained and literate labourers are also necessary. The introduction of technical courses and training programmes, therefore, is of absolute importance. The modernization of the factories by replacing the old machinery with some more advanced machinery seems also to be essential. This is particularly important because it results in a greater volume of industrial goods which can compensate to some degree for the measures restricting the physical expansion of the factories.

(d) Because the majority of the machinery used by the factories is made abroad, the Government must assist these factories to buy spare parts and new machines, by further tax reduction and customs facilities, until such time as they can be replaced by home manufactured machines.

(e) The re-location of some of the factories seems to be necessary because they need either to be replaced by rather more appropriate land use function or their negative impact on the urban environment ought to be wholly removed. The industrial units in the central district of Karaj could, for instance, be moved out to the southern industrial district of the city or even to somewhere outside the industrial boundary limit of Tehran. Owing to its locational advantage (close to the city centre), the 25 hectare site of the Sugar factory would be very suitable for a large housing development project or the provision of necessary services such as hospital or educational institutions. The inefficiency of the machinery, the seasonal pattern of activity and the low rate of productivity (12000 tons of sugar per year) seem to make this idea fairly attractive.

The conclusions of this part of the study would seem to be compatible to those priorities suggested by the preliminary studies of the Sixth Development Plan (1978-82) and they can be summarised as follows: ⁽⁵⁾

(a) Reinforcement of a policy to halt the industrial growth of Greater Tehran (including Karaj).

(b) Continuation of the licensing procedure which in the short term is the only way of implementing a strict ban on new industrial developments in the Tehran region as well as stopping the extension of existing plant in the more dynamic sectors.

(c) Continuation of tax-relief measures and institution of a selective capital equipment grant to encourage industrial developments in certain regions which are judged to deserve priority in spatial planning terms.

(d) Finally, assistance in moving industrial establishments out of the Tehran-Karaj region, given that such movement is really desirable.

CHAPTER 6

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CHAPTER 7

LAND USE PATTERNS AND URBAN MASTER PLANNING

Investigations of urban land-use structure are frequently concerned with recording and classifying particular uses viewed in terms of an urban activity system. The patterns of land utilization in a settlement are mainly a consequence of the function a settlement performs, according to which the predominant activity groups can be surveyed and interpreted.

Having explained the different functional activities of the city in earlier chapters (Chapters 4, 5 and 6), we will now attempt to examine how the various land-uses which these different functions give rise to are distributed and interrelated.

As shown in Table 7.1, whilst residential land accounted for a considerable proportion of the total land area of several major Iranian cities in 1966, ranging from about 32 per cent of all land-use in Shiraz to about 70 per cent in Babol, residential land in Karaj made up only 4.9 per cent of the total city area. The existence of large plots of agricultural land and orchards, together with large area of vacant lands, within the city boundary were largely responsible for this situation, with 82 per cent of the city's area being devoted to open space or recreational use. This is obviously a very significantly higher proportion than in any of the other cities studied. Another interesting point shown by this table is that other than for Tehran, the area of land within the Municipal boundary of Karaj also exceeded that of all the other cities examined. The presence of large, space extensive industrial establishments, educational and research institutions is another reason for this; but the substantial areas given over to agriculture and orchards provide the main explanation. The intensive care and continuous nursing of these gardens by the inhabitants seems to be one reason why these marginal land uses have been included within the urban area of Karaj, thus accounting for

Table 7.1: Comparison of major types of Land Use for Karaj and selected Iranian Cities in 1966

Type of Land Use	Karaj		Tehran		Shiraz		Babol		Esfahan		Mashhad		Tabriz	
	area (ha)	%	area (ha)	%	area (ha)	%	area (ha)	%	area (ha)	%	area (ha)	%	area (ha)	%
Residential	192	4.9	7565	41.6	718	32	460	70	1622	57.4	1301.0	35.9	1350	58.6
Commercial	4.4	0.1	736	4.0	14	0.6	10	1.5	87.5	3.1	78.2	2.1	46.6	2
Industrial	132	3.3	1891	10.4	165	7.5	9.5	1.4	109	3.8	93.6	2.6	86.8	3.8
Public Buildings	11.6	0.3	277.2	1.5	32.3	1.5	13.7	2.1	131.9	4.7	28.6	0.8	94.8	4.1
Governmental Buildings	13.2	0.4	1945	10.7	432.7	19.7			32.7	1.1	367.2	10.1	201.4	8.7
Health	1.5	0.1	143.6	1.3	3.1	0.4			17.8	0.6	104.3	2.9	19	0.8
Education	24.4	0.6	306.2	1.7	42.1	1.9	6.8	1.1	70.7	2.5	101.3	2.8	39.6	1.7
Transport	325	8.3	4935	27.2	210.2	9.6	35	5.3	619	21.9	1000.1	27.6	324	14.0
Recreation and Open Space	3223	82.0	213.4	1.2	571.5	26.0	120	18.3	138.6	4.9	553.0	15.2	144	6.0
Total Area	3926.1	100	18010	100	2188.9	100	655	100	2829.2	100	3629.3	100	2306	100

Source: 1. Ministry of Housing and Urban Development Op.cit.
 2. Etesam, I. Present and future standards for Town Planning in major cities of Iran, Tehran, May, 1973.

the relatively large land area of the city. Moreover, the much higher potential land values that derive from a location within the boundary of an urban area, and the advantages this brings in terms of the provision of public utilities and the possibility of conversion into building plots were also significant factors. Because the majority of these gardens belong to influential Tehranis, their inclusion within the urban boundary of Karaj would seem to have been less an accidental process and more the result of explicit personal and political influences.

7.1 Evolution and Development of Land-Use Patterns

Several factors have been responsible for producing the present pattern of land-use in Karaj, of which physical, historical and planning influences are the most important and will be discussed briefly as follows:

7.1.1 Physical Influences

The rugged heights and steep hills to the north of the city, the expanded bed of the Karaj river to the centre and south, are amongst the principal physical constraints which have affected the location of the settlement and the patterns of housing development within it, and consequently have played a key role in the overall urban structure of the city. Physical factors are also of importance in the form of the mild climate the Karaj area enjoys and the relatively abundant supplies of water, which are an important reason behind the greater part of the Karaj area being covered by orchards and cultivated lands.

7.1.2 Historical Influences

Historical factors are perhaps most evident in the scattered pattern of development that has occurred within the city as a result of Karaj and its surroundings being included by the Qajar Royal Family as "Arazi-ye-Khaleseh", or crown lands, in the 19th century. This has meant

that housing development and other forms of land utilization have often been confined to particular localities in Karaj rather than being able to expand in a zonal pattern more evenly throughout the settlement. Although in 1937, the "Majlis" approved the "Qanoon-e-Foroosh-e-Arazi-ye-Khaleseh" (Act for Sale of Crown Lands) to the public, Karaj remained something of an exception because many vast plots of fertile land in the area were passed over to the Government for the construction of industrial development, research and scientific institutions such as the Agricultural College, the Veterinary Institute, the Sugar Factory and the Industrial Model Town of Karaj. Construction of housing quarters attached to some of these places also occurred, giving a more nuclear pattern of growth to the city.

7.1.3 Planning Influences

In examining the impact of planning on urban land-use in Karaj it is important to recognise that this factor is in general a new phenomenon in Iran, deriving mainly from the directives of the 3rd National Development Plan (1963-67), which required the preparation of the first Master Plan for Karaj. According to the legislation imposed by the preliminary and the executive phases of this plan, the future expansion of the city would be guided by the zoning of land for different uses. Prior to this legislation, there were different acts at a national level that have had marked effects on the urban structure and land use of Iranian Cities. Among these are the Municipality Act of 1913 (whose main concern was street cleaning and fair distribution of major food items at a reasonable price), the Street Widening Act of 1933, and the Amended Street Widening Act of 1941. ⁽¹⁾

It was in fact the Street Widening Act of 1933, passed during Reza Shah's reign, that authorised municipalities to straighten and widen some of the traditional narrow, winding lanes of Persian Cities to broader 'Haussman-like' streets. The impact of this act on Karaj in particular

meant the transformation of the settlement from a rural to an urban character, exemplified by the construction of Maidan-e-Pahlavi to the north of the settlement and the creation of a main north-south Khiaban-e-Shahr-e-Sanati, to connect with the newly developed Industrial Model Town, 4 kilometres to the south of the city (see Chapter 3, Figure 3.4 Karaj in 1940).

Land values and internal-external forces provide additional variables which have affected the land use pattern of Karaj. In the works of many writers on urban studies, land use arrangements are explained in terms of the values and attitudes held by city residents and the forms of behaviour these values set in motion which culminates in particular locations being selected to satisfy these values and attitudes. For instance, in both Burgess's Concentric Zone Concept and in Hoyl's Sector Theory and to a lesser extent in the Harris-Ullman Multiple Nuclei hypothesis,, considerable emphasis is placed on the economic determinants of land use.

In studying the land-use pattern of Karaj it can be observed how both regional and local forces interact. More specifically the external forces (mainly from Tehran) which affect the make-up and vitality of the economy act on the internally focussed process of the urban land market to determine the actual locations of urban functions within Karaj. To an important degree these regional and external forces influence how much and at what rate land goes into development in the city.

7.2 Urban Land Use and Theories

The allocation of land to different uses is one of the key elements in theories of urban spatial organization and it is now recognised as one physical manifestation of the social and economic stratification of a society. ⁽²⁾ As Carter ⁽³⁾ suggests, the range of studies which is covered by the simple phrase, 'urban land-use' is vast and includes contributions from all the disciplines which conventionally fall within the social

sciences. Classifications and criteria use by urban studies specialists to explain and examine the works on urban theories are numerous and their approaches often differ widely. Even similar titles at times refer to different kinds of classification. For instance the following table compares the classification used by Chapin and Carter in their studies of land use theories. ^(4,5)

<u>Chapin</u>	<u>Carter</u>
1. Economic Determinants	1. Ecological approaches
	2. The economic approach
2. Socially rooted determinants	
	3. Activity approach
3. The public interest determinants	

As can be seen the economic determinants approach suggested by Chapin includes both the ecological and economic approaches of Carter. In turn the activity system approach of Carter is fairly similar to the Socially Rooted and Public Interest determinants of Chapin.

Many of these studies are basically aspatial in context and, therefore, would seem not to come within the purview of geographical investigation. Those studies which exist are often only valid as very general statements of the structure and growth of cities but have proved remarkably persistent as concepts, largely because of their generality. Most of the spatial models were formed with reference to the American city at a particular point in time; they have become more inadequate as urban systems, have become more complex and as contrasts between cities in different parts of the world are more clearly identified.

The three most popular and simplest models of urban land-use are the concentric-zone model of Burgess (1925), the sector model of Hoyt (1939) and the multiple-nuclei model of Harris and Ullman (1945), all of which have had a considerable and continuing impact upon the literature of urban studies.

Considering the fact that these theories were formulated upon

evidence from North American cities, and not specifically with reference to cities of the Third World or Middle Eastern cities, the application of such theories in these areas might seem inappropriate. At first glance this would appear to be the case in a city such as Karaj which is experiencing a very rapid growth of population in a very short period of time, although as we shall see, the application of these models to this settlement may have some utility in helping to explain its recent evolution. The recent development of Karaj means also that the pattern of old-new contrast or dual structuring observed by Costello⁽⁶⁾ in the city of Kashan does not wholly apply to Karaj. The clear trend towards a westerly expansion of the city is particularly notable, a feature which can be related to factors such as the existence of physical barriers to the east and the large areas of open and level ground with a better physical environment to the west. This westerly trend of growth which has followed the direction of the existing Tehran-Karaj-Qazvin highway is certainly likely to continue because of the westerly route of Karaj-Qazvin autobahn which is due to be completed in the near future.

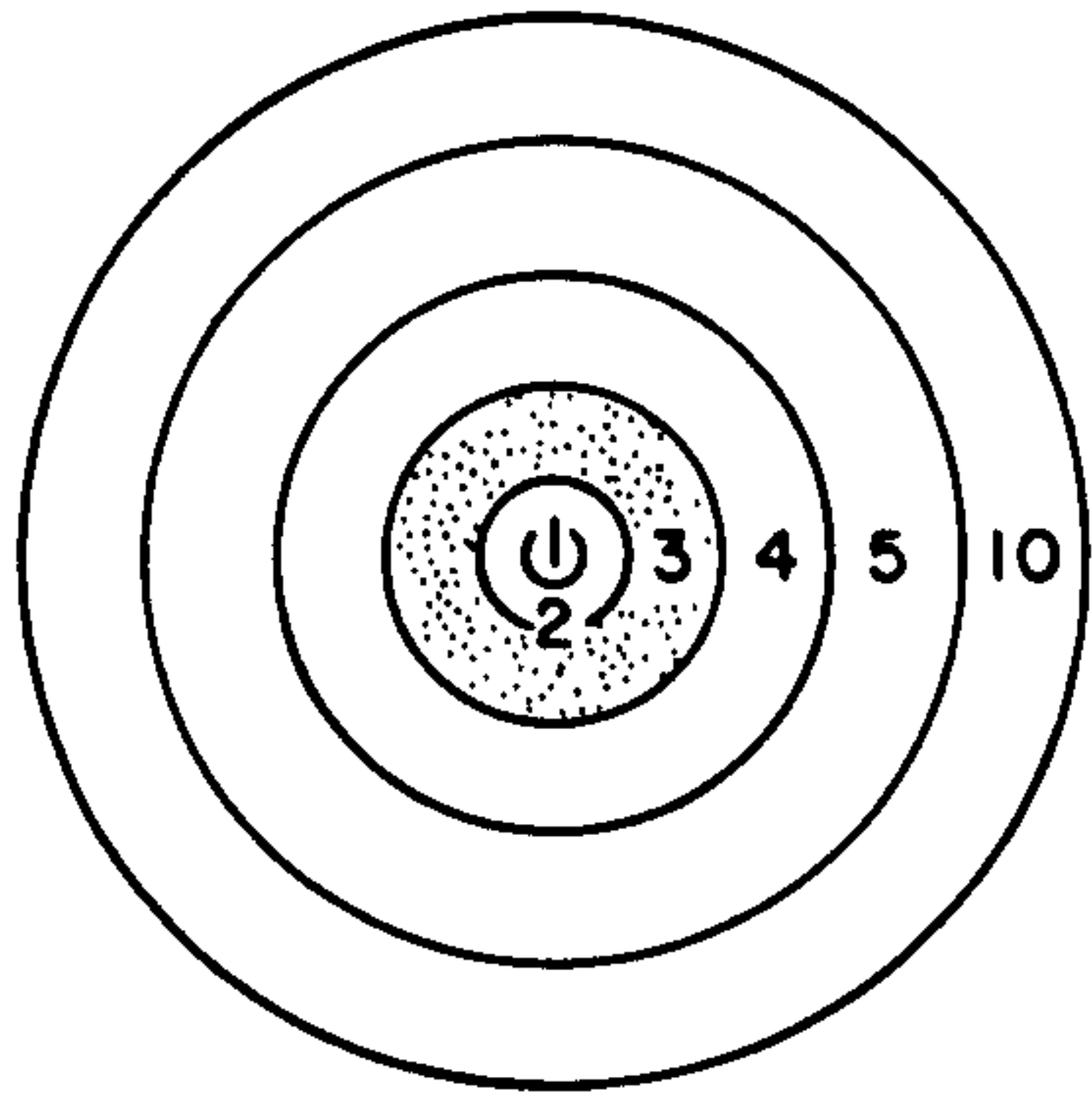
The construction of dwellings on a large number of building plots near a royal palace in the satellite settlement of Mehrshahr has been another factor encouraging this trend towards a westerly extension of Karaj.

When these elements are combined, it becomes apparent that the arrangement of land-uses in Karaj have assumed at least the beginning of a sectoral pattern of the type suggested by Hoyt.

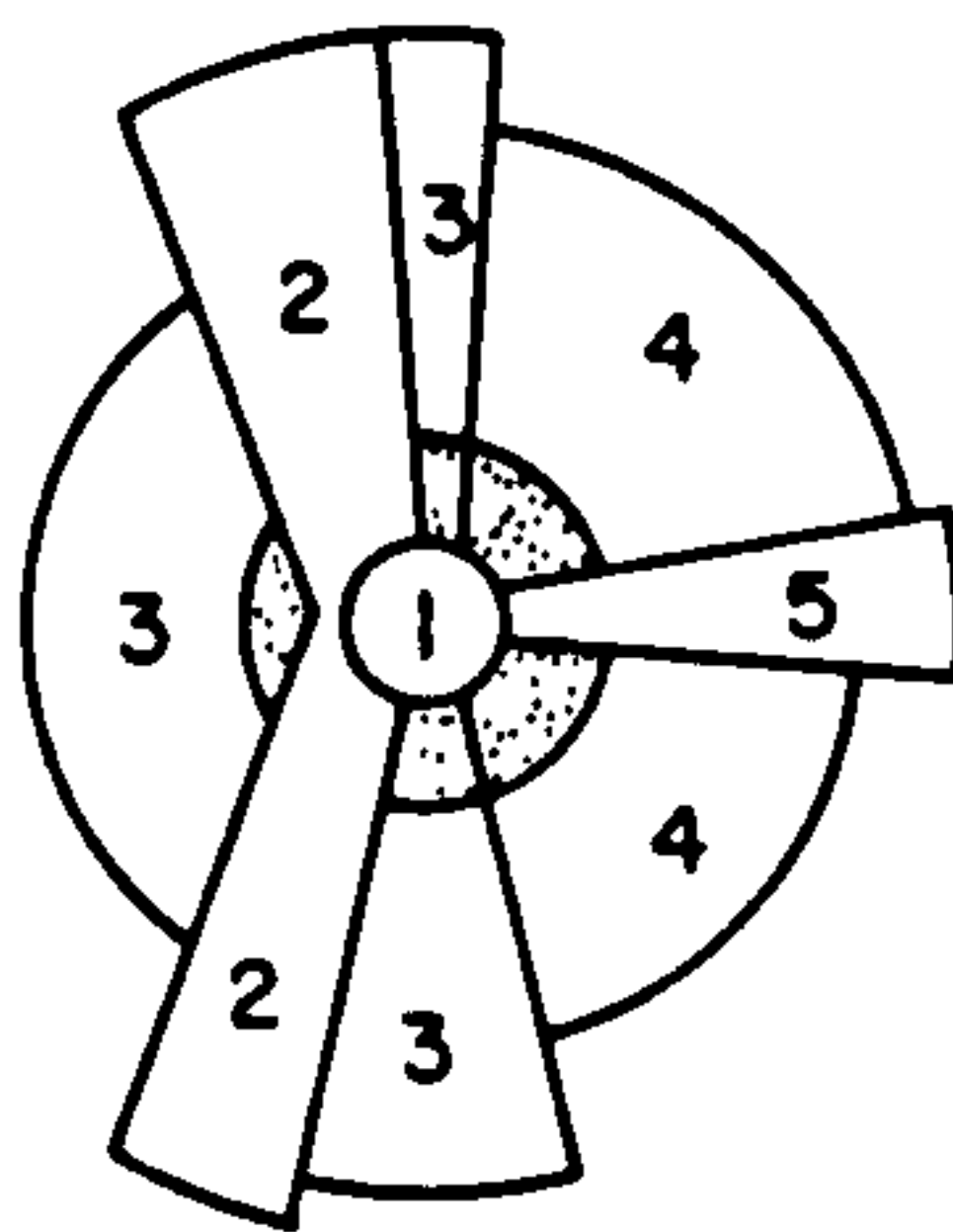
As is known, Hoyt's studies were directed at residential areas and particularly at the identification of the growth patterns of high-rent and high grade areas which he considered to have the dominant influence on the direction of residential growth. That is, the high grade housing, through its social prestige and effect on land values, would have the best of the medium-grade housing close to it, while the low-grade housing would be as far removed from it as was physically possible.

Fig7-1 "CLASSICAL" MODELS OF INTERNAL STRUCTURE OF CITIES

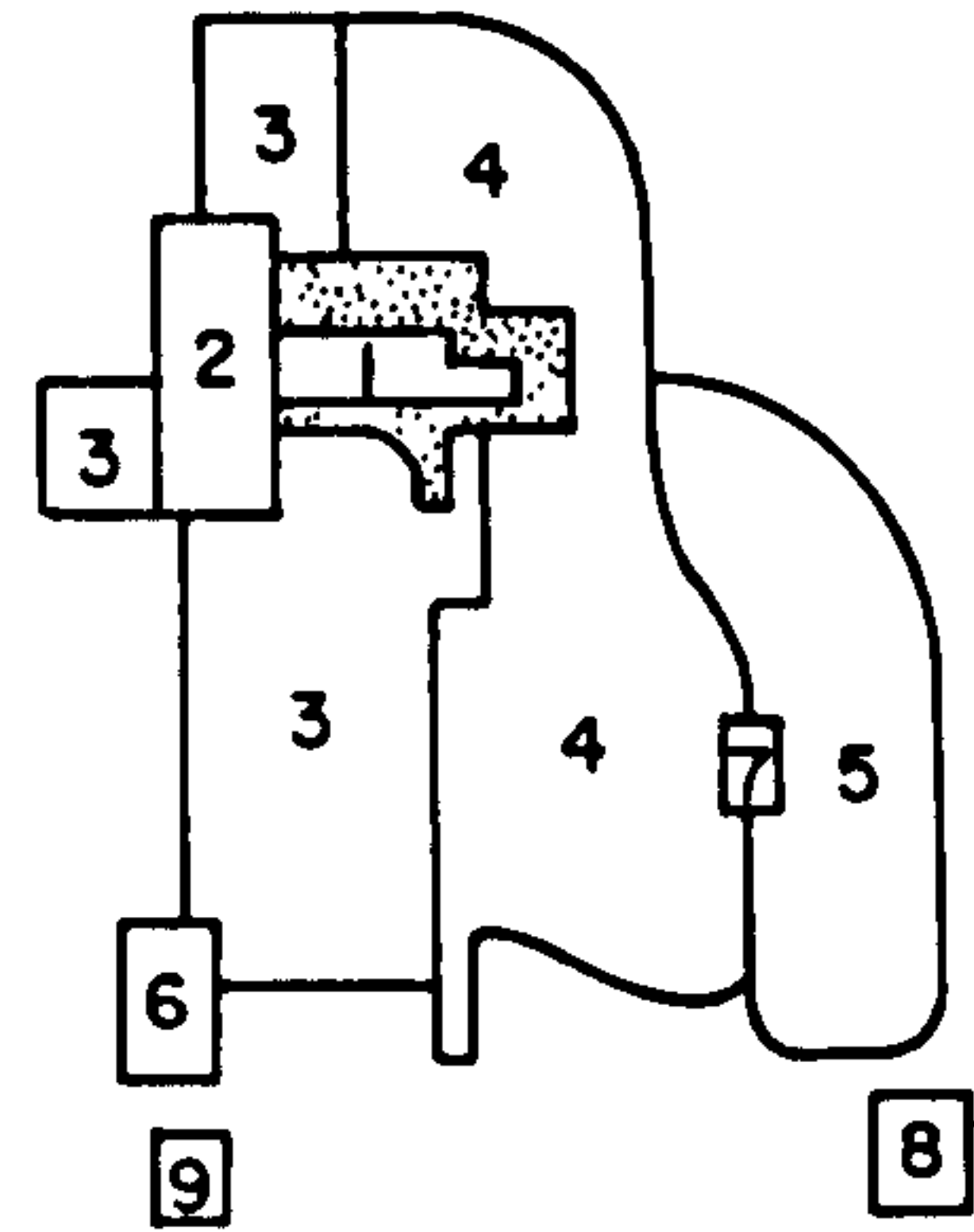
A. CONCENTRIC ZONES
(E.W. Burgess)



B. SECTORS
(H. Hoyt)

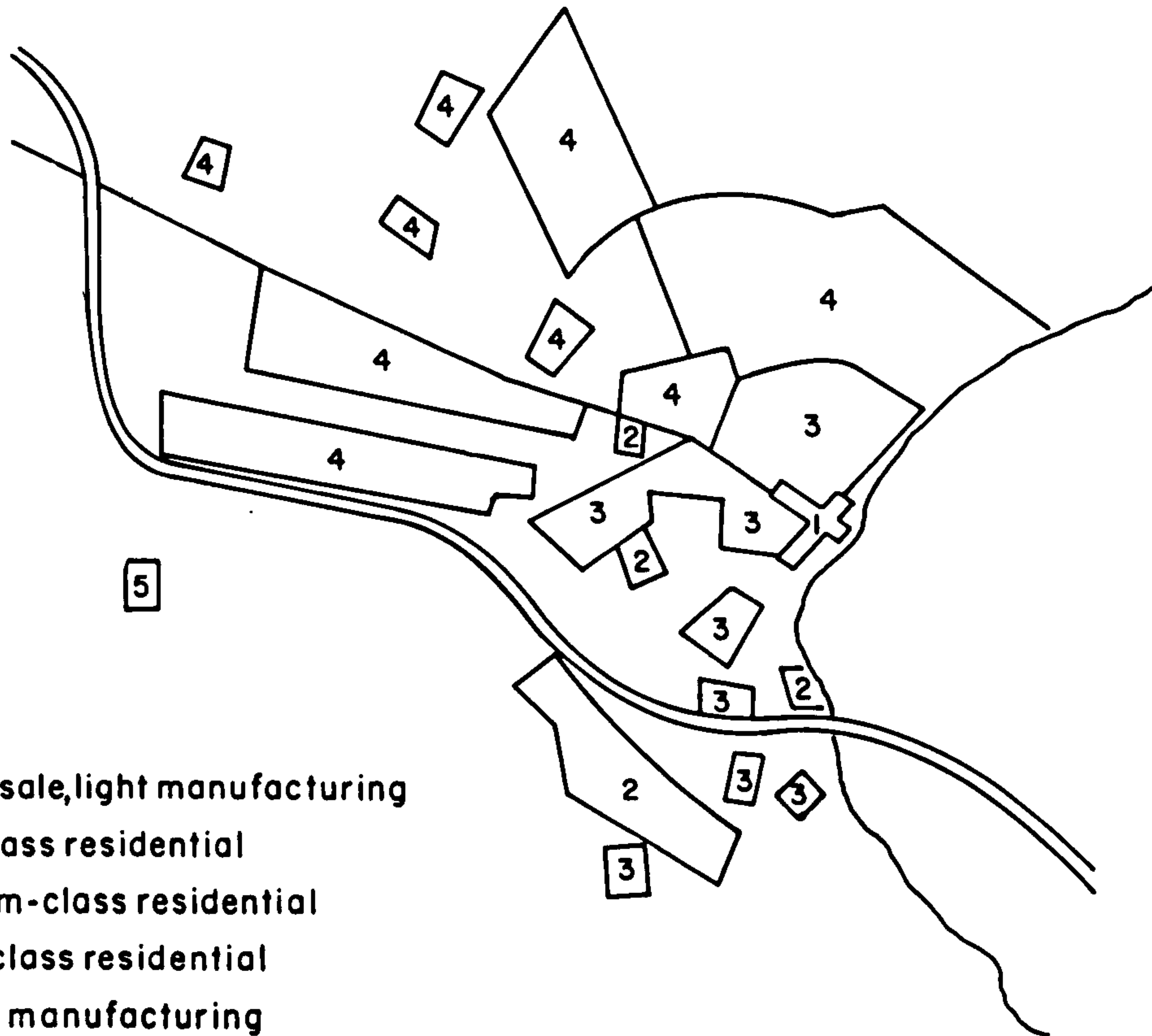


C. MULTIPLE NUCLEI
(C.D. Harris and E.L. Ullman)



Zone in Transition

HOYT'S SECTOR THEORY APPLIED TO KARAJ



- 1. C.B.D.
- 2. Wholesale, light manufacturing
- 3. Low-class residential
- 4. Medium-class residential
- 5. High-class residential
- 6. Heavy manufacturing
- 7. Outlying business
- 8. Residential suburb
- 9. Industrial suburb
- 10. Commuters' zone

(See Text for Source)

Much of the low-cost housing appears in juxtaposition with the industrial sector, largely as a result of the depreciation and deterioration of dwellings consequent upon industrial development. (7)

Figure 7.1 suggests that the city structure of Karaj may be closer to a sectoral pattern than to the concentric zone and multiple nuclei models, although it must be stressed that none of these theories individually provides a full explanation of the actual patterns of growth exhibited by Karaj, as will become apparent from the following brief analysis of the city's structure.

The present residential land use pattern of Karaj can be viewed as comprising three major classes of housing. Firstly, the peri-urban slums and near slum dwellings belonging to the original Karajis to the south in old Karaj, and in the vicinity of Maidan-e-Pahlavi. Secondly the squatter settlements up the slopes of Tappeh-e-Moradab. Both of these two can be considered as sectors of low-class housing, as shown by the number 3 in Figure 7.1. The third category comprises the newly developed residential areas on the peripheries of Karaj which are generally represented by single family houses occupied by urban migrants mainly from Tehran who commute back to the capital to work every day. These latter areas can be categorised as medium class residential indicated by the number 4 in Figure 7.1. The middle class sectors mainly extend towards the west along the Karaj-Qazvin highway and especially autobahn, and are beginning to extend towards the south west in the direction of Mehrshahr where there is the residence of a member of the Royal family.

7.3 Existing and Projected Land Use Patterns

With the introduction of directives from the Master Plan for Karaj, in 1975, it would seem that the future land-use pattern of the city may increasingly be affected and directed by planning strategies. However, being so close to Tehran, the future development of Karaj is also equally

likely to be determined by the policies decided in the capital. To understand these future trends, some consideration of the objectives of the Master Plan for Karaj would seem appropriate. However, in focussing our attention on this topic it is also important to be aware of the limitations of the classic master-plan approach to 'solving' urban problems and guiding land-use change in a situation of unprecedented population growth, such as that experienced by Karaj. In particular, there is the question of how such 'end state planning' - in which the plan is seen as a relatively complete statement of achievable goals, in this case up to 1991 - can be effective when it gives no recognition to the continuous nature of the planning process. Whilst the existence of a Master Plan may increase the probability of certain developments taking place in a place such as Karaj by helping to create commitment to them, this may be at the expense of a much needed flexibility to cope with the pressures resulting from the years of uncontrolled expansion.

Having said this by way of introduction, we may now examine the objectives of the Karaj Master Plan. In the first place development projects introduced following the Master Plan are to be based on various regulations and minimum standards, some of which are concerned exclusively with the pattern of land use. Measures are also to be taken to harmonise these regulations with those of Iranian Civil Law. In order to create a sound division of building plots and provide guidance for future investment in urban development, certain density measures will be introduced by regulations for land sub-division. Meanwhile, to control and preserve the urban landscape and building structures, a separate set of building regulations have also been prepared to control building in the city, to regulate open spaces and to provide for strengthened building foundations. Furthermore, regulations on such matters as road widening, creation of parks, open spaces, public establishments, conservation of green spaces, and all that makes for desirable and sound city growth, are also advocated.

The Master Plan for Karaj, therefore, claims to be highly comprehensive in its concern with the improvement of the physical environment, increased provision of educational facilities; it focuses, too, on the agricultural potential of the plan area, paying attention to the probable future demands of population for housing, a sound system of transportation and supply of public facilities such as parks.

To achieve the above-mentioned objectives, three different executive boundaries have been defined in the plan, namely the district, legal, and controlling boundaries. The district boundaries include ten separate districts, each with its own capability and potentialities. All the development activities within these boundaries are subject to the general definitions and regulations in force for the whole city. As far as the handling or completion of a development activity or projected plan is concerned, all of these urban districts are regarded as equal. If because of the potentialities and advantages offered, development and expansion in one particular district becomes faster than that experienced in others, then priority will be given to the provision of the public amenities required in that particular district.

The purpose of the legal boundary is to delimit an area in which the requirements of the Karaj inhabitants are provided for, and renovation of old quarters is carried out, together with general improvement and construction works.

Land division within this legal boundary will be allowed provided that due consideration is given to the zoning and density regulations laid down in the Master Plan. Those land plots of 25000 sq. metres and above cannot be sub-divided unless the regulations of the Master Plan are carefully followed; and besides this the land holder must take into account the pattern of land use zoning and the stipulated development density, as well as allocate a fixed portion of his land to the Municipality for services and infrastructure according to the anticipated functions

of that area. The proportions of this land to be deducted according to different functions are as follows: commercial uses, 14%; high density residential uses, 12%; medium density residential uses, 10%; low density residential uses, 8%; and very low density residential uses, 6%. The Municipality of Karaj is expected to convert this land to amenity use in the same proportions for each district.

Those land plots of less than 25000 square metres in size can also be subdivided provided that all directives and regulations of the Master Plan are observed, but in this case an amount of money equivalent to the current fair price of land exceeding the following maximum land plot sizes will be calculated by the officials and will be collected by the Municipality from the developers. These maximum land plot sizes for the different functions are as follows:

Commercial zone	2200 sq. m.
High density residential zone	2500 sq. m.
Medium density residential zone	3000 sq. m.
Low density residential zone	3800 sq. m.
Very low density residential zone,	5000 sq. m.

The revenues collected in this way must also be spent entirely on the creation and improvement of services. All these regulations thus provide an interesting example of how one Iranian municipality may be able to tackle the thorny problem, equally faced by many developed countries, of getting developers to contribute directly or indirectly towards the cost of providing infrastructure and community facilities for the developments from which they will reap substantial financial gains.

In order to supervise and administer all the development projects in the vicinity of Karaj, including building activities, land subdivision and other activities related to the pattern of land use, on which Tehran

exerts a profound influence, the service boundary of the city has been drawn deliberately to include an area substantially larger than the Municipality itself. Within this line all investment and land-use activity must be based on the approved regulations and come under the supervision of the executive committee of the plan.

In general the targets set by the Master Plan are as follows: co-ordination of urban activities, regular communication with the authorities at the city, "Ostan" and national level; and the supervision and guidance of urban affairs so as to bring about a move towards more effective physical planning and social welfare. The duties of the Karaj Municipality with regard to the plan can be summarized as follows:

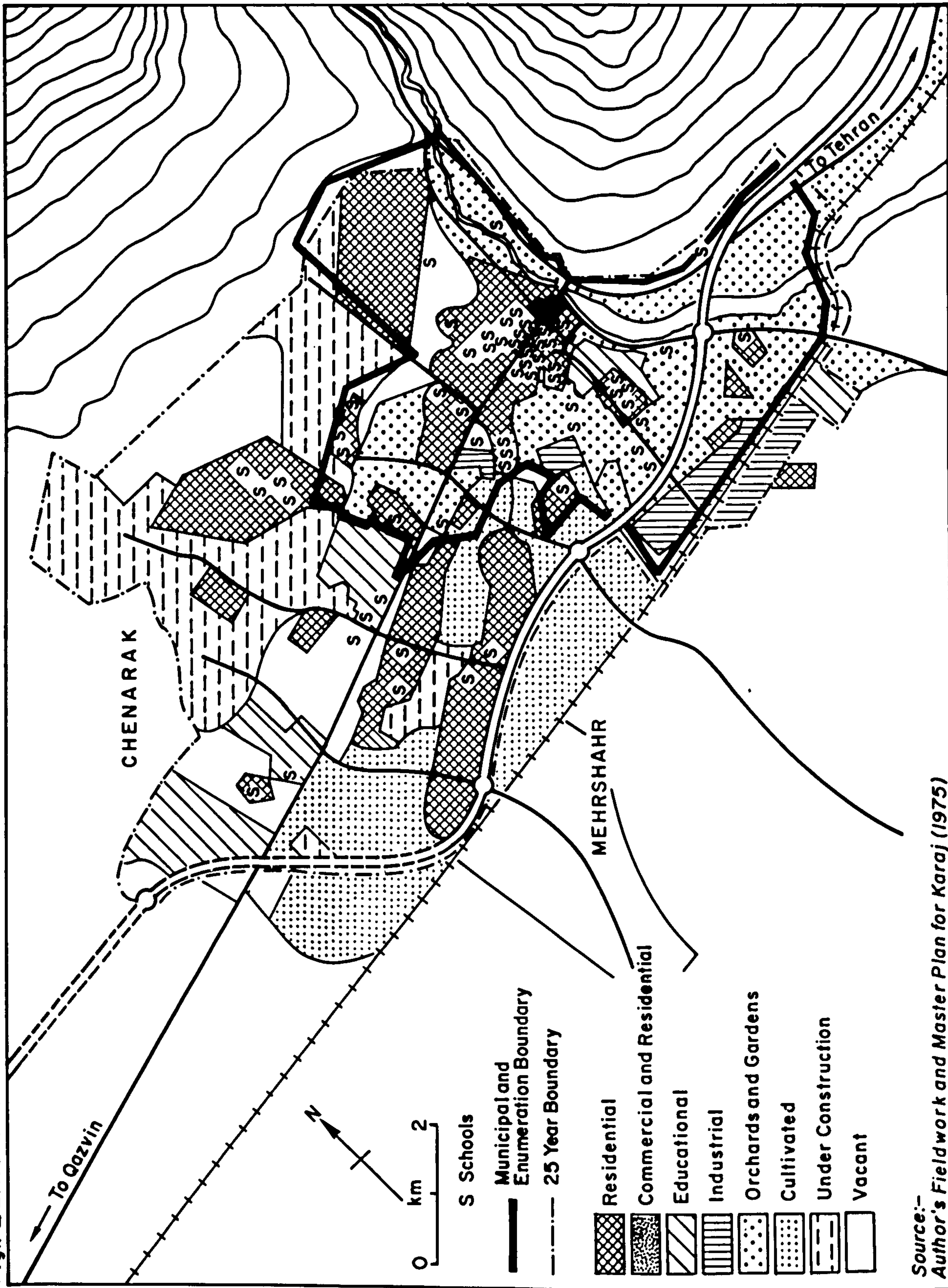
- (i) the conservation of urban resources through the provision of directives and urban regulations in accordance with the proposals of the Master Plan;
- (ii) investigation of the effects of regional and national plans on Karaj;
- (iii) the supervision of the Master Plan by committees making reports to related organizations;
- (iv) the control of development activities;
- (v) the complete supervision of urban development in the service limits around the city, up to 25 year boundary;
- (vi) the renovation and redevelopment of the older parts of the city and squatter dwellings in the central area;
- (vii) determining issues related to conservation of the environment.

It is hoped that the financial resources required for the above mentioned development projects of the Municipality will be supplied through an Urban Renovation Tax levied within the city's legal boundaries as delimited in the Revised Edition of the Karaj Master Plan, together with revenues acquired from the private developers, mentioned in the directives and regulations of the Plan.

Figures 7.2 and 7.3 enable a comparison to be made between the existing land-use patterns of Karaj in 1975 and those projected for the city at the end of the Master Plan period in 1991. Both maps cover an area of about 8160 hectares. Although it is common practice for an urban study area for planning purposes to be larger than an urbanized area defined in the census, it would seem that the figure of 8160 hectares is considerably larger than the 3900 hectares contained within the census boundary of Karaj in 1976. This is one reason why, as shown in Table 7.2, in 1976 only 43 per cent of the total planning area was allocated to be a built up area, whereas the remaining 57 per cent was to be orchards, cultivated and vacant lands. In 1975, 12.1 hectares of the city area were under commercial use and 151 hectares were used by industrial establishments. Administrative and governmental institutions, having built mostly on the "Arazi-ye-Khaleseh", covered an area of about 601 hectares. Educational organisations used about 83 hectares of land, whereas only 4 hectares were devoted to health establishments. Recreation and sports fields surprisingly covered a small area of only 29 hectares. Public establishments took up a further 210 hectares with basic establishments covering 206 hectares; and finally, transport uses including roads, roundabouts and parking spaces covered a considerable area of about 1246 hectares (15.3% of total city area, see Table 7.2).

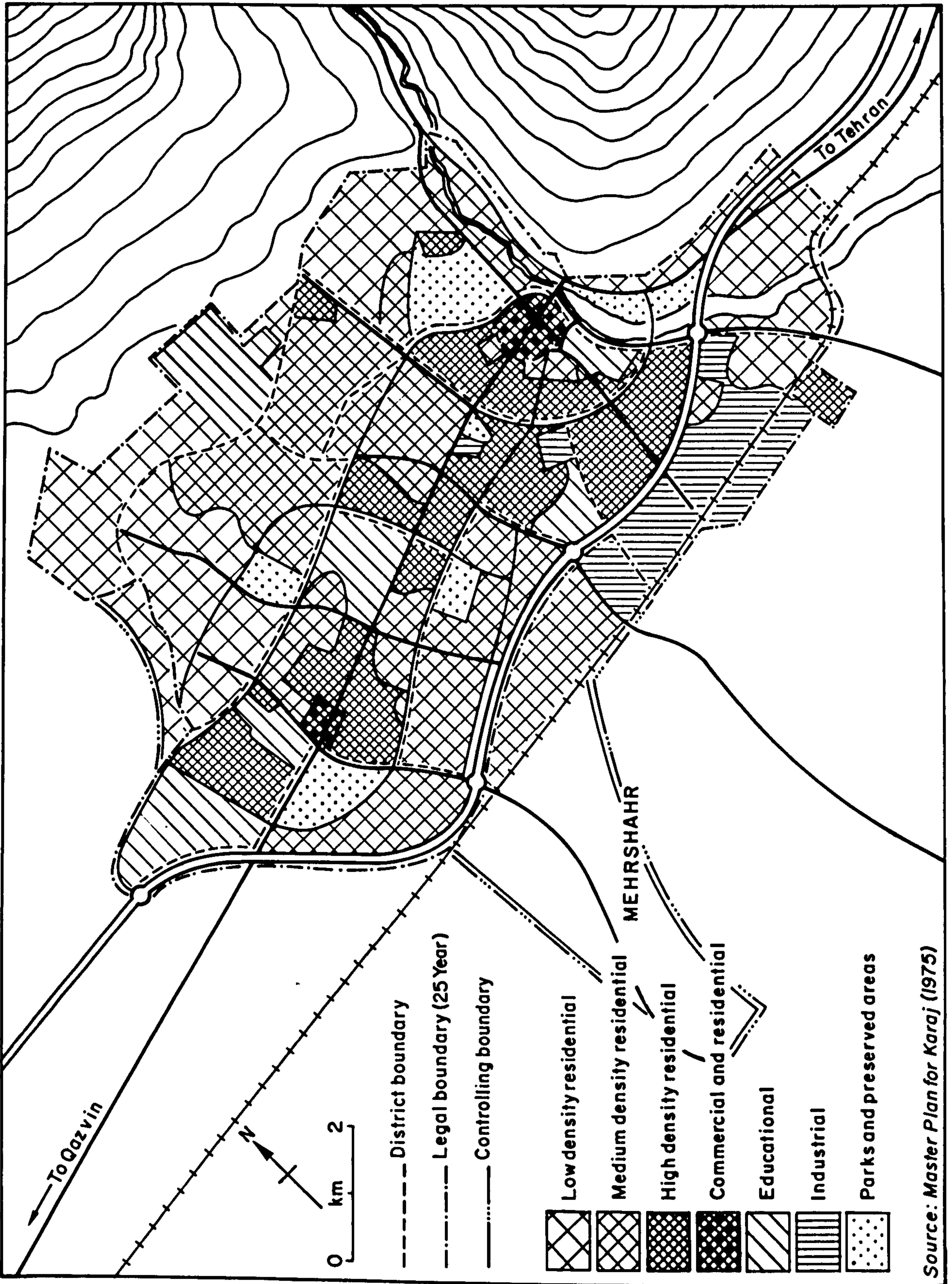
Conventional land-use maps are only useful in answering the questions, "where" and "what" a certain feature or phenomenon in relation to location at a particular moment in time. They tell us very little of "why" that feature is where it is or about how the "where" changes over a period of time and so in the following pages an attempt will be made to analyse and investigate the patterns of some selected land uses in Karaj. These uses will cover residential, educational, transport and open spaces and vacant lands. The reasons why these particular types of land-use have been chosen is because Karaj is increasingly becoming a

Fig.7.2 EXISTING LAND USE PATTERN OF KARAJ



Source:-
Author's Fieldwork and Master Plan for Karaj (1975)

Fig.7.3 PROJECTED LAND USE PATTERN OF KARAJ



Source: Master Plan for Karaj (1975)

Table 7.2: The existing and projected land uses by type and size (1975-1991)

Type of land use	Residential	Commercial	Industrial	Governmental	Educational	Health	Recreation & Sports	Public Buildings	Basic Establishments	Transport	Total Built-up area	Total undeveloped land			Grand total area	
												Orchards	Culti-vated	Vacant		
1975																
Total area (in hectare)	631.0	12.1	151.0	601.0	83.0	4.0	29.0	210	206.0	1246.0	3176.0	1602.0	769.5	2620.0	8169.0	
Total per capita area (in sq.m.)	65.5	1.3	15.7	62.4	8.7	0.4	3.1	21.9	21.4	129.3	329.5	166.3	79.8	271.9	847.4	
Percentage of total built up area	19.9	0.4	4.8	18.9	2.6	0.1	0.9	6.6	6.5	39.2	100.0	-	-	-	-	
Percentage of total city area	17.7	0.1	1.9	7.4	1.0	0.1	0.4	2.6	2.5	15.3	38.9	19.6	9.4	32.1	100.0	
1976																
Total area (in hectare)	766.0	16.0	198.0	601.0	108.0	8.0	1161.0	215.0	246.0	1284.0	3563.0	1602.0	769.0	2234.0	8169.0	
Total per capita (in sq. m.)	74.0	1.6	19.2	58.0	10.5	0.8	11.3	20.8	23.4	124.0	343.9	154.7	74.3	215.7	789.5	
Percentage of total built up area	21.5	0.5	5.6	16.9	3.0	0.2	3.3	6.1	6.9	36.1	100.0	-	-	-	-	
Percentage of total city area	9.4	0.2	2.4	7.4	1.3	0.1	1.4	2.6	3.0	15.8	43.6	19.6	9.4	27.3	100.0	
1981																
Total area (in hectare)	1054.0	20.0	239.0	601.0	390.0	11.0	291.0	220.0	268.0	1504.0	4602.0	1602.0	769.0	1194.0	8169.0	
Total per capita area (in sq.m.)	77.0	1.5	17.5	43.9	28.5	0.8	21.3	16.1	19.6	19.8	336.0	117.0	56.2	87.2	596.3	
Percentage of total built up area	29.9	0.4	5.2	13.1	8.5	0.3	6.3	4.8	5.8	32.7	100.0	-	-	-	-	
Percentage of total city area	12.9	0.3	2.9	7.4	4.8	0.1	3.6	2.7	3.3	18.4	56.3	19.6	9.4	14.6	100.0	
1986																
Total area (in hectare)	1448.0	25.0	294.0	602.0	406.0	14.0	384.0	225.0	296.0	1711.0	5410.0	1602.0	769.0	387.0	8169.0	
Total per capita area (in sq.m.)	80.0	1.4	16.3	33.3	29.4	0.8	21.3	12.9	16.4	94.6	298.9	88.6	42.5	21.4	451.3	
Percentage of total built up area	26.8	0.5	5.4	11.1	7.5	0.3	7.1	4.2	5.5	31.6	100.0	-	-	-	-	
Percentage of total city area	17.7	0.3	3.6	7.4	5.0	0.2	4.7	2.8	3.6	21.0	66.3	19.6	9.4	4.7	100.0	
1991																
Total area (in hectare)	1699.0	28.0	342.0	603.0	413.0	24.0	440.0	231.0	314.0	1961	6059.0	1602.0	506.0	-	8169.0	
Total per capita area (in sq.m.)	82.0	1.4	16.5	29.1	20.0	1.2	21.3	11.2	15.2	94.6	292.3	77.3	24.4	-	394.1	
Percentage of total built up area	28.0	0.5	5.7	9.7	6.8	0.4	7.3	3182.0	5.2	32.4	100.0	-	-	-	-	
Percentage of total city area	20.8	0.4	4.2	7.4	5.1	0.3	5.4	2.8	3.8	24.0	74.2	19.6	6.2	0.0	100.0	

Source: Master Plan for Karaj (with some alteration and adjustment)

dormitory-town for Tehran. It is for this reason that one can expect a considerable increase in housing provision in the city, together with the necessary services such as educational facilities, especially at primary and secondary school levels. Furthermore, because of the location of Karaj in the neighbourhood of Tehran, a significant proportion of land in Karaj is devoted to transportation routes with differing traffic modes, so the pattern of this major land use also deserves examination.

7.3.1. Residential Land Use

Housing as one of the most immediate and important necessities of any human society occupies a considerable proportion of land in most urban settlements. The actual area covered by this major land use is, however, usually decided mainly by the size of population of a settlement. It seems that this is not the case with Karaj, partly because of the relatively large planning area of the city and partly because of the very rapid nature of its population increase. Thus, residential areas cover a relatively small proportion of land. As shown in Table 7.2, in 1975 only 7.7 per cent of the total city area of Karaj was occupied by houses, a figure which was adjusted to 9.4 per cent in 1976. Although the projected figure for 1991 indicates an increase of almost three times, to about 21 per cent of the total land area, it seems there would be still an unusually low residential space requirement in Karaj.

Recent changes in the patterns of residential land-use were documented by an examination of all the building permits issued and recorded by the Municipality of Karaj during the first six months of 2536 (March-September 1977). For this purpose, information on the size of building plots, the area under constructions (floor space) and the actual locations of the plots was extracted and compiled for five major divisions of the

city. The results are presented in Table 7.3*. Although the information covers only a six month period it can be extended to cover the remaining half of the year because, owing to obstacles such as shortfalls in the supply of construction materials and shortages in the building labour-force, the starting date of building for all those permits issued after 21st September was from 21st March 1978.

According to Table 7.3, in 1977 the total number of building plots for which permits were issued as 1139 units, covering a total area of about 39.7 hectares. Several major trends can be observed from the figures in the table. Firstly, the significant proportion (36.5%) of houses to be built in the western part of the city reflects a residential movement in line with both the physical advantages of the area and the planning directives of the Master Plan. The northern and central parts of the city also account for a large proportion of the permitted residential development. However, whereas the northern section (corresponding to the Azimiyeh residential quarter and represented generally by one storey villas) uses mainly peripheral vacant land, the houses in the central parts mainly replace the existing orchards or cultivated lands.

Secondly the larger size of the building plots deserves comment. These plots range in sizes from 287 to 539 sq. m., with an average area of 379 sq. m. Although the availability of land at a relatively low price as compared with, for example, Tehran help to provide a reason for such a high average size, the directives of the Karaj Master Plan which has been

* The location of buildings is shown in the first column of Table 7.3. The five broad sub-divisions have been adjusted to correspond with the boundaries of the 1976 enumeration districts. The enumeration district numbers which correspond with the locations in this table are as follows: North = district 2 (excluding squatter dwellings on Tappeh-e-Moradab); South = districts 5 and 8; West = districts 1 and 3; East = district 7; Centre = districts 4 and 6. (See chapter 4 for the boundaries of enumeration districts).

Table 7.3: Total number and area of the building plots and floor space in different parts of Karaj, based on the building permits issued during the first six months of 1356 (March - September, 1977).

Location of Buildings	Building plots (Total number)	Building plots (Total area) sq. m.	Building plots (Average size) sq. m.	Total number of storeys	Floor space (total size) sq. m.	Floor space (average size) sq. m.	Percentage of floor space to the total land plot	Average number of storeys
North	256*	104,101	407	254	43056	170	41.3	1
South	35	11,433	327	35	4192	120	37.0	1
West	417	125,194	300	460	60312	132	48.2	1.1
East	50	28,738	539	48	7684	142	28	1
Centre	147	60,489	411	168	24206	144	40	1.1
Not specified	234	67,186	287	255	43339	170	64.5	1.1
Grand Total	1139	397,141	379	1220	182789	146.4	43.2	1.1

Source: Building Department, Municipality of Karaj

* The reason why the figure for the total number of building plots is greater than the total number of storeys is because it includes some building permits which have been issued only for wall construction.

implemented through the introduction of minimum sizes for building plots, have also been very important. Finally, the low percentage of the total actual floor space of the buildings compared to the total area of building plots should be mentioned. Out of a total of 37 hectares of building plots, only 18.3 hectares or 43.2 per cent were used as floor space. A comparison of the average size of floor space for buildings in different parts of Karaj shows a narrow range from 120 sq. m. in the south to 170 sq. m. in the north. Finally the average number of storeys of buildings for the whole of Karaj city was 1.1, which emphasises the horizontal rather than the vertical expansion of housing in Karaj. It is possible that an increase in housing demand in the future will change this pattern of low density, one storey housing development towards more high-rise developments, particularly if the renewal programmes for the redevelopment of the old quarters near the centre of the city such as Deh-e-Karaj are carried out. The sites currently used for other kinds of activity such as the Sugar Factory, may also provide potential locations for high rise buildings and development here will consequently affect the present pattern of residential land-use. The recent completion (September 1977) of two multiple-storey commercial residential blocks on Khiaban-e-Daneshkadeh, north of the Agricultural College, are a good example of this trend towards centrally located high rise development. (See Plates No.17 & 18).

The increasing population of Karaj, which comprises of mainly low and middle income groups, together with the rapidly rising price of land means that the newer arrivals tend to live on smaller plots at a higher residential density. This was one major reason for the revision of the Master Plan for Karaj in 1975. As shown by the following table, the original suggested minimum size of building plots, especially for those in medium and high density areas, introduced in 1972 had to be reduced considerably when the Master Plan was revised in 1975.



PLATE 17.

High-rise building construction, a new trend of vertical development in Karaj City



PLATE 18.

Two multiple-storey commercial-residential blocks on Khiaban-e-Daneshkadeh

Table 7.4: Changes in the Minimum Size of Building
Plots, 1972 - 1975

	1972	1975 (Revised edition)
Very low density	2000 sq. m. (summer houses) 1000 sq. m.	1000 sq. m.
Low density	500 sq. m.	500 sq. m.
Medium density	400 sq. m.	250 sq. m.
High density	300 sq. m.	180 sq. m.

Source: Master Plan for Karaj, First Stage and
Revised Edition

7.3.2 Educational and Research Institutions

Educational activities, particularly those concerned with studies and research in agricultural and husbandary, have been in Karaj for the past fifty years. From the view point of their space requirements the land devoted to educational uses can be divided into two separate categories:

- (a) Institutions below university level
- (b) Institutions of higher education and research centres.

The first category includes such places as nursery schools, primary and secondary schools. Such establishments, although functionally important are not major users of land in Karaj and they tend to be dispersed throughout the entire urban area. Furthermore, because of their scattered nature and small size it is difficult to show their precise location on a map, and so they are shown only by the letter S (see Figure 7.2). However, as mentioned before they are very closely related to the pattern of housing distribution in both their location and numbers. Table 7.5 shows such information as the number of educational establishments, the number of pupils, total floor space, per capita floor space area, and the total

Table 7.5: Educational Establishments by Type and Size (1972-75)

Type of Establishment	Number and Area	1972	1973	1974	1975	1976
Nursery School	Number of establishments	2	2	3	5	8
	Number of pupils	54	81	130	217	680
	Total floor space (sq. m.)	560	560	968	2918	3678
	Per capita floor space (sq. m.)	10.4	7.0	7.4	13.4	5.4
	Total area (sq. m.)	2181	2181	2789	6139	7595
Primary School	Number of establishments	39	43	44	48	56
	Number of pupils	11313	13145	14110	16297	26680
	Total floor space (sq. m.)	18091	20637	20917	22847	26036
	Per capita floor space (sq. m.)	1.6	1.6	1.5	1.4	1.0
	Total area (sq. m.)	45366	49753	52033	56823	65163
Secondary School	Number of establishments	31	36	38	38	42
	Number of pupils	6824	7612	8743	9564	15453
	Total floor space (sq. m.)	16434	21441	21881	21881	25731
	Per capita floor space (sq. m.)	2.4	2.8	2.2	2.3	1.7
	Total area (sq. m.)	26116	33626	34866	34866	39746

Source: Ministry of Education

Table 7.6: Educational Establishments by Size of Pupils and Area (1978-1991)

Type of Establishment	1978*	1981		1986		1991	
	Number of pupils	Number of pupils	Total area (sq. m.)	Number of pupils	Total area (sq. m.)	Number of pupils	Total area (sq. m.)
Nursery School	1038	1140	12,209	2235	23,936	3260	34914
Primary School	39081	21340	233,459	27500	300,850	20250	330935
Secondary School	23483	21510	264,072	27582	238,625	29366	372802

Source: *Ministry of Education (1978) and Master Plan for Karaj

space area of nursery schools, primary and secondary schools, during the period 1972-76. One notable feature of this information is a marked decrease in the floor space area per head, which must be directly related to the ever increasing number of school-age children in the population. One consequence of such a trend is likely to be the over-crowded and unsuitable conditions in educational establishments (for example there are some primary schools in Karaj which run three shifts a day as from 8.30 to 11.30, 11.30 to 14.30 and from 14.30 to 17.30.

The future educational space requirements projected by the Master Plan for Karaj are based on a sample survey of the population carried out in 1975, but it would seem that much greater space provision will be necessary for educational land use in the future if an undesirable situation is not to develop. To support this argument, the 1978 figure for school pupils at different levels is compared with the figure forecast by the Master Plan for 1981, 1986 and 1991. As shown in Table 7.6, the number of primary school pupils in 1978 recorded by the Ministry of Education is 39081 children, which is already considerably greater than any figure projected by the plan for the three periods up to 1991. This indicates the rapid increase in migrants with large numbers of children of primary school age. The figure for secondary school pupils in 1978 is also greater than that for 1981 by about 2000 persons. Yet considering that an even larger number of primary school leavers will enter the secondary school system during the planning period up to 1991 can be appreciated that the present figures for educational requirements are a gross under-estimate of likely future trends, given that most children likely to be entering secondary school after the Master Plan period, have already been born. Further space provision must, therefore, be made for this particular function in Karaj.

In 1976, the total number of educational establishments was 117, comprising 8 nursery schools, 56 primary schools, 42 secondary, vocational

and technical schools; the remaining number included institutions of higher education such as the Agricultural College, the Faculty of Forestry and Natural Resources, the Centre for Mathematics and Management Studies and the Higher Institution of Environmental Conservation. The research centres include agricultural, husbandary and training centres, some of which were originally built during the Reza Shah period. Environmental suitability, nearness to Tehran and availability of Arazi-ye-Khaleseh are the main reasons for the emergence of these land users in Karaj.

The allocation of nearly 2 million square metres of land since 1976 for the construction of the Teacher's Training University (to replace the existing one in Tehran) and also Farabi University, indicates that Karaj is gradually acquiring an established educational and research function. With the recent policy of the government to encourage the creation of private educational establishments, there will be still greater possibilities for further expansion in educational facilities and thus educational land use in Karaj.

7.3.2 Transportation Land Use

Transportation is often regarded as the key determinant of the land-use pattern of an area. It is by no means the only influence on land-use of course, or the only factor accounting for the locational advantages or disadvantages of a particular area: site rentals, financial and physical limitations to utility extensions, public action through land-use controls, the activities of real estate and private developers, competition between businessmen, the social needs proposed in Master Plans, and the desires to home owners all have a very important share in deciding the arrangement of land-uses within any city. But none of these influences occupies the central role of transportation. Transportation may not be responsible for every change in the urban patterns, but on the other hand, no change will be possible unless reasonably efficient

and convenient transportation can be provided.

The particular location of Karaj on the way to Tehran has important effects in that Karaj has to cope with a substantial volume of traffic flow ranging from national to regional and local needs. As shown in Table 7.2, about 15.3 per cent of the total land in Karaj is used for the different means of transportation. Those national and regional routes which go through the Karaj region seem to account for a major part of the traffic flow because except at the main intersection Khiabans, the Karaj autobahn and the newly opened road to Shahriyar - which are all parts of national or regional networks - the remaining routes are mainly of local importance only and inefficient for rapid motor traffic. Indeed apart from a few primary roads which are the result of planning projects, most of the secondary and tertiary routes are unplanned and follow such factors as the boundaries of agricultural lands and orchards or the direction of irrigation canals. Therefore these minor routes produce a complex of narrow alley ways which in the absence of an urban development plan hardly function as an efficient network.

Consequently, the construction of well-engineered thoroughfares which function efficiently to serve these residential areas is a matter for priority, taking into account the rapid increase of the city population which has been followed by a concomitant increase in the car ownership rate. It would seem that with the existence of large open spaces in the vicinity of the central area of Karaj, the construction of such a comprehensive transport network to serve the residential neighbourhoods would not be such a difficult task, owing to the fact that few buildings would need to be demolished so less time would be needed to acquire property or award compensation to owners. With the possibility of compulsory purchase of land, it seems that the financial limitation of the Karaj Municipality is the only reason for the delay in the execution of plans such as a 6 kilometre bypass road for heavy traffic to run

Source: National Cartographic Centre

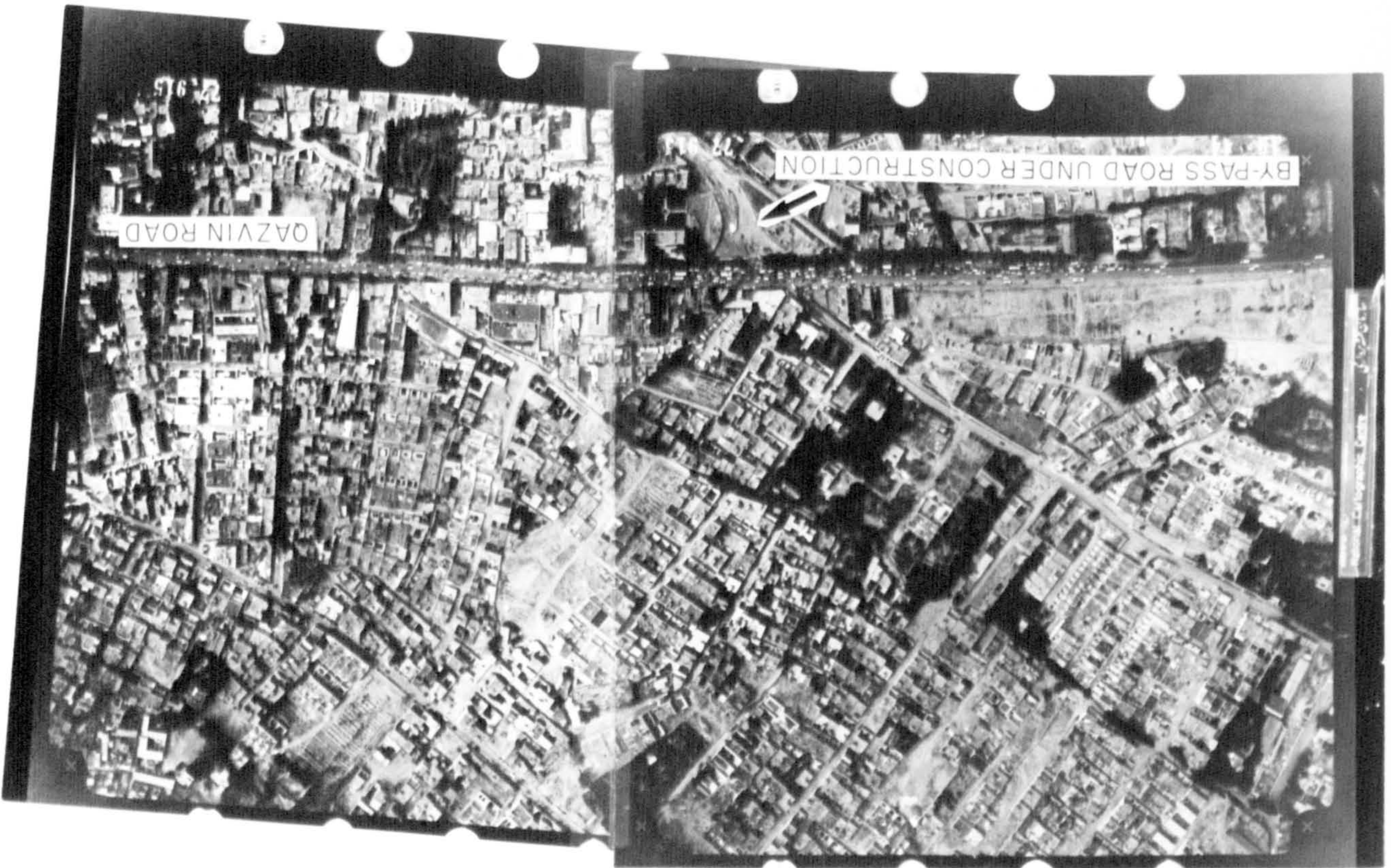
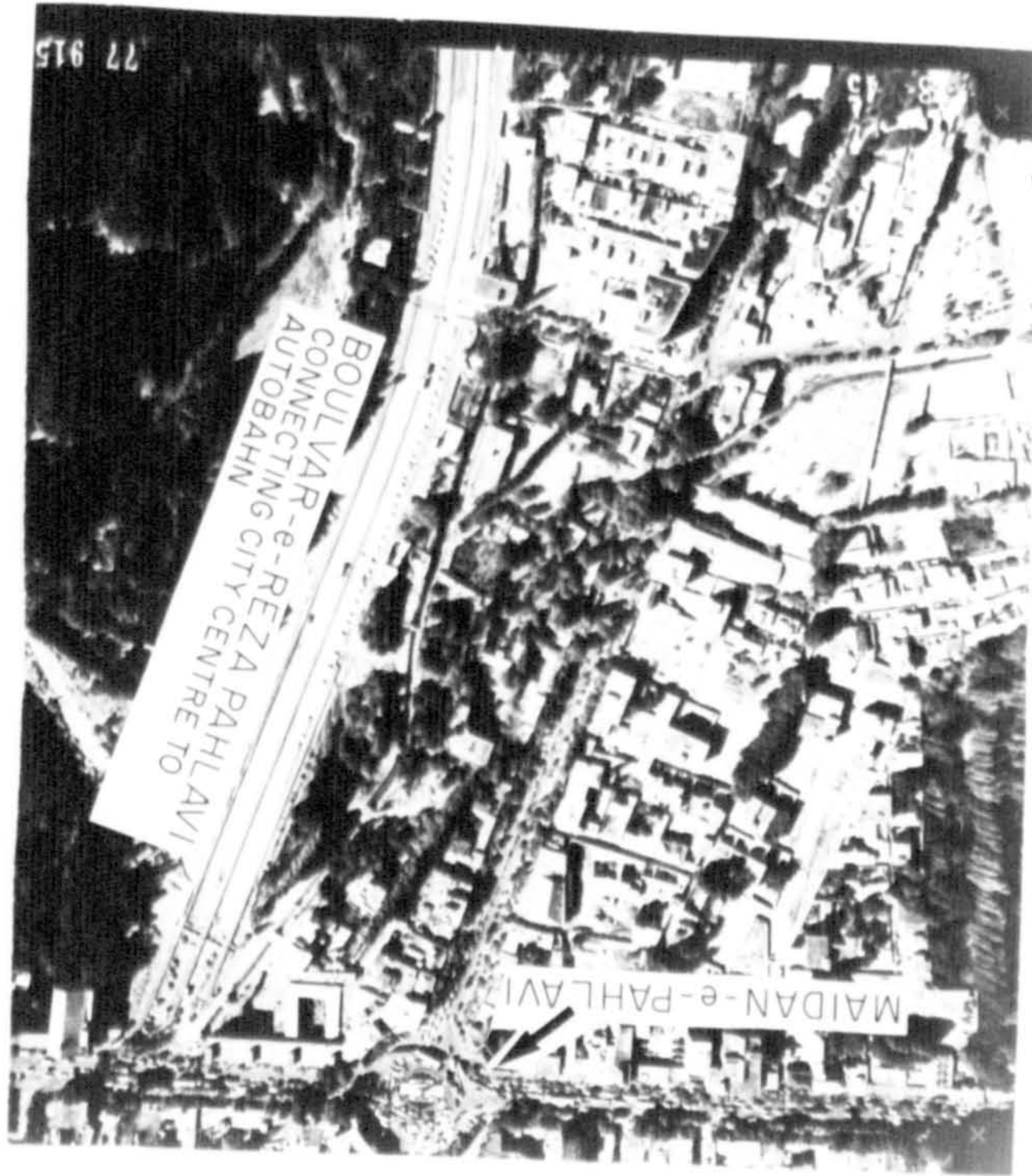


Fig 7-4 TRAFFIC CONGESTION ON GAZVIN ROAD AND MAIDAN-e-PAHLAVI

parallel with Karaj autobahn to the south of Khiaban-e-Pahlavi. Indeed, in the two year break between the two periods of the author's fieldwork (1975 and 1977), this latter project which is vital if there is to be an improvement in the city's traffic flow, remained at the preliminary stage of development. (See Figure 7.4)

At present, in the absence of adequate motorable routes, which also makes existing conditions for pedestrians almost intolerable, the only measure to improve the situation would be to segregate pedestrians physically from motor traffic. The idea of walkways, discussed briefly in Chapter 5, is one possibility in the face of the present traffic congestion of the Karaj city centre. However, until the transit bypasses are constructed, the city centre will continue to suffer from a very heavy and confused pattern of traffic. (See Plates No. 19 and 20).

7.3.3 Vacant land, Cultivated land, Orchards

In studying the area of vacant land our concern is to provide investigation of the capabilities and suitability of vacant lands for urban use and development, for residential industrial and other classes of land use. The vacant land study identifies the potentialities of vacant and open land for such development, by taking into account the physiographic features and the presence or absence of such man-made improvements to the land as transportation routes and provision of public utilities.

By 1975, out of the total city area of 8169 hectares, 4993 hectares or 61 per cent, were classified as undeveloped land. The orchards and cultivated areas accounted for about 1602 and 769.5 hectares of this respectively, whereas about 2620 hectares were classified as vacant land (see Table 7.2). As shown by Figure 7.5, this latter area of vacant land as projected by the Master Plan for Karaj, will be gradually built over and will be occupied by different kinds of urban activity by 1991.



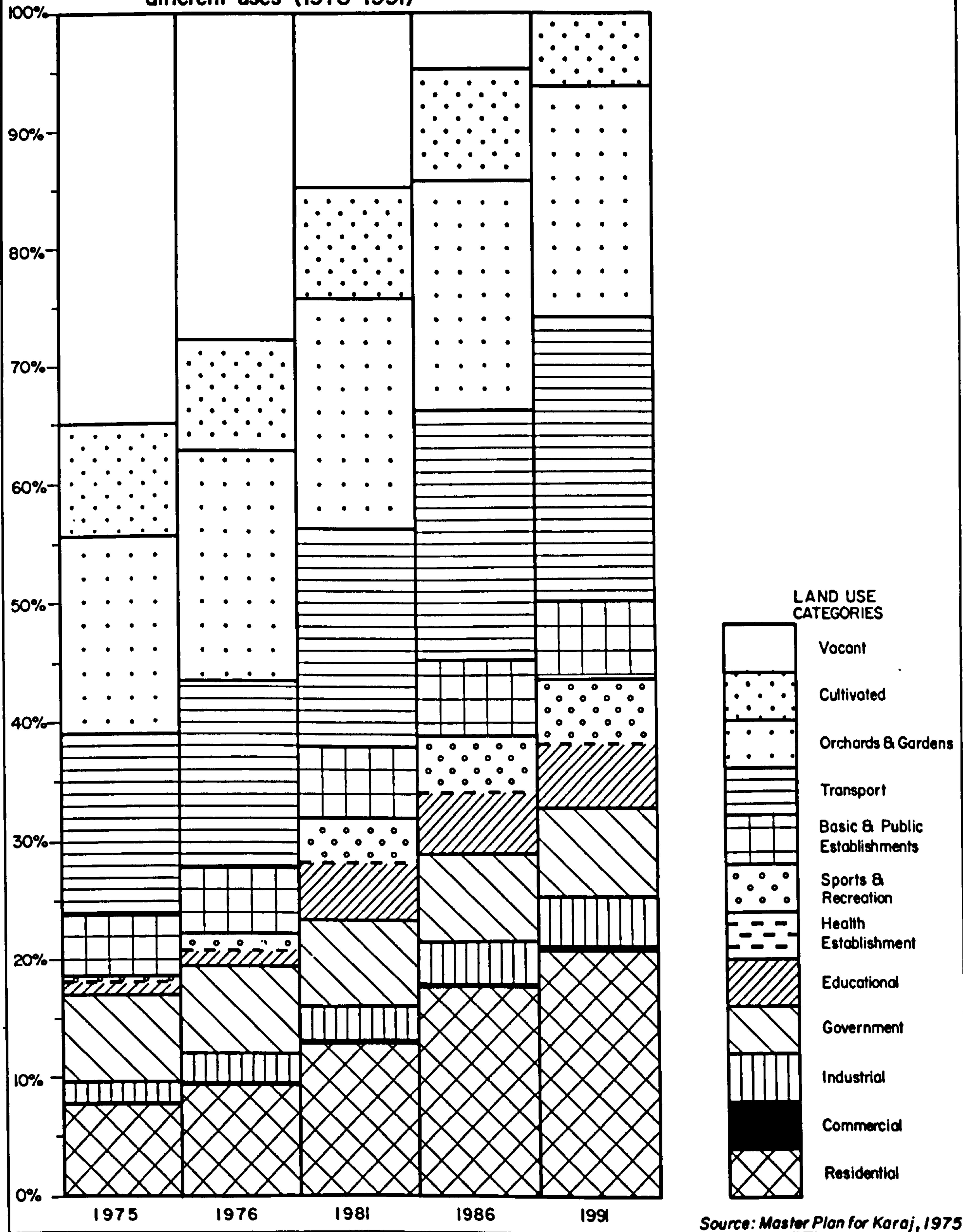
PLATE 19.

Traffic congestion and pedestrian flows on Khiaban-e-Pahlavi



PLATE 20.

Fig. 7-5 Existing and projected percentage of land under different uses (1975-1991)



Yet another 265 hectares of cultivated land will also be put into development during the planning period.

Since the vacant land in the central area of Karaj is limited mainly because of physical obstacles such as the steep slopes of Kuh-e-Poshteh, and the Karaj river bed, and is unsuitable or difficult to use for development, the peripheral lands available mainly to the west of the city will be the major sources of vacant land for future development.

In contrast to open lands and unbuilt vacant areas, which are located mainly in the peripheries of the city, orchards in Karaj have a predominantly central location. This is because this type of land originally needed to be closer to the settlements in order to receive careful and intensive care. However, with the rising value of this land, so its current use as orchards has become less economic compared to more competitive land users of the commercial and residential kind, and consequently these orchards are giving way to other forms of development. On account of this, one is doubtful about whether the area under orchards up to 1991 projected by the Master Plan for Karaj, is realistic, as it is more likely that most of the lands now given over to orchards will have been converted to other uses by the end of the plan period.

Having outlined some of the salient aspects of the land use pattern in Karaj, it is now possible in conclusion to offer some suggestions which could help to improve land use planning and meet the pressures towards change and rapid growth.

(i) Since planning is still a relatively new phenomenon in Iran, it is suggested that any proposal for the improvements of Karaj city, should be introduced with adequate opportunities for public participation. For instance, apart from the only copy of the City Master Plan available to the public in the Karaj Municipality, copies should be placed in certain parts of the city such as libraries, educational institutions for public

information, as well to allow for some feedback from interested members of the public and so help to improve the climate of co-operation and public understanding of planning matters.

(ii) As the present east-west traffic axis of Khiaban-e-Pahlavi will continue to serve as a major traffic artery, even if the expected alternative road is built, the construction of some pedestrian subway or overpass bridges will be absolutely essential in places such as the vicinity of Maidan-e-Pahlavi and where the north-south roads cross Khiaban-e-Pahlavi. This will certainly be necessary both for reasons of safety, as well as helping to improve traffic flow.

(iii) Since the present land use pattern in Karaj comprises large areas of vacant land and open space, it would seem that carrying out the directives of the Master Plan will be less difficult and less expensive than in many other cities, once there is provision of the necessary financial resources. This suggests also that there ought to be, first some increase in autonomy, and second improvement in the administrative efficiency of the Municipality, which can sometimes be simply achieved by reducing unnecessary bureaucratic procedures, for example, in approval of a plan or issuing a licence or housing permission. Indeed, perhaps the main obstacles to the implementation of the Karaj Master Plan will be that the Municipality which has responsibility for implementing the plan, does not have jurisdiction over all the municipal activity. Water, the most crucial requirement for development in Iran, no longer comes under the control of the Municipality and a wide range of basic functions are allocated to government and semi-government agencies which clearly frustrates orderly development. It also points to the need for planning legislation to provide for the co-ordination of the many agencies involved in developing the city, and also to recognise comprehensive urban land-use planning as a continuous and necessary activity.

(iv) Whilst the existence of a comprehensive master plan is necessary for the orderly planning of development, it is not in itself sufficient to solve all the problems that stem from unprecedented population growth. Consequently, such a plan must be backed up by a realistic and consistent national and regional urban development policy, with appropriate legislation to provide for the co-ordination of all the city and combined with the enforcement of more effective controls over the use of land.

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THE DEVELOPMENT OF SATELLITE SETTLEMENTS IN THE KARAJ REGION

Rapid development of a large number of residential satellites in the Karaj region is a phenomenon which has occurred during the past decade. The rise of these satellite communities has in fact been a common feature in the development of both Karaj and (on a larger scale), Tehran, and their existence has drawn Karaj closer to Tehran than ever before. These satellite towns may eventually be an effective means of reducing the problems of congestion and overcrowding faced equally by central Karaj and Tehran. The major themes to be examined in this chapter concern the pattern of distribution of these satellite centres, the reasons behind their development, together with an analysis of the function they perform and the relationship of these settlements to the higher order centres of Karaj and Tehran.

The data

Documents and sources of information employed in this investigation were limited and usually in an unpublished form. This was partly owing to the recent development of these satellites, and partly because the private developers alone were responsible for their construction. However, certain other data sources have also been of importance and have been utilised wherever possible. The sources used in the chapter can be categorised as follows:-

- (i) Governmental agencies
- (ii) Offices of private developers
- (iii) Personal enquiry and fieldwork 'on the ground.'

(i) Governmental agencies: Despite having no direct involvement in the development of these satellites of Karaj, some of the related governmental agencies do hold some useful documents. For instance in Karaj, places such as the Government Office, Land Registration Office, Regional Water Board and Department of Energy were particularly useful sources of information;

and in Tehran unpublished sources kept in the Ministries of the Interior and Housing and Urban Development were of considerable help in providing general background material for this chapter.

(ii) Offices of private developers: Documents produced by the offices of satellite housing developers, although limited in number, are the major sources of unpublished material concerned directly with the subject of this study. Documents including those detailing different stages in planning the satellite projects which have been submitted to and then approved by the Ministries of the Interior and Housing and Urban Development, also proved quite useful.

(iii) Personal enquiry and fieldwork: Again this is a major source of information on which most of the second half of this chapter is based. Basic surveys carried out included a sample survey of the patterns of movement along the Tehran-Karaj autobahn; interviews with the satellite authorities together with an intensive enquiry about the household characteristics of the two most populated satellites, namely Gohar Dasht and Golshahr Villa.

8.1 Pattern of distribution of satellite settlements

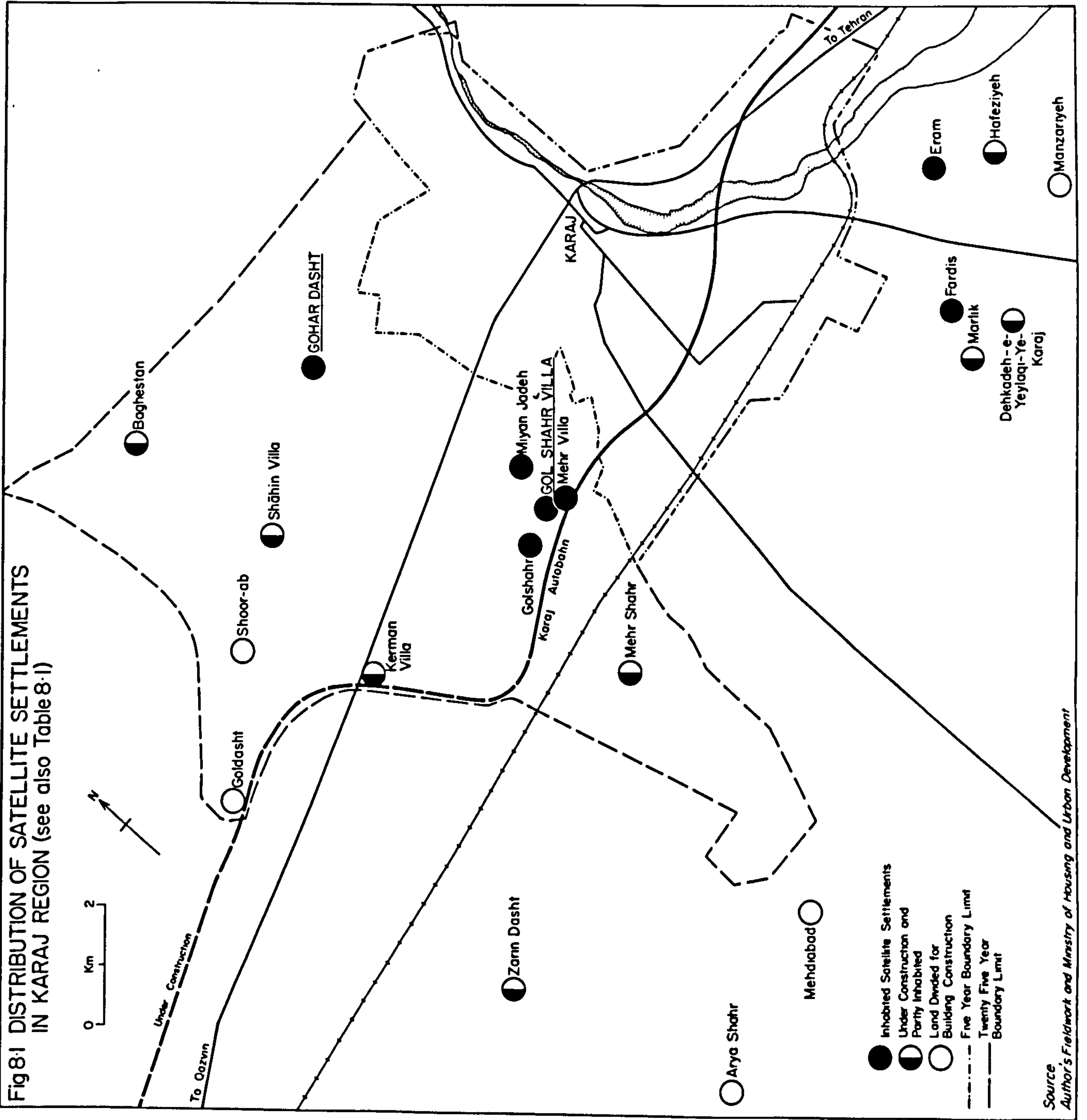
The recent development of satellite settlements in the Karaj region originates in the general improvements of the Iranian economy which occurred after the Second World War, which manifested themselves in an increasing concentration of economic activities in Tehran and its immediate surroundings. This process was a major factor in encouraging a number of wealthy people to invest in the purchase of land in the Karaj region for an anticipated benefit in the neighbourhood of this rapid growth centre. The very low price of land was a decisive factor in this process leading to the purchase of vast areas of land, sometimes covering the whole area of a

village up to 3 to 5 million square metres in size.* Assets such as a paved road and especially the existence of a permanent source of water were the most important factors behind the purchase of a particular set of villages. Indeed, analysis of available data on water rights indicates that the majority of the inhabited and partly inhabited satellite settlements at the present time are villages which, historically, used to have a fixed permanent ration of water direct from the Karaj river.

During the 1960's this active trend in land transactions continued, especially after the land reform programme (1962). Having more of their wealth available in cash, some of the previous landlords entered this new market, because they found it an easy and profitable activity. Following the preliminary procedures, such as land levelling and road paving, land dividing programmes started to be implemented. However, it was not until 1970 that intensive housing development projects started to be carried out and as a consequence a large number of housing blocks were constructed and occupied. At present there are 20 such development schemes at different stages of completion which cover 3555 hectares and are sub-divided into 24127 building plots. About one sixth or 3807 plots have already been built on, 809 plots have dwelling under construction, together with a further 2000 land plots which have been converted into private gardens, to be used as temporary accommodation.⁽²⁾ As shown in Fig. 8.1, the distribution of these satellite settlements follows two broad patterns: firstly there are those located generally to the west and south of the Karaj region although they are found predominantly to the west. The westward orientation of these

* No area figure appears on the original registration documents of villages studied, instead, major natural land marks were considered as boundary indicators. As regards the low price of land, the village of Vaharjard, now the site of the satellite settlement of Gohar Dasht, provides a good example, the registered price of the whole village being only Rials 30,000 or about £235 sterling (£1 is equal to 128 Rials) when it was bought in 1949.⁽¹⁾

Fig 8-1 DISTRIBUTION OF SATELLITE SETTLEMENTS IN KARAJ REGION (see also Table 8-1)



Source: Author's Fieldwork and Ministry of Housing and Urban Development

satellite developments whilst conforming with the anticipated future expansion of Karaj City, demonstrates the close relationship between the distribution of satellite communities and existing east-west routes and especially Karaj-Qazvin autobahn which currently is under consideration. The second feature of the satellite settlements is that the ones already occupied are located close to the five year boundary limit of Karaj whilst the satellites which are only partially occupied and are still under construction are situated further away from the city boundary, and those settlements whose land division and street layouts have only now been completed are relatively far from the city - some of them even outside the 25 year boundary.

8.2 Reasons behind the satellite settlements development

Analysis of the available data suggests a number of reasons for the emergence and development of satellite settlements in the Karaj region. The following reasons seem to be the most significant:

- (a) considerable improvements in the national economy in recent years represented by increase in the financial ability of families, together with changes in the social behaviour of people, such as splitting the composite families into nuclear families, especially in the capital, have in turn facilitated the outward movement of population, away from Central Tehran which has encouraged the trend towards suburbanization.
- (b) Restrictive measures imposed by the Master Plan for Tehran to control the expansion of the boundary of the built up area of this city have indirectly affected the satellite developments in the vicinity of Karaj.
- (c) The impact of a fast highway system, particularly the Tehran-Karaj autobahn has resulted in considerable reduction in the time-distance

between Karaj and Tehran and encouraged the sprawling expansion suburban settlements of Tehran beyond its municipal boundary.

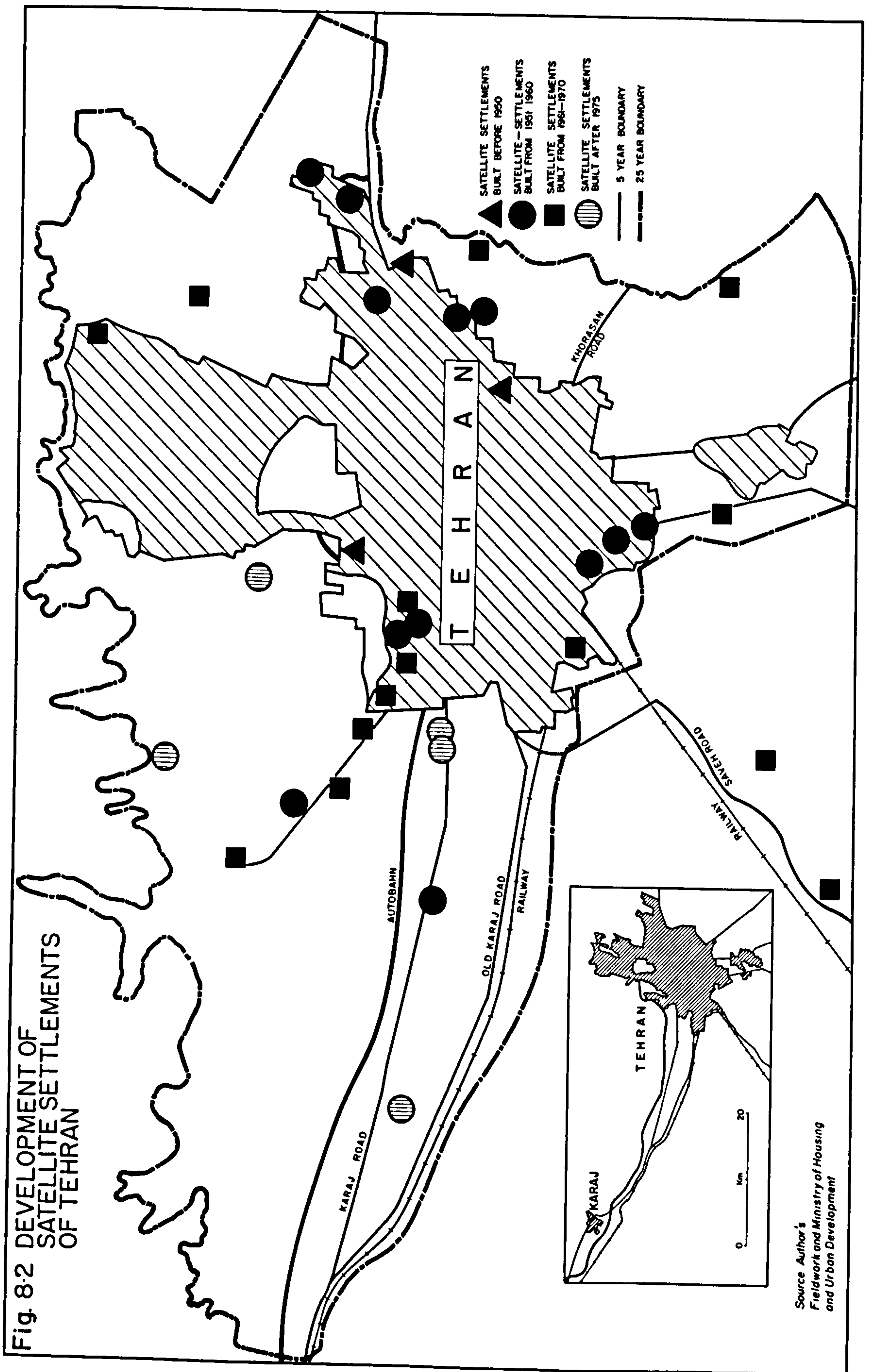
(d) Finally the favourable geographical location of Karaj, together with the relatively low price of land and housing and the more favourable physical environment compared with Tehran have also proved attractive.

These reasons, which can be divided into push and pull factors, are all inter-related and responsible for the outward movement of a sizeable proportion of population from Tehran to reside in the Karaj region. Whilst all the factors mentioned had some influence, the restrictive legislation on the boundary limits of Tehran and the construction of the Tehran Karaj autobahn would appear to have been the most decisive. Consequently, these two factors will now be examined in more detail. When the two selected satellites of Gohar Dasht and Golshahr Villa are discussed the other reasons mentioned will be examined in greater depth.

8.2.1 Effect of Tehran Master Plan on the Karaj region

As already mentioned, towards the end of the past decade the shortage of accommodation in Tehran became a serious problem. This, in fact, was one major outcome of the ever-increasing population of the capital, which had received the lion's share of the overall socio-economic improvements in Iran up to that time. The 1966 Census results showed that 51 per cent of the population of Tehran had been born outside the capital, whilst a significant increase in 1.2 million or 79% of the total population (from 1.5 to 2.7 million) was recorded during the period 1956-66.⁽³⁾ These conditions encouraged further the horizontal expansion of Tehran and added to its problems. Indeed, the problems arising from this rapid unplanned population increase have been the subject of many studies,⁽⁴⁾ and the commissioning of the preparation of the first Master Plan for Tehran represented

the initial response of the Iranian Government to this situation of rapid change. This plan for the development of Tehran had a 25 year horizon date (1966-91) which was to be divided into programmed phases each of five years. Although preparation began in 1966 it was not, however, fully effective until 1970. According to the development regulation contained in the plan, restrictions were to be imposed on the construction of houses outside the city's boundary limits and would not be lifted until the empty plots within the city limits had been fully utilized. Nevertheless, a rapid increase in land and house prices in the city was one immediate outcome of the limitation imposed by this master plan. Further population increase added to the seriousness of the situation, discrepancies over the timing and the manner in which the preliminary directives of the Master Plans for Tehran and Karaj were implemented resulted in a boom in land and housing speculation in the Karaj region. The sudden increase in land prices (in some cases rising from 100 Rials to 1000 Rials per square metre),^(5,6) together with the availability of facilities for the quick registration of land deeds, the easy provision of electricity and licences for water well digging, and the delays in the approval of the Karaj Master Plan, all contributed to the growing problem of speculation. In 1971, when further expansion beyond the boundary of the built up area of Tehran was expected, the government decided not to extend it and therefore the original five year boundary limit, beyond which no development was allowed without special permission, was fixed again for another five years. This period coincided with a period of intensive high-rise apartment building in Tehran, but also with an outward movement of the lower middle class and 'middle' middle class Tehranis who were absorbed by the newly developed settlements around Karaj. The restrictive controls imposed in the Tehran Master Plan on the horizontal expansion of the built-up area can be easily seen by examining Fig. 8.2.



As is shown, the construction of a large number of satellite settlements and major residential quarters were the chief features of the housing development in Tehran during the Nineteen Fifties and Sixties. Indeed, there were about 24 such satellites and major residential quarters built during these two decades. Since there was no such development between 1970-74, this can be attributed to the tighter control of the city's boundary limits introduced by the Master Plan for Tehran. As indicated by Table 8.1, this latter period almost coincided exactly with an important phase of satellite development within the areas surrounding Karaj city. Although the extent of this satellite development was later considerably restricted by the Ministry of the Interior, enough time elapsed to give rise to a boom in housing construction in the Karaj region. Since then, the illegal and partially overnight construction of housing has been a common feature of these satellites and has added to the supply of accommodation in the area.

After 1975 a change in the boundary limits of Tehran was permitted mainly to the west and north west of the city, and five new residential quarters and satellite developments were given planning permission consisting of complexes of high rise buildings (see Fig. 8.2 for the location of these recent developments).

8.2.2 Effects of Tehran-Karaj Autobahn

The influence that rapid communications routes can exert on the pattern of settlement expansion is very direct and can be supported by many examples. In the case of Karaj region, the construction of the Tehran-Karaj autobahn facilitated a significant expansion of suburban settlements in both the cities of Karaj and Tehran. Apart from a considerable reduction in the time-distance between the two places (halved to about 30 minutes driving time), the alignment of this autobahn coincided with the general westerly direction of growth of Tehran, envisaged in both the

Table 8.1: Date of land registration and sale transaction in some of the villages near Karaj city, for the purpose of satellite settlement development.

No.	Name of satellite settlements	Original name of settlement	Initial land registration/purchase date	Date of land dividing for sale/housing development
1	Arya Shahr	Sultanabad	1950	1968
2	Baghestan	Baghestan	1954	1972
3	Fardis	Sarhadabad	1960	1970
4	Gohar Dasht	Vaharjard	1949	1968
5	Golshahr	Qalehshanbeh	1948	1958
6	Golshahr Villa	Qalehshanbeh	1953	1972
7	Marlik	Roknabad	1960	1971
8	Mehrshahr	Hosainabad	1934	1963
9	Shahinshahr	Soofi abad	1953	1973

Source: Land Registration Office, Karaj

physical and planning objectives of the Master Plan.

In order to understand better the impact that this very important factor has had on the patterns of communication between Tehran and Karaj, a sample survey was conducted by the author in which almost one per cent out of a total of 7760 private car drivers driving towards Karaj were interviewed at the eastern entrance of the Tehran-Karaj autobahn.* As a result during the 12 hours' study (8 a.m. - 8 p.m.) the destination and purpose of trips of 74 persons using the autobahn was studied. Out of a total of 74 car drivers interviewed, 8 (or 11 per cent) were visiting destinations between Tehran and Karaj, 32 drivers (or 43 per cent) had Karaj and its immediate surroundings as their destination, 19 drivers (or 26 per cent) were using the autobahn to get to the recreational centres to the north of Karaj (alongside the Karaj river or Amir Kabir Dam Reservoir), or different parts of the Caspian Sea coast; and, finally, the remaining 15 drivers (or 20 per cent) were travelling towards the west of the country after bypassing Karaj city. Yet 21 per cent of the drivers whose destination was somewhere beyond the Karaj region, intended to have a short stop of 30 minutes to 2 hours to buy food or refreshments in Karaj.

For the purpose of this study, only the answers of those 32 drivers travelling to Karaj and its immediate surroundings will be considered and the results of an analysis of the answers given to the four major questions on the pattern of communication will be examined (see Table 8.2). These major questions are as follows:

* As shown in Fig. 8.3, a 12 hour vehicle count was carried out on both carriageways of the autobahn. However, a much tighter control by Road Police and persons in charge of selling autobahn tickets at the eastern entrance is the reason why only the answers given by drivers travelling towards Karaj have been considered and analysed here, although it is accepted that figures for one side of the autobahn are not enough for a satisfactory result.

Table 8.2: Analysis of answers given by selected drivers using the Tehran - Karaj autobahn

	I Purpose of trip				II Frequency of trip			III Length of stay at destination				IV Reasons for using the autobahn		
	1. Work	2. Recreation	3. Visiting relatives	4. Going back home	1. Every day	2. Once a week	3. Once a month or more	1. Less than one day	2. Two days	3. One week	4. More than one week	1. Faster	2. Less congested and more secure	3. Closer
1	+				+			+				+		
2			+			+		+				+		
3	+					+		+					+	
4	+						+				+		+	
5	+					+		+					+	
6	+					+		+					+	
7	+						+	+					+	
8	+				+			+					+	
9	+						+	+						+
10				+		+					+		+	
11	+				+			+					+	
12	+				+			+					+	
13		+				+		+					+	
14	+					+		+					+	
15				+		+			+				+	
16				+			+				+		+	
17		+					+		+				+	
18	+					+		+				+		
19				+		+					+	+		
20		+					+	+					+	
21	+				+			+					+	
22	+				+			+					+	
23	+				+			+					+	
24	+							+					+	
25	+				+			+				+		
26		+				+			+			+		
27				+		+				+		+		
28		+				+		+					+	
29		+				+		+					+	
30			+				+	+					+	
31	+					+		+				+		
32	+					+		+					+	

Source: Fieldwork by author

1. Purpose of trip
2. Frequency of trip
3. Length of stay at destination
4. Reasons for using the autobahn.

As a result of this investigation, it was discovered that 19 cases (59 per cent) of the total trips were made for the purpose of daily or occasional work. Those who were going to Karaj for recreational purposes comprised 6 cases (19 per cent) of the total, whereas the remaining 7 cases (22 per cent) of the trips were made to return home or to visit relatives. A question on the frequency of use of the autobahn was included in order to find out about the pattern of trips. Consequently, it was noted that out of a sample of 32, 8 cases (or 25 per cent) used the autobahn every day, 16 drivers (or 50 per cent) used it once a week and the remaining 25% travelled on this autobahn once a month or more. When these percentages are examined against the purpose of trips, it can be seen that journey to work is the only reason for all the daily trips made, whereas only one fifth of all the weekly trips were for the purpose of occasional work or business. Recreation and visiting relatives both account for an equal proportion of trips and together include a half of the total number of weekly trips. The remaining cases included were those who were going back home once a week from Tehran.

As regards the length of stay, 24 cases (75 per cent) of those who were interviewed intended to stay in their destination for no longer than one day, and the remaining 8 cases (25 per cent) intended to stay for a period of two days to one month.

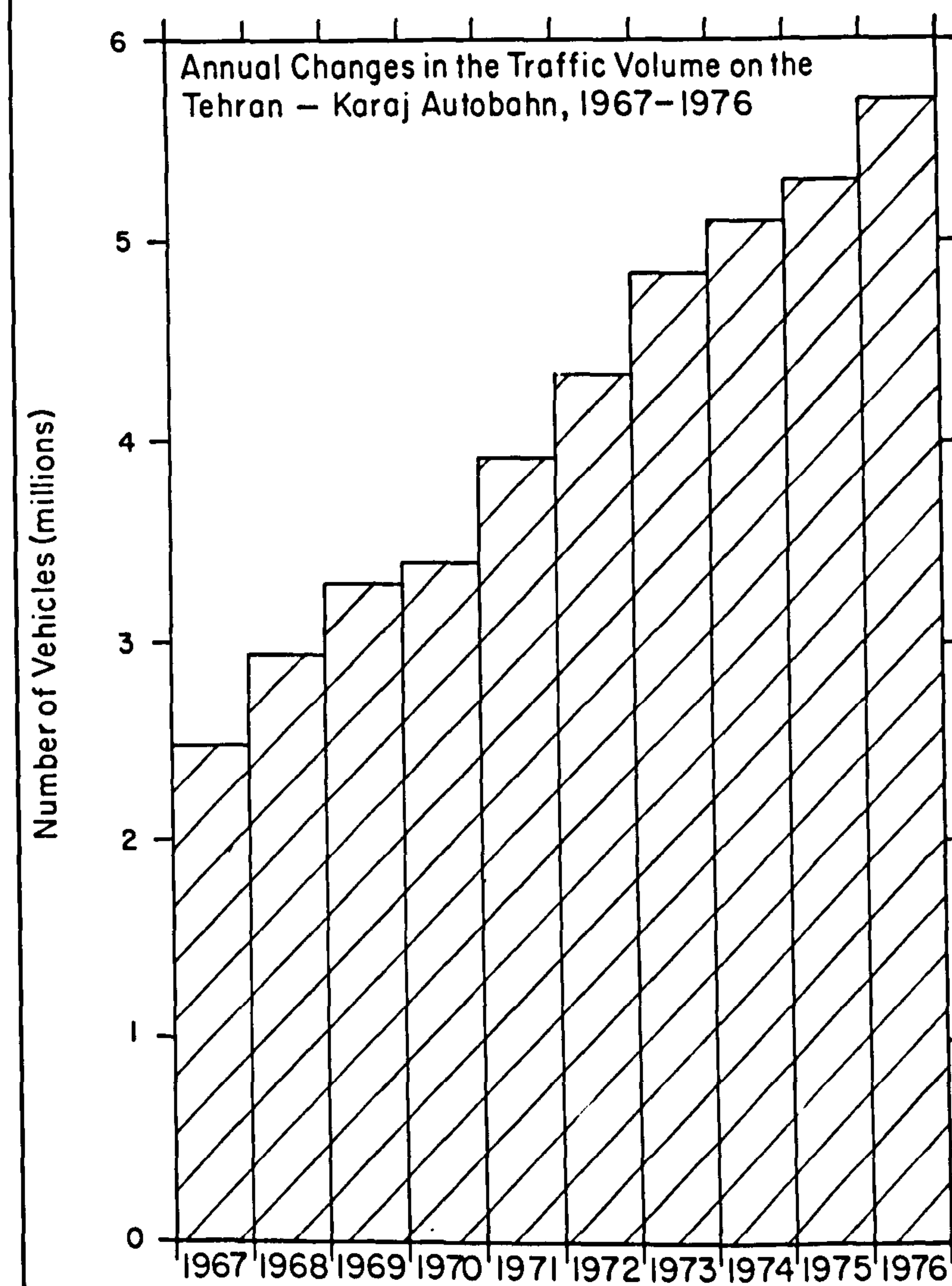
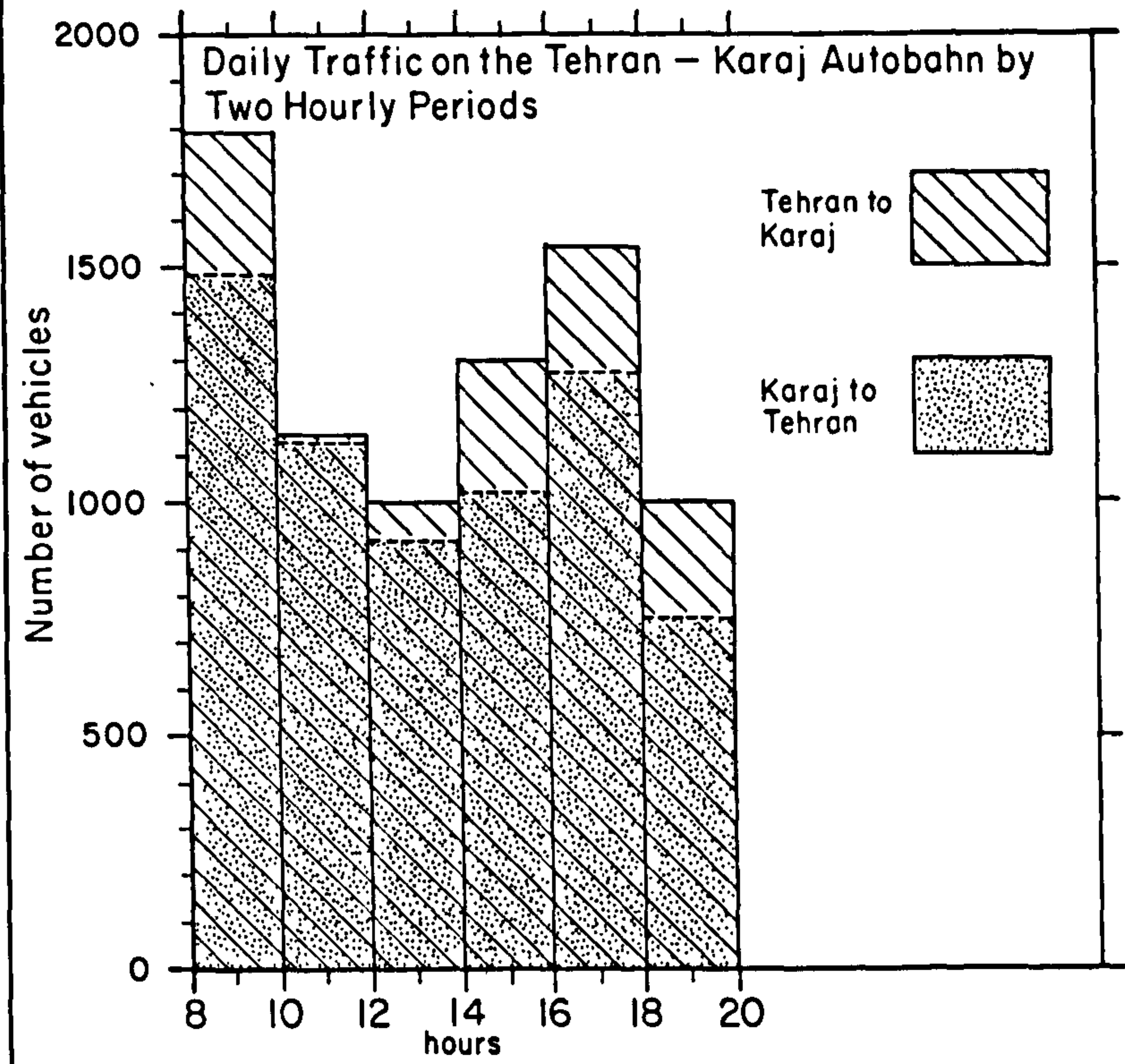
As to the reason why the autobahn was being used for the trips (especially considering the 10 Rials road tax per car), the answers were rather different from what was expected. A high percentage of drivers

(70%) replied that the less crowded and more secure conditions were the reason for choosing to use the autobahn. 25 per cent believed that the faster driving time was the main factor. Obviously, the two answers are interrelated, but it is clear that the very congested and dangerous traffic situation on the Karaj road (with about 300 fatal motor accidents per year) makes the Tehran-Karaj autobahn much more popular than the Karaj road, where the number of fatal accidents is about 50 per annum.

As shown, the number of private cars using the Tehran-Karaj autobahn has increased more than twofold, from 2,490,000 to 5,650,000 units, during the ten year period 1967-1976 (see Fig. 8.3). Since 1971, a significant annual increase in traffic volume can be seen, which might be related partly to the westward movement of Tehranis to reside in Karaj and its immediate surroundings, and partly to an increase in the popularity of week-end trips to picnic spots and sports centres around Karaj, and further north to the Caspian Coast.

There are other indicators which reflect the important effect that the Tehran-Karaj autobahn has had on Karaj of which the following are especially significant. Firstly, there is the way that Azimiyeh, the first satellite settlement in Karaj, built in 1964 and now within the city boundary, has developed and expanded. As has already been shown in the air photographs taken at different periods, this residential community had a fairly slow growth initially, but since the completion of the Tehran-Karaj autobahn and especially after 1970, it has developed very rapidly, (see Figures 3.7 and 4.8 in Chapters 3 and 4). Secondly, there are the interesting results of a personal enquiry among the household heads of the two selected satellite settlements of Gohar Dasht and Golshahr Villa, of whom between 90 and 95 per cent mentioned that if this autobahn had not been built they would not have moved to live in these satellites. It is

Fig.8-3 DAILY AND ANNUAL TRAFFIC FLOW ON THE TEHRAN – KARAJ AUTOBAHN



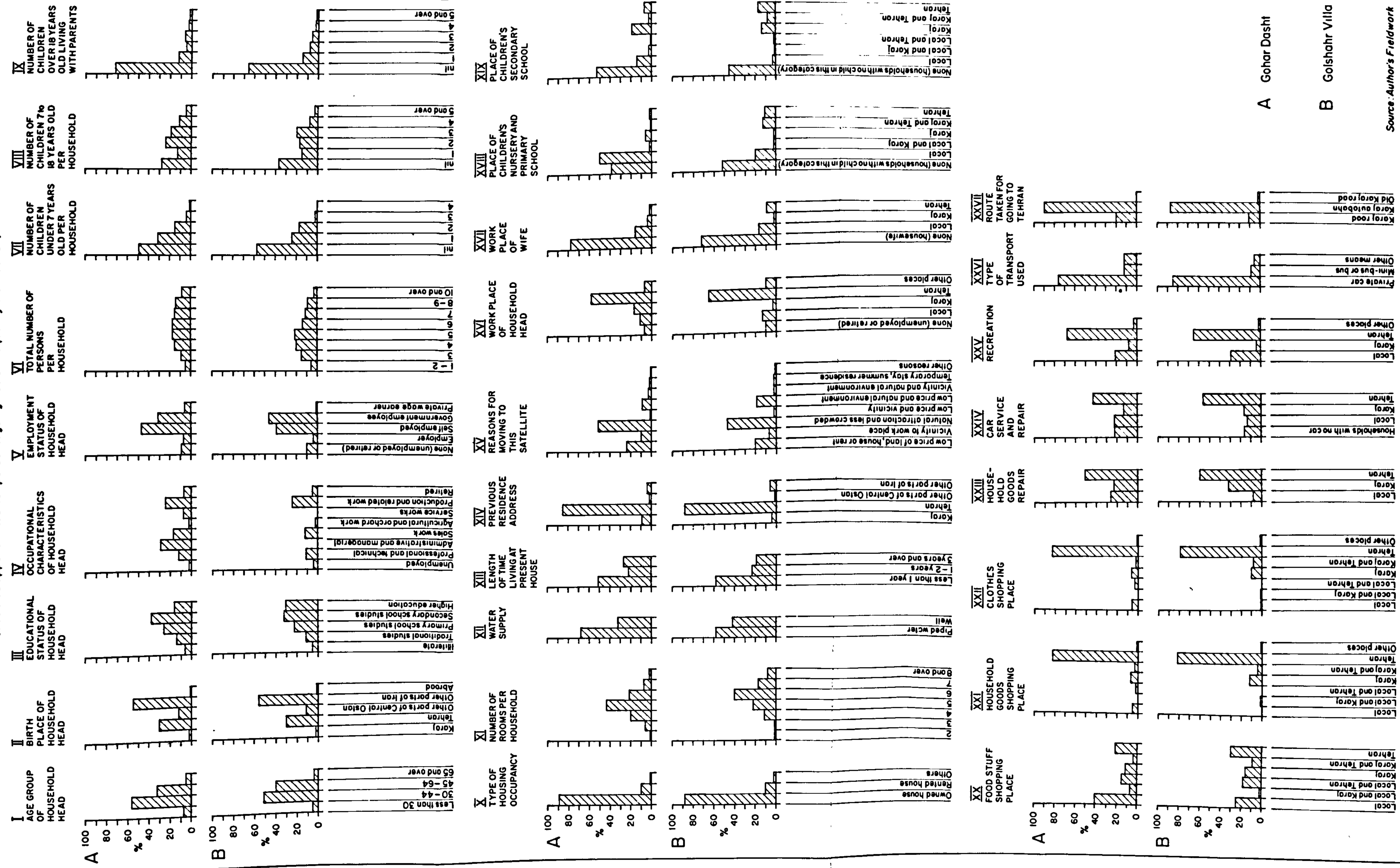
Source: Author's Fieldwork and Department of Road and Transportation, Central Ostan

households could be interviewed and also to permit, to the maximum extent possible, a comparison between household characteristics in the two satellite settlements. The questionnaire used for this study (questionnaire No.4 to be found at the end of the thesis), includes 28 questions each of which is taken here as one characteristic (see Table 8.3). Because of the large number of households interviewed (634), the use of a computer was found to be necessary to analyse the households' characteristics. The result of this analysis is shown by Fig. 8.4, in which a set of histograms was drawn up to compare the percentage frequency distribution of households' characteristics in the two satellites. Since in both settlements, males make up about 98 to 99 per cent of the total of heads of households, this feature has not been shown, but the other 27 features are demonstrated, some of which can be explained as follows:

The age group of the heads of households is the first characteristic to be considered because it provides a useful indicator for demonstrating the stage of family life-cycle in the satellite settlements studied. Indeed this feature, together with the percentage of children of different age group per household, may provide a clear picture in this respect (see Fig. 8.4, histograms No.I, VII, VIII and IX). Here, the age groups of the household heads have been classified into four major categories of less than 30 years old, 30-44, 45-64 and 65 years and over. As shown, those household heads under 30 years old surprisingly form a very low percentage (5 to 7 per cent of the total) in both satellites, compared with the corresponding percentage (22%) for Karaj city in 1966.⁽⁷⁾ The young middle age group of 30-44 years comprises a significant proportion of total household heads, 56 and 51 per cent respectively for both satellites and those who were between 45 to 64 years old also made up a substantial percentage of the totals, 32% to 40% of all household heads

Fig.8-4 CHARACTERISTICS OF HOUSEHOLDS IN THE TWO SELECTED SATELLITE SETTLEMENTS OF KARAJ

(See also appendix No.5 for percentage figures of frequency distribution)



Source: Authors Fieldwork

very likely that the intention of the responsible authorities to widen the present route (adding one lane on either side to make it a six-line autobahn, will bring considerable relief to drivers using it and may well encourage a further outward movement of population and settlement.)

8.3 Study of two selected satellite settlements of Gohar Dasht and Golshahr Villa

Having explained the development and distributional patterns of satellite settlements around Karaj, and some of the reasons behind their emergence it is now possible to select and study two of the most populated centres.

Such an examination throws light on additional aspects of these satellite settlements which are the concern of this investigation; the function and role these settlements perform, their internal and external differences and finally the relationship they have with Karaj and Tehran. These two satellites are Gohar Dasht and Golshahr Villa, whose locations are shown and underlined in Fig. 8.1. The specific location of these two satellites in relation to major transportation routes is another reason for selecting them for special study. Situated 6 kilometres to the north west of Karaj city centre, Gohar Dasht has the most direct connections with Karaj, whereas Golshahr Villa, about 7 kilometres to the west of Karaj, although located just beside the autobahn has apparently the least direct relationship with Karaj. As mentioned earlier, a detailed survey was carried out by the author with the co-operation of the geography students of the National University of Iran, Tehran, in the course of which 634 households were visited and interviewed; 453 in Gohar Dasht and 181 in Golshahr Villa, that is, about 25 per cent and 50 per cent of households in the two satellites respectively. The study was deliberately conducted at a week-end in order that the heads of

Table 8.3: List of characteristics of households studied in the two selected satellite settlements of Gohar Dasht and Golshar Villa

- I. Age group of household head
- II. Birth place of household head
- III. Educational status of household head
- IV. Occupational characteristics of household head
- V. Employment status of household head
- VI. Total number of persons per household
- VII. Children under 7 years old per household
- VIII. Children 7-18 years old per household
- IX. Children above 18 years old living with parents
- X. Type of housing occupancy
- XI. Number of rooms per household
- XII. Water supply
- XIII. Length of time living at present house
- XIV. Previous residence address
- XV. Reasons for moving to this satellite
- XVI. Work place of household head
- XVII. Work place of household wife
- XVIII. Place of children's nursery and primary school
- XIX. Place of children's secondary school
- XX. Food stuff shopping place
- XXI. Household goods shopping place
- XXII. Clothes shopping place
- XXIII. Household good repair
- XXIV. Car service and repair
- XXV. Recreation place
- XXVI. Type of transport used
- XXVII. Route taken by head of household to go to Tehran

See Fig. 8.4 and Appendix No.5

respectively in each settlement. In fact, about 88 and 91 per cent of the household heads of the two satellites fell into the middle age band. The comparison of the two satellites on this characteristic, suggests that the household heads on Gohar Dasht were generally younger than those in Golshahr Villa. This may be related to many factors, including the earlier development (about four years) and more favourable conditions with regard to house purchase in Gohar Dasht, both of these factors resulting in a lower price of accommodation which is more within the financial reach of younger people. However, considering that the average age of the population of the country is low anyway, the very high proportion of middle aged people in the satellite is a striking feature. The latter fact can be better understood if the households are considered by the percentage of children in different age groups. It was found that 51 per cent of households in Gohar Dasht and 43 per cent in Golshahr Villa had respectively 1 to 4 children under 7 years old; 72 and 53 per cent of households had 1 to 5 children of 7 - 18 years old; and 28 per cent and 34 per cent with 1 to 5 children above 18 years old. Once again whilst these figures indicate that the households in Gohar Dasht are comparatively younger than those in Golshahr Villa, they also demonstrate as a whole the great frequency of grown-up families with second and occasionally third generations in both satellites. A similar result may be gained by considering the number of persons per house living in these two satellite settlements, 5.6 in Gohar Dasht and 5.1 in Golshahr Villa, significantly higher than the average family size in Karaj (4.9) and Tehran (4.6) in 1976. (8)

The birth place of household heads is another element to be examined because it reveals to some extent the pattern of population

movement. However, such an examination may be more meaningful if the figures concerned with birth place are correlated with figures showing the previous resident address of households before coming to these two satellites. The result of such an analysis showed that only 2 per cent of the household heads in both satellites were born in Karaj, whereas 7-9 per cent of them previously used to live there. The corresponding figures for Tehran are significantly higher, because while 30 per cent of household heads were born in that city, 85 per cent of the total households in Gohar Dasht and 88 per cent in Golshahr Villa had moved from Tehran to live in these satellites. Such high percentages indicate the relative importance of these satellites in providing accommodation for families who have moved from Tehran.

The educational status of household heads, together with their occupational and employment status may reveal whether there is any particular relationship between the type of qualification and economic activity of the household head and the movement of households. In general, between 95 to 96 per cent of household heads interviewed were literate, of these between 80 to 84 per cent held some type of education certificate from primary school to university level; for instance 17 per cent and 30 per cent of the heads of households in Gohar Dasht and Golshahr Villa respectively graduated from various institutions of higher education. In general it would seem that such a high level of educational status may have been an important factor behind the movement of families to these satellites, taking into account that such residential movement is not usually undertaken by grown up parents. However, as will be pointed out, the existence of large housing units with an adequate number of rooms at a reasonable price is a particularly important factor when families have a large number of grown-up children to house and cannot afford the high

cost of the limited number of such dwellings available in Tehran.

With regard to the occupational status of household heads, four major types of occupation can be identified, namely administrative and managerial, production and sales work, together with professional and technical activities. However the percentages are considerably different when the two satellites are compared. For instance, whilst 29 per cent of household in Gohar Dasht are engaged in administrative and managerial jobs, the corresponding figures for Golshahr Villa is as high as 41 per cent out of the total of household heads studied. Between 6 - 7 per cent were retired persons, and 2 - 4 per cent unemployed (see Fig. 8.4 histograms No. IV-V). The fairly significant proportion of retired people in these settlements may be because of the pleasant natural surroundings and quiet environment of these satellites.

Turning to employment status, the highest proportion of household heads are classified as self-employed, followed by government employees, whereas those who are categorised as employers of others consist only of a relatively low proportion of 9 to 10 per cent. This indicates to some extent that the dwellers in these satellites are mainly of lower middle or middle class families. Once again the related figures are different from one satellite to another. For example whilst 74 per cent of heads of households in Gohar Dasht are classified as self-employed, this group forms 39 per cent of the total in Golshahr Villa. Government employees comprise 31 per cent of the total households in Gohar Dasht, but the corresponding proportion for Golshahr Villa is about 46 per cent. Two major conclusions may be drawn from these differences. Firstly, in general it would seem that the distance of these satellites from a major work place such as Tehran, makes them slightly more attractive to those who are self-employed, such as production and especially sales workers (mainly shopkeepers),

who may have more flexible working hours. Secondly is that easier access to the autobahn by the residents of Golshahr Villa makes this satellite more popular for governmental employees (46 per cent of total), who are more subject to a fixed working timetable.

Housing characteristics were also studied, but only two aspects, namely type of occupancy and number of rooms per housing unit, will be looked at although other aspects are illustrated in Fig. 8.4, histograms No. X-XIII.

A question on the reasons why the residents of these satellites had chosen to come and settle in them is particularly pertinent to this study. 89 per cent of households in Gohar Dasht and 88 per cent in Golshahr Villa live in their own private houses, proportions which are not reached in either Karaj or in Tehran. Furthermore, the large number of rooms per housing unit are also very common, and this results in a reasonable density of persons per room. For instance 73 per cent of houses in Gohar Dasht and 87 per cent of houses in Golshahr Villa have more than five rooms. If the figures for persons per household are matched against these figures, a fairly low density ratio of persons per room will be apparent. This is particularly evident in Golshahr Villa because where there are 37 per cent of households with six persons, there are more than 65 per cent of houses which have six rooms and more, i.e. almost a gross density of one person per two rooms.

As to reasons for residing in these satellite settlements three major answers were given, namely the low price of land and housing, closeness to work-place and natural attraction and less crowded environment. As shown by Fig. 8.4, histogram No. XV, between 20 and 24 per cent of the households gave the low price of accommodation as the main reason for settling in these satellites, whilst 47 and 51 per cent stated that

they had done so for the quiet and the natural surroundings. This last point is perhaps a reflection on Tehran's noisy environment and polluted air - pollution now is rising rapidly to a critical level - which are making life gradually more difficult there, thus causing people to seek better living conditions outside the city. (See plates No. 21, 22 and 23).

The remaining parts of the survey deal mainly with the relationship and dependence of household members on different places and various services. The most important aspects of these relationships is the work place of household heads and their wives. One very dominant pattern of journey to work is evident in the case of these households who travel daily to work in Tehran. Some 58 and 65 per cent of these people in Gohar Dasht and Golshahr Villa respectively work in Tehran. Another interesting feature is that while 17 per cent of the household heads in Gohar Dasht have their work place in Karaj, only 3 per cent of those in Golshahr Villa work in Karaj, evidence of the much greater dependency of Gohar Dasht on Karaj. The overall conclusion to be drawn from the last two observations concerns the high rate of dependency of these satellites on Tehran, which has been intensified by the construction of the autobahn. The pattern of journey to work for the wives of households in Golshahr Villa working in Tehran is similar but on a much smaller scale. However, the general pattern of these women's journeys to work suggests that the married women are more likely to work locally than either men or single women wage earners.⁽⁹⁾ Married women take mainly local jobs so as to have shorter commuting journeys. A comparison of the two satellites shows that while 16 to 17 per cent of married women have local jobs, only 11 to 13 per cent of men work locally (see Fig. 8.4, histograms No.XVI and XVII).

The extent to which such local establishments as shopping centres, schools, household goods repair or car service repair works are patronised



PLATE 21. Natural attraction and less crowded environment, the major appeals of satellite settlements of Karaj



PLATE 22.



PLATE 23.

One storey villa-type houses in Golshahr Villa

by the residents of these satellites serves as a measure of their dependency or self sufficiency in terms of service provision. The result of such an examination for Gohar Dasht and Golshahr Villa is illustrated in Fig. 8.4, histograms No. XVIII - XXV, showing that the lower the importance of the service, the more likely it is to be offered locally. In reverse, the larger the centre, the more important the service it provides. However, the fact that Gohar Dasht is the longer established of the two settlements and their particular location in relation to Karaj and Tehran, may to some extent affect their generalisation. Taking nursery and primary schools as an example, of the total children at this age, 50 per cent in Gohar Dasht and 20 per cent in Golshahr Villa go to the local schools whilst the corresponding percentages for those going to secondary school is only 14 and 3 per cent respectively.

The fact that Tehran supplies 82 per cent of household goods, 79 to 83 per cent of clothes or 43 to 56 per cent of car services or repairs and finally 65 to 68 per cent of households' recreation facilities, can be accounted for by the overwhelming dominance of Tehran over its metropolitan region.

One final point worth mentioning is the high rate of private car ownership among households of these satellites, which ranges from 75 to 85 per cent. This makes communication between these satellites and other large centres such as Karaj and especially Tehran, much easier.

Besides studying the households' characteristics, already commented on, our enquiry was extended to look at the day to day problems faced by households in these satellites. The result of the investigation is shown in Table 8.4, in which these problems are classified according to their frequency. Satellites suffer, as can be seen, from inadequacies in medical services and facilities, lack or shortage of urban utilities or

Table 8.4: Existing problems of households in Gohar Dasht
and Golshahr Villa (in order of importance)

Order of importance	Gohar Dasht	Golshahr Villa
1	Inadequate medical facilities	Inadequate medical facilities
2	Inadequate means of transportation	Inadequate urban utilities (telephone, electricity, piped water)
3	Inadequate urban utilities (telephone, piped water, electricity)	Lack of recreation facilities and parks
4	High price of goods	Inadequacy of educational institutions
5	Inadequate security	Shortage of stores and super-markets
6	Shortage of recreational facilities and parks	Inadequate security
7	Shortage of stores and super-markets	Inadequate public institutions (public baths, mosques, libraries)
8	Loneliness and isolation	Inadequate transportation means
9	Special problems (being outside the city limits, disturbances by animals and surrounding unbuilt areas)	Loneliness and isolation
10	Inadequacy of educational institutions	High price of goods
11	Inadequacy of public institutions (public baths, libraries, mosques)	Lack of post office and bank
12	Lack of local council and inefficient management	Unsuitable condition of building construction

Source: Fieldwork

inadequate security. Loneliness and isolation, which is rather a common feature in most of the new towns and recently constructed suburbs, were also mentioned frequently (ranked 8th and 9th in the table), and for this, inadequate public transportation and communication facilities (post and telephone) are partly responsible. The lack of local councils and inefficient management was also mentioned which can be said to be the most important reasons for the above mentioned problems. The recent date of development, diversity of home towns and the most important of all, different work places outside satellites, minimised the possibility of meeting and mixing and contributed to the latter problem. The fact that these satellites are not recognised officially by the Ministry of the Interior is also very important; despite the urban functions they have, they were classified as villages by the definition of the 1976 Census and although exceeding 5,000 population, have not received municipality status.

Finally, the gaudy style and poor quality construction of some of the buildings are immediately noticeable, and give rise to complaints by many occupants. (See plates No. 24, 25 and 26).

Because these satellites have all been created by the private sector, mostly with limited capital, the desire to make a quick profit has been largely responsible for the inadequate workmanship in many of the dwellings.

In the light of the above discussions, a number of preliminary conclusions may be drawn by the author, namely as follows:

1. The rapid and continuous population increase of Tehran, leading to an enormous demand for accommodation, is the major reason for the



PLATE 24.



PLATE 25.



PLATE 26.

Gaudy style and inferior quality construction are characteristics of some houses in Gohardasht

appearance and expansion of the satellite settlements that now occur in the Karaj region. It seems that the overwhelming primacy of Tehran and the pressures associated with this have been reflected in a high degree of land and housing speculation which coincided with the introduction of an arbitrary five year boundary limit on expansion. Together these have encouraged the growth of satellite communities which are mainly dormitories for Tehran, although constructed 40 to 50 kilometres away from the city.

2. Because the private developers who are responsible for these satellite settlements all operate directly from Tehran, the benefits gained by these developers accumulated mainly in Tehran and consequently increase the influence of Tehran over the Karaj region.

3. The speculative increase in land prices caused by these satellite settlements has had a major and direct effect on both Karaj city and its region. Firstly, there has been the disappearance of large area of scarce agricultural land which could have been producing valuable crops, and secondly a considerable increase in urban land and housing construction expenditure in Karaj city. Indeed owing to the multiple increase* in land prices, agricultural activities can no longer compete with housing development; and many farmers have also begun constructional activities because they found it more profitable. In the meantime, the guarantee of a longer period of employment, and requirements of a massive amount of constructional material, have the result that both the building labourers, and the constructional material producers, prefer to be engaged in developing large housing projects in these satellites, rather than small scale building work in Karaj city itself.

* For instance according to the Zonal Price Index produced by the Ministry of Finance in 1965, one square metre of divided level piece of land in Gohar Dasht had a taxable price of 5 Rials, whereas the price of the same area had increased to about 5000-6000 Rials in 1977⁽¹⁰⁾ (i.e. by almost 1000-fold in 12 years).

4. As explained, the short distances between these satellite settlements and Karaj city has not resulted in their dependence on Karaj. Rather, the presence of the autobahn has caused them to be heavily dependent on Tehran. If in the first place, reasonable measures had been taken to secure the provision of basic facilities in these communities, they might have had less dependence on Tehran.

5. Difficulties deriving from the directives of the Tehran Master Plan have given rise to much criticism and consequently loosened considerably the influence of the Plan in controlling events; this may soon lead to huge housing activities on the immediate peripheries of Tehran. This probably can be supported by evidence from the pressures set up by the residents of existing quarters outside the city boundary to the south and south east of Tehran, which resulted in a series of clashes between the residents of these areas and the municipal police, where eventually the case was taken to an Imperial Committee and finally H.I.M. Shah of Iran ordered the inclusion of their settlement within the 25 year boundary limit during the summer of 1977.* If this occurs, then there will be enough land around Tehran for new housing projects, and consequently development of satellite settlements around Karaj is likely to slow down and perhaps to be confined mainly to the establishment of second homes.

Since Tehran has expanded beyond the limits the planners foresaw, it is recommended that the Government try to do its utmost towards the current enactment of decentralization programmes and give priority to provincial development projects. It is hoped that if this recommendation is enacted, the pressure of over-urbanization on Tehran will decline, and

* As a result of this command, in September 1977, there were 16 low class residential quarters which were included earlier than was expected by the city boundary⁽¹¹⁾, and there are still some more quarters to the east to be included.

consequently there will be less demand for housing in Tehran and Karaj.

However, because the National Budget for the Iranian Year of 2537 (starting from 21st March 1978), which is also the first year of the 6th National Development Plan, has placed considerable emphasis on housing construction to be carried out, particularly in the pattern of satellite settlements and new towns, some suggestions and recommendations for improvement will be mentioned below. It is hoped these comments will be useful in providing a better understanding of the current situation of the satellite settlements of Karaj.

1. In addition to their role of moderating factors in the accommodation problem, since the satellite settlements help to create a healthier environment, it is suggested that the government alongside the construction of fast road networks, provide more facilities with their development.

2. It is suggested that the government might well show more co-operation in the establishment, administration and direction of such satellites. Such a policy would result in the appearance of satellite towns which would then offer better accommodation at a lower cost. The existence of nationalised sections of land, together with the possibility of raising capital through government bonds and long term bank loans with low rates of interest, seem to make this suggestion feasible. Perhaps if government owned land is offered to the co-operatives associated with government establishments, the problem of providing employment in such satellite settlements could be avoided and harmony and unity would be achieved among the dwellers in each settlement.

3. In addition to the provision of public services, the government should set up a technical body to supervise the satellite settlement projects and to administer them permanently. The government may benefit from

the experience with present settlements, especially from those which have carried out their duties more responsibly. Perhaps a healthy partnership of the private and government sectors would be one highly desirable solution to the proper establishment of such settlements. And perhaps it will be through a combination of all these efforts that it may be possible to bring about better living conditions in a quiet noise-free environment away from the hustle and bustle of the city of Tehran, into the serene setting of the countryside.

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CONCLUSION

The very high rate of growth in Karaj has been mainly a direct result of the absorption of a large inflow of migrants with high natural increase with a youthful age structure also contributing. The rate of increase of population for the city has been 12.1% annually (1966-76), whereas for the country it has been only 3% per annum. In fact, most than two thirds of the city's population now consist of immigrants. This rapid increase in population is reflected in the ever-increasing problems of housing, transportation, amenities and leisure provision. One of the more obvious examples of the pressures generated is the very considerable demand for housing produced by the increasing population.

Having examined the contemporary geographical and socio-economic conditions of Karaj city and the problems resulting from a period of rapid change, it is now possible to make some comments and suggestions as to the future action aimed at improvement. Throughout this investigation the overall dominance of Tehran over its surrounding areas has been apparent and this trend is becoming even more intense. One obvious example of the great dependency of Karaj on Tehran is shown by the fact that more than half (56%) of the retailing and wholesaler premises import their goods from Tehran. In addition, construction of the Tehran-Karaj Autobahn reduced by half the time distance between the two settlements, and this has been instrumental in bringing about an interdependence between Tehran and Karaj.

Much of the rise in the city's population has been attributed to the growth of the squatter element in the central area of Karaj: this element now comprises almost one quarter of the city's population. The second generation in this area has already started to pose problems, for

example, in extra requirements for health and educational facilities, whilst the rate of direct rural in-migration is still mounting.

The overall problems which have been discussed throughout this thesis are the direct result of Karaj's population increasing suddenly in a very short period of time and this in turn can be related directly mainly to the geographical location of this city in relation to Tehran. This locational situation is at present unique in the whole country in the severity of problems encountered, but the government organisations ought to be aware that it will not be very long before similar problems are experienced by many other provincial capital cities in Iran.

Although in most developed countries (western societies) suburbanization is a feature of attraction for young married couples who have high fertility, a different pattern, partly characterises Karaj. This is because, as we have noted, there is a significant number of older in-migrants who already have a family - often grown up and resident within ~~of~~ immediately outside Karaj city. This development of migration by older people must be related to growing housing shortages and the expense of accommodation in Tehran.

As a result of urban migration, especially from Tehran, a trend towards modernization is taking place in the western and northern part of the city with the emergence literally, of a somewhat better 'west end'. This can be regarded as a stimulus and pattern for the general future improvement of the city in the near future. However, there must be measures to make sure that the general over-population which has already started, would not affect and damage the whole economy and management of the city.

The inclusion of some appropriate concluding and improvement points at the end of each chapter may seem to have reduced the task involved in producing a final general conclusion. However, because there are aspects

of interrelationships of various factors and combination of arguments which are discussed in different chapters, these are best analysed in this general conclusion. An attempt will be made particularly as regards the status of Karaj in relation to Tehran. Suggestions of various kinds have been made that there should be changes in the administrative and legal position of Karaj as a municipality: its civic and national status. However, because Karaj remains still to a considerable degree satellite to Tehran, it is impossible to treat the problems of Karaj wholly separately: directives and legislation aimed at controlling the expansion of Tehran would be decisive also for Karaj, which could not therefore plan entirely independently. Such questions as general decentralization of function and economic activity, and development of agriculture could only be settled at regional or even wider level. Karaj alone could not provide effective solutions to its own problems. There are obviously strong inter-relationships at local, inter-urban and regional levels, and the satellite function of Karaj remains - although this is not the entire situation. It would be incorrect to view Karaj as merely a large and distant suburb of Tehran, since it also has certain activities and functions of its own, not directly related to Tehran.

As a basis for further development and improvement it is necessary to refer to the planning proposals drawn up as a several-plan for future city development. For Karaj, directives and legislation contained in the Master Plan for Karaj are based on a sample survey which was held in 1975. Due, however, to considerable differences between this survey (based partly on projection of trends for 1966, and also on the sample survey of 1975), and the actual situation as revealed in the 1976 National Census. Therefore, there is need for re-examination of major elements in this Master Plan.

Secondly, there is the impact of rapid transportation on urbanization

and quicker access to places of employment and services. It is suggested that as well as retaining and improving the present routes, which run between Tehran and Karaj, there should be a new construction of a six lane autobahn to run parallel to the north of the existing autobahn. The latter would be used by heavy vehicles only, and is very important and vitally necessary. Furthermore, creation of a fast inter-city train (electric or diesel) between Tehran and Karaj to run regularly between the two settlements would be of a good relief for traffic congestion and could lead naturally to much better communication with the capital.

Thus, Iran has an acute and growing problem. Rapid urbanization and higher living standards have generated greater demand for foodstuffs, which is increasingly met by higher imports. Yet at the same time there is continuous out-migration from rural areas. Agricultural and rural development must be emphasised and encouraged. Commercialization and modernization of present subsistence and low output agriculture and the replacement of food imports by local production, must be given top priority in development. This is a major and fundamental matter.

The anticipated increase in agricultural productivity is, however, dependent upon the supply of fertilizers, much better technical services, storage and marketing facilities, road access, better transportation, and last but not least, upon much better management, education and social services in rural districts. The presence of technically skilled and generally better-educated people within reach of rural areas is one of the pre-conditions of agricultural advance. In other words, it must be a very high priority to accelerate the spread effects of urban civilization over backward rural areas.

The high priority and emerging necessity to modernize and commercialize the existing agricultural situation in Iran could have undoubtedly a distinct impact upon the urbanization pattern. It is also advantageous,

in the long run, to guide labour-oriented and wage-sensitive industries, as well as small-scale industrial plants to be located closer to rural areas and their enormous manpower sources.

Yet all available information indicates that until very recently policies to encourage the outward movements of people from rural areas was a major activity of the government.* In fact, this was thought to be an objective or an instrument of development policy, because it eases pressure on the land and facilitates agricultural improvement. However, the most recent policy of agricultural development programmed by the new government of Mr. Sharif Emami in August 1978, indicates a considerable change in that encouragement of rural life is to receive the highest priority. Such a fluctuation in policy making shows how a need for long term economic planning must be clear, decisive, and held to for a sufficiently long period.

It is accepted generally that more rapid industrial progress and increase in G N P may be achieved by concentrating investments in a primate city such as Tehran. In fact this form of urbanization may more easily adjust to the present political situation of Iran. However it must now be realized that the gains of polarized urbanization would be strictly economic and would largely disregard cultural obliteration and standardization, as well as social strains, stresses and costs, and consider them the unavoidable obstacles and bottlenecks of modernization and economic advance - an acceptable price to be paid for modernization.

A lasting and basic advantage of the decentralized pattern of

* In February 1978, in his address for the submission of the National Budget for the year 1357, Dr. J. Amuzegar, the former Prime Minister of Iran, emphasised the current man/land ratio of 2.5 hectare of agricultural areas for each rural family should be increased to 10 hectares. Consequently, rural-urban migration is an important issue.

urbanization lies in its housing aspects. Since land costs will usually be considerably lower in small towns, the solution of housing problems of many kinds will be easier there. Even more important is the elementary fact that, on the basis of commuting from rural areas, decentralized urbanization may be initiated and continued to a much greater extent in primate cities. It thus becomes part of a gradual process of transfer of non-agricultural activities without any abrupt disruption of family life, traditional links and social controls. This also means a great reduction of total needs for urban housing and infrastructures. Indeed, it is obvious that under the decentralized development strategy the growth of urban centres proper will be less rapid and speculative. Public investment will be needed less for basic urban infrastructures and facilities and may be directed to a greater extent to agricultural and industrial development or to national and regional networks of infrastructures of transportation, water, and power economy.

One of the most recent decisions of the government towards the implementation of decentralization is separation of Qazvin Shahrestan from Central Ostan and the inclusion of it within the administrative boundary of Zanjan Ostan. Furthermore, in order to reduce the centrality and supremacy of Tehran, Arak city has been selected to function as a provincial capital of the newly named Ostan-e-Tehran, which replaces the Central Ostan.

Whilst the present study was in its almost final stage of completion, it was announced in May 1978 that Karaj city would be included with effect from June 1978, within the urban region of Tehran. Although such decision-taking seems to be important mainly as affecting the reduction of pressure on Tehran, there was the idea that incorporation could be of benefit to Karaj. However, until alternative feasible facilities are provided in the other urban centres, especially from which Tehran and Karaj receive their highest number of in-migrants, the success of the new scheme is open to doubt.

To fulfil its declared aims, the government has still to reduce further the supremacy of Tehran as well as maintaining standards of living. Decentralization is, therefore, an immediate concern and is being pursued vigorously with the establishment of growth centres in various parts of the country. Capital and resources concentrated in Tehran are thus being fed into the provinces, resulting in a rise in the standards of living in outlying areas and in a greater degree of communication between the capital and the rest of the state, the product of which will hopefully be a decentralized nation in which there is not the present-day gulf separating the capital city from the economic and social conditions of the nation as a whole. Sharing of authority between Karaj and Tehran could be one way of achieving this, provided that necessary financial resources, commensurable with the real needs of enlarged Karaj are provided, and there is an increase in autonomy at local level.

The expansion of Tehran may in fact stimulate the regional economy as a whole. But the growing congestion, centralization of population, and activity in Tehran, and the unplanned decentralization that is taking place to satellite communities such as Karaj, make it clear that any physical plan for the capital or its satellites must be closely related to a coherent national and regional urban development policy. The study of Karaj city shows that its problems form part of a larger complex.

APPENDICES

APPENDIX 1

General Characteristics of the Commercial Premises on Maiden-e-Pahlavi and four major surrounding Khiabans compared with the old part of Karaj.

(Percentage of Frequency Distribution). (See Figure 5.1).

	A=26	B=19	C=53	D=50	E=41	F=96	G=118	H=54	I=46	J=62
	%	%	%	%	%	%	%	%	%	%
<u>V.I Age Groups of Shopkeepers</u>										
1 = Less than 20 years old	-	-	2	4	-	1	2	-	-	2
2 = 20 - 44	38	53	62	58	63	42	55	52	54	48
3 = 45 - 64	47	37	28	36	32	45	36	41	39	42
4 = 65 and over	15	-	8	2	5	12	7	7	7	8
5 = No answer	-	10	-	-	-	-	-	-	-	-
<u>V.II Birth Place of Shopkeepers</u>										
1 = Karaj City	35	32	32	28	27	24	20	52	30	24
2 = Karaj Shahrestan	4	16	19	2	17	13	16	6	20	8
3 = Qazvin	4	-	7	4	10	8	9	6	15	8
4 = Tehran	15	10	6	10	5	5	7	2	2	6
5 = Tabriz	-	5	-	10	10	13	-	6	-	19
6 = Hamadan	4	5	4	2	2	5	5	2	4	2
7 = Yazd	-	-	4	12	2	13	14	2	-	2
8 = Kashan	8	-	4	2	-	1	1	2	2	5
9 = Esfahan	4	5	-	6	10	8	7	4	7	3
10 = Zanzan	8	-	-	-	2	1	2	-	2	3
11 = Other Places	15	16	24	24	12	6	18	20	17	19
12 = No answer	4	10	-	-	2	-	-	-	-	2
<u>V.III General Type of Commercial and Service Premises</u>										
1 = Wholesale	-	-	19	-	-	-	1	-	-	2
2 = Wholesale and Retail	-	-	10	-	-	-	-	11	-	-
3 = Producer Retailer	15	-	9	20	5	10	15	13	11	29
4 = Retail	69	68	36	56	88	77	64	63	56	58
5 = Services	15	32	26	24	7	12	20	13	33	11

Appendix 1 (Continued)

	A=26	B=19	C=53	D=50	E=41	F=96	G=118	H=54	I=46	J=62
	%	%	%	%	%	%	%	%	%	%
<u>V.IV The Actual Type of Commercial and Service Premises</u>										
1 = Fruits and Greens	4	5	21	-	2	3	7	9	15	5
2 = Other Agricultural products	-	-	-	-	5	-	2	4	-	-
3 = Bakery	11	-	4	2	2	2	3	-	6	5
4 = Confectioner	4	5	4	2	-	1	2	2	-	3
5 = Tailoring	-	-	4	2	-	1	1	-	-	5
6 = Jewellery and watch-maker	-	-	-	2	-	1	3	2	-	2
7 = Blacksmith and Tinsmith	-	-	4	6	-	3	1	-	-	2
8 = Auto Repair	-	5	4	-	-	-	-	6	-	-
9 = Household goods repair	-	-	4	4	-	-	-	-	-	-
10 = Miscellaneous repairs	-	-	-	2	2	2	-	-	2	8
11 = Butcher & Chicken, Eggs	8	5	2	8	5	7	5	2	8	5
12 = General Grocers and Dairy	15	10	9	14	19	18	15	17	20	23
13 = Other food stuff	-	5	4	-	2	1	1	9	6	-
14 = Agricultural tools and Fertilizers	4	-	2	4	7	-	-	-	-	-
15 = Stationers, Bookshops and Newsagents	-	16	-	4	2	4	6	-	-	2
16 = Cloth and Clothing	19	-	2	6	12	12	7	4	2	5
17 = Household goods and Electrical goods	8	-	6	8	7	15	12	15	4	19
18 = Construction materials and tools	4	10	6	2	10	7	8	7	2	2
19 = Footwear	-	5	-	4	5	7	4	4	-	-
20 = Car Showroom and spare parts	4	10	4	-	7	1	3	9	2	-
21 = Chemistry	4	5	-	2	-	-	4	-	-	2
22 = Other non food retail	-	-	-	6	2	-	-	-	-	5
23 = Inns, Restaurants and Traditional eating places	11	10	15	12	2	2	10	6	24	6
24 = Photographic Studios	4	5	4	6	-	1	-	2	-	3
25 = Barbers and Public Bath	-	-	-	-	5	3	2	2	4	-
26 = Laundry	-	-	-	2	-	1	-	2	-	-
27 = Estate Agents	-	-	4	2	-	4	3	-	2	-

Appendix 1 (Continued)

	A=26 %	B=19 %	C=53 %	D=50 %	E=41 %	F=96 %	G=118 %	H=54 %	I=46 %	J=62 %
<u>V.V. Years of Business</u>										
1 = Less than 5 years	19	21	25	24	27	19	32	30	20	48
2 = 5 - 10	19	11	26	34	17	25	21	24	22	24
3 = 10 - 15	11	16	24	14	19	19	18	13	22	13
4 = 15 - 20	12	21	11	18	10	17	14	9	17	3
5 = 20 - 30	12	26	9	8	15	18	7	15	13	10
6 = 30 - 50	19	5	5	2	12	3	2	7	6	2
7 = More than 50 years	8	-	-	-	-	-	-	-	-	-

V.VI Previous Business Address

1 = Karaj City	38	63	55	62	46	49	36	56	30	35
2 = Karaj Shahrestan	4	-	4	-	5	5	8	2	17	5
3 = Tehran	8	5	9	10	5	4	7	7	4	5
4 = Other Places	4	11	23	28	44	34	43	24	39	53
5 = No previous business	-	-	-	-	-	7	6	11	9	2
6 = No answer	46	21	9	-	-	-	-	-	-	-

V.VII Source of Major Goods

1 = Karaj Region	34	11	28	20	15	16	21	20	30	31
2 = Tehran	58	58	58	68	78	68	68	67	17	53
3 = Other Parts of Central Ostan	8	21	2	4	-	1	2	4	4	2
4 = Other Parts of Iran	-	5	8	-	2	-	-	-	39	3
5 = Abroad	-	-	-	-	-	7	1	-	-	3
6 = Not applicable (service function)	-	5	4	6	5	8	8	9	9	8
7 = No answer	-	-	-	2	-	-	-	-	-	-

V.VIII Obtaining of Major Goods

1 = Collected	65	74	49	78	85	77	80	83	74	84
2 = Delivered	35	21	39	12	10	14	11	7	15	8
3 = Both	-	-	6	2	-	1	1	-	2	-
4 = Not applicable (service function)	-	5	4	6	5	8	8	-	9	8
5 = No answer	-	-	2	2	-	-	-	10	-	-

Appendix 1 (Continued)

A=26 B=19 C=53 D=50 E=41 F=96 G=118 H=54 I=46 J=62
% % % % % % % % % %

V.IX Number of persons engaged

1 = 1 person	27	26	38	32	54	35	49	52	33	81
2 = 2 - 3 persons	46	53	55	62	39	57	35	39	43	18
3 = 4 persons and more	27	21	7	6	7	7	16	9	24	2

V.X Status of Premises

1 = Owned	8	10	9	6	-	2	13	2	2	24
2 = Rented	92	90	91	90	100	98	86	98	98	76
3 = Vaqf	-	-	-	4	-	-	1	-	-	-

V.XI Monthly Rent (In Rials)

1 = Less than 1000 Rials	-	-	4	-	-	-	19	2	16	68
2 = 1000 - 2000	54	53	77	91	73	88	64	85	64	32
3 = 3000 - 4000	38	35	17	9	27	12	8	13	16	-
4 = 4000 and more	8	12	2	-	-	-	10	-	4	-

V.XII Estimated Catchment Areas

1 = Karaj City	83	84	70	41	97	45	95	99	99	100
2 = Karaj Region	15	15	24	57	3	55	5	-	-	-
3 = Tehran	2	1	4	1	-	-	-	1	1	-
4 = Other Places	-	-	2	-	-	-	-	-	-	-

V.XIII Daily Sale (in Rials)

1 = Less than 2,000	8	11	15	-	15	1	1	4	1	40
2 = 2,000 - 5,000	8	26	36	42	24	24	25	22	24	55
3 = 5,000 - 15,000	42	32	23	48	29	56	43	26	48	5
4 = 15,000 - 30,000	15	10	11	8	17	17	16	28	13	-
5 = More than 30,000 Rials	4	21	4	2	10	1	9	15	11	-
6 = No answer	23	-	11	-	5	1	6	6	4	-

Appendix 1 (Continued)

	A=26 %	B=19 %	C=53 %	D=50 %	E=41 %	F=96 %	G=118 %	H=54 %	I=46 %	J=62 %
V.XIV <u>Sargofli (Key Money)</u> <u>(in Rials)</u>										
1 = Less than 500,000	-	-	2	-	-	1	6	4	-	100
2 = 500,000 - 2,500,000	38	53	81	60	54	45	63	70	74	-
3 = 2,500,000 - 5,000,000	50	47	17	38	44	48	26	22	22	-
4 = More than 5,000,000	12	-	-	2	2	6	4	4	4	-

Source: Author's Fieldwork

- A = Maidan-e-Pahlavi
- B = Khiaban-e-Tehran (North side)
- C = Khiaban-e-Tehran (South side)
- D = Khiaban-e-Daneshkadeh (East side)
- E = Khiaban-e-Daneshkadeh (West side)
- F = Khiaban-e-Pahlavi (South side)
- G = Khiaban-e-Pahlavi (North side)
- H = Khiaban-e-Chalus (West side)
- I = Khiaban-e-Chalus (East side)
- J = Deh-e-Karaj (Old Karaj)

**TEXT BOUND INTO
THE SPINE**

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7-72	Statement	73-80	Optional Sequence								

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Appendix 3

3.1: The correlation coefficients between the age groups of the shop keepers of Maidan-e-Pahlavi and four major surrounding Khabans compared with the old part of Karaj.

	M. Pahlavi		KH. Tehran		Danezhkadeh		KH. Pahlavi		KH. Chalus		Deh-e-Karaj	
	M. side	W. side	N. side	S. side	E. side	W. side	S. side	N. side	W. side	E. side	W. side	E. side
M. Pahlavi	1000											
KH. Tehran	0.848	1000										
KH. Tehran	0.896	0.937	1000									
KH. Danezhkadeh	0.859	0.974	0.978	1000								
KH. Danezhkadeh	0.829	0.962	0.996	0.990	1000							
KH. Pahlavi	0.992	0.901	0.859	0.915	0.888	1000						
KH. Pahlavi	0.894	0.966	0.980	0.994	0.991	0.941	1000					
KH. Chalus	0.939	0.965	0.948	0.981	0.968	0.974	0.992	1000				
KH. Chalus	0.921	0.969	0.964	0.988	0.980	0.961	0.997	0.998	1000			
Deh-e-Karaj (Old Karaj)	0.958	0.951	0.925	0.970	0.948	0.986	0.982	0.997	0.997	0.992	1000	

Significance Level: 50 = 0.878 20 = 0.934 10 = 0.959

3.2 The correlation coefficients between the Birth Places of shopkeepers of Maidan-e-Pahlavi and four major surrounding Khabans compared with the old part of Karaj

	M. Pahlavi		KH. Tehran		Danezhkadeh		KH. Pahlavi		KH. Chalus		Deh-e-Karaj	
	M. side	W. side	N. side	S. side	E. side	W. side	S. side	N. side	W. side	E. side	W. side	E. side
M. Pahlavi	1000											
KH. Tehran	0.810	1000										
KH. Tehran	0.771	0.864	1000									
KH. Danezhkadeh	0.733	0.702	0.763	1000								
KH. Danezhkadeh	0.649	0.837	0.824	0.663	1000							
KH. Pahlavi	0.767	0.631	0.636	0.666	0.831	1000						
KH. Pahlavi	0.540	0.662	0.870	0.723	0.718	0.682	1000					
KH. Chalus	0.870	0.858	0.858	0.844	0.848	0.748	0.680	1000				
KH. Chalus	0.681	0.784	0.914	0.596	0.908	0.661	0.811	0.821	1000			
Deh-e-Karaj (Old Karaj)	0.628	0.696	0.722	0.811	0.779	0.660	0.499	0.811	0.646	1000		

Significance Level: 50 = 0.576 20 = 0.658 10 = 708

3.3 The correlation coefficients between the general type of commercial and service premises on Maidan-e-Pahlavi and four major surrounding Khabans compared with the old part of Karaj

	M. Pahlavi		KH. Tehran		Danezhkadeh		KH. Pahlavi		KH. Chalus		Deh-e-Karaj	
	M. side	W. side	N. side	S. side	E. side	W. side	S. side	N. side	W. side	E. side	W. side	E. side
M. Pahlavi	1000											
KH. Tehran	0.915	1000										
KH. Tehran	0.796	0.937	1000									
KH. Danezhkadeh	0.971	0.923	0.787	1000								
KH. Danezhkadeh	0.982	0.898	0.807	0.912	1000							
KH. Pahlavi	0.995	0.915	0.811	0.945	0.996	1000						
KH. Pahlavi	0.995	0.941	0.827	0.986	0.967	0.986	1000					
KH. Chalus	0.981	0.893	0.746	0.927	0.984	0.987	0.967	1000				
KH. Chalus	0.921	0.981	0.886	0.965	0.870	0.903	0.953	0.880	1000			
Deh-e-Karaj (Old Karaj)	0.953	0.773	0.615	0.943	0.903	0.928	0.941	0.914	0.826	1000		

Significance Level: 50 = 0.878 20 = 0.934 10 = 959

3.4 The correlation coefficients between the actual type of commercial and service premises on Maidan-e-Pahlavi and four major surrounding Khabans compared with the old part of Karaj.

	M. Pahlavi		KH. Tehran		Danezhkadeh		KH. Pahlavi		KH. Chalus		Deh-e-Karaj	
	M. side	W. side	N. side	S. side	E. side	W. side	S. side	N. side	W. side	E. side	W. side	E. side
M. Pahlavi	1000											
KH. Tehran	0.174	1000										
KH. Tehran	0.354	0.304	1000									
KH. Danezhkadeh	0.614	0.235	0.258	1000								
KH. Danezhkadeh	0.546	0.261	0.551	0.253	1000							
KH. Pahlavi	0.653	0.189	0.195	0.618	0.635	1000						
KH. Pahlavi	0.683	0.476	0.512	0.627	0.666	0.827	1000					
KH. Chalus	0.432	0.366	0.514	0.333	0.669	0.663	0.730	1000				
KH. Chalus	0.564	0.383	0.767	0.572	0.542	0.395	0.689	0.562	1000			
Deh-e-Karaj (Old Karaj)	0.585	0.109	0.335	0.692	0.499	0.777	0.742	0.645	0.538	1000		

Significance level: 50 = 0.381 20 = 0.445 10 = 487

Appendix 3

3.5 The correlation coefficients between the commercial premises based on the years of business, for Maidan-e-Pahlavi and four major surrounding Khibans compared with the old part of Kara).

	M. Pahlavi	KH. Tehran N. side	KH. Tehran S. side	KH. Daneshkadeh E. side	KH. Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Kara)
M. Pahlavi	1000									
KH. Tehran N. side	0.414	1000								
KH. Tehran S. side	0.569	0.526	1000							
KH. Daneshkadeh E. side	0.622	0.514	0.890	1000						
KH. Daneshkadeh W. side	0.755	0.718	0.852	0.708	1000					
KH. Pahlavi S. side	0.563	0.791	0.871	0.888	0.796	1000				
KH. Pahlavi N. side	0.599	0.617	0.932	0.871	0.879	0.818	1000			
KH. Chalus W. side	0.738	0.652	0.868	0.853	0.924	0.838	0.916	1000		
KH. Chalus E. side	0.610	0.742	0.932	0.875	0.858	0.961	0.879	0.828	1000	
Deh-e-Karaj (Old Kara)	0.595	0.583	0.798	0.726	0.846	0.637	0.909	0.931	0.663	1000

Significance Level: 5% = 0.707 2% = 0.789 1% = 0.834

3.7: The correlation coefficients between the source of major goods of commercial premises on Maidan-e-Pahlavi and four major surrounding Khibans compared with the old part of Kara).

	M. Pahlavi	KH. Tehran N. side	KH. Tehran S. side	Daneshkadeh E. side	Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Kara)
M. Pahlavi	1000									
KH. Tehran N. side	0.874	1000								
KH. Tehran S. side	0.976	0.878	1000							
KH. Daneshkadeh E. side	0.951	0.934	0.971	1000						
KH. Daneshkadeh W. side	0.916	0.932	0.957	0.993	1000					
KH. Pahlavi S. side	0.915	0.913	0.948	0.989	0.993	1000				
KH. Pahlavi N. side	0.949	0.921	0.976	0.998	0.993	0.991	1000			
KH. Chalus W. side	0.946	0.932	0.969	0.998	0.991	0.990	0.999	1000		
KH. Chalus E. side	0.296	0.119	0.387	0.182	0.184	0.133	0.210	0.189	1000	
Deh-e-Karaj (Old Kara)	0.981	0.838	0.987	0.958	0.932	0.938	0.966	0.961	0.332	1000

Significance Level: 5% = 0.754 2% = 0.833 1% = 0.875

3.6 The correlation coefficients between the previous business addresses of the shopkeepers of Maidan-e-Pahlavi and four major surrounding Khibans compared with the old part of Kara).

	M. Pahlavi	KH. Tehran N. side	KH. Tehran S. side	Daneshkadeh E. side	Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Kara)
M. Pahlavi	1000									
KH. Tehran N. side	0.741	1000								
KH. Tehran S. side	0.502	0.936	1000							
KH. Daneshkadeh E. side	0.357	0.873	0.985	1000						
KH. Daneshkadeh W. side	0.144	0.856	0.865	0.904	1000					
KH. Pahlavi S. side	0.200	0.760	0.923	0.959	0.969	1000				
KH. Pahlavi N. side	0.022	0.512	0.762	0.824	0.983	0.913	1000			
KH. Chalus W. side	0.296	0.853	0.951	0.977	0.865	0.958	0.796	1000		
KH. Chalus E. side	0.166	0.374	0.643	0.708	0.918	0.963	0.959	0.698	1000	
Deh-e-Karaj (Old Kara)	0.030	0.433	0.690	0.748	0.958	0.872	0.987	0.704	0.943	1000

Significance Level: 5% = 0.811 2% = 0.882 1% = 0.917

3.8: The correlation coefficients between the obtaining of major goods of commercial premises on Maidan-e-Pahlavi and four major surrounding Khibans compared with the old part of Kara).

	M. Pahlavi	KH. Tehran N. side	KH. Tehran S. side	Daneshkadeh E. side	Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Kara)
M. Pahlavi	1000									
KH. Tehran N. side	0.961	1000								
KH. Tehran S. side	0.976	0.883	1000							
KH. Daneshkadeh E. side	0.909	0.888	0.802	1000						
KH. Daneshkadeh W. side	0.902	0.985	0.792	0.999	1000					
KH. Pahlavi S. side	0.919	0.992	0.819	0.998	0.998	1000				
KH. Pahlavi N. side	0.901	0.986	0.793	0.999	0.999	0.999	1000			
KH. Chalus W. side	0.873	0.962	0.748	0.987	0.987	0.977	0.981	1000		
KH. Chalus E. side	0.923	0.993	0.826	0.997	0.997	0.999	0.998	0.972	1000	
Deh-e-Karaj (Old Kara)	0.884	0.979	0.768	0.998	0.999	0.996	0.999	0.984	0.995	1000

Significance Level: 5% = 0.878 2% = 0.934 1% = 0.959

Appendix 3

3.9: The correlation coefficients between the number of persons engaged by commercial premises on Maidan-e-Pahlavi and four major surrounding Khiabans compared with the old part of Karaj.

	M. Pahlavi	KH. Tehran N. side	KH. Tehran S. side	KH. Daneshkadeh E. side	KH. Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Karaj)
M. Pahlavi	1000									
KH. Tehran N. side	0.989	1000								
KH. Tehran S. side	0.771	0.855	1000							
KH. Daneshkadeh E. side	0.886	0.944	0.978	1000						
KH. Daneshkadeh W. side	0.204	0.344	0.781	0.635	1000					
KH. Pahlavi S. side	0.829	0.902	0.995	0.994	0.716	1000				
KH. Pahlavi N. side	0.087	0.231	0.702	0.539	0.993	0.629	1000			
KH. Chalus W. side	0.223	0.362	0.793	0.649	0.999	0.730	0.991	1000		
KH. Chalus E. side	0.881	0.940	0.981	0.999	0.644	0.995	0.548	0.658	1000	
Deh-e-Karaj (Old Karaj)	0.332	0.181	0.354	0.154	0.861	0.262	0.915	0.851	0.164	1000

Significance Level: $5\% = 0.997$

3.10: The correlation coefficients between the status of commercial premises on Maidan-e-Pahlavi and four major surrounding Khiabans compared with the old part of Karaj.

	M. Pahlavi	KH. Tehran N. side	KH. Tehran S. side	KH. Daneshkadeh E. side	KH. Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Karaj)
M. Pahlavi	1000									
KH. Tehran N. side	0.997	1000								
KH. Tehran S. side	0.999	0.999	1000							
KH. Daneshkadeh E. side	0.999	0.996	0.998	1000						
KH. Daneshkadeh W. side	0.999	0.995	0.997	0.999	1000					
KH. Pahlavi S. side	0.999	0.995	0.997	0.1000	0.1000	1000				
KH. Pahlavi N. side	0.996	0.999	0.992	0.994	0.993	0.994	1000			
KH. Chalus W. side	0.999	0.996	0.997	0.1000	0.1000	0.994	0.994	1000		
KH. Chalus E. side	0.999	0.996	0.997	0.1000	0.1000	0.1000	0.994	0.1000	1000	
Deh-e-Karaj (Old Karaj)	0.967	0.984	0.979	0.963	0.959	0.962	0.987	0.962	0.962	1000

Significance Level: $5\% = 0.997$

3.11: The correlation coefficients between monthly rent of commercial premises on Maidan-e-Pahlavi and four major surrounding Khiabans compared with the old part of Karaj.

	M. Pahlavi	KH. Tehran N. side	KH. Tehran S. side	KH. Daneshkadeh E. side	KH. Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Karaj)
M. Pahlavi	1000									
KH. Tehran N. side	0.101	1000								
KH. Tehran S. side	0.366	0.789	1000							
KH. Daneshkadeh E. side	0.338	0.749	0.997	1000						
KH. Daneshkadeh W. side	0.288	0.888	0.979	0.966	1000					
KH. Pahlavi S. side	0.334	0.765	0.998	0.999	0.972	1000				
KH. Pahlavi N. side	0.501	0.592	0.942	0.949	0.872	0.944	1000			
KH. Chalus W. side	0.353	0.771	0.999	0.999	0.975	0.999	0.946	1000		
KH. Chalus E. side	0.518	0.761	0.984	0.974	0.956	0.975	0.956	0.980	1000	
Deh-e-Karaj (Old Karaj)	0.829	0.322	0.081	0.091	0.177	0.100	0.178	0.084	0.077	1000

Significance Level: $5\% = 0.811$ $2\% = 0.882$ $1\% = 0.917$

3.12: The correlation coefficients between the estimated catchment areas of commercial premises on Maidan-e-Pahlavi and four major surrounding Khiabans compared with the old part of Karaj.

	M. Pahlavi	KH. Tehran N. side	KH. Tehran S. side	KH. Daneshkadeh E. side	KH. Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Karaj)
M. Pahlavi	1000									
KH. Tehran N. side	0.999	1000								
KH. Tehran S. side	0.987	0.990	1000							
KH. Daneshkadeh E. side	0.578	0.590	0.691	1000						
KH. Daneshkadeh W. side	0.988	0.985	0.952	0.444	1000					
KH. Pahlavi S. side	0.650	0.661	0.756	0.994	0.523	1000				
KH. Pahlavi N. side	0.992	0.990	0.961	0.472	0.999	0.550	1000			
KH. Chalus W. side	0.986	0.984	0.949	0.435	0.999	0.515	0.999	1000		
KH. Chalus E. side	0.986	0.984	0.949	0.435	0.999	0.515	0.999	0.1000	1000	
Deh-e-Karaj (Old Karaj)	0.986	0.984	0.949	0.435	0.999	0.515	0.999	0.1000	0.1000	1000

Significance Level: $5\% = 0.878$ $2\% = 0.934$ $1\% = 0.959$

Appendix 3

3.13: The correlation coefficients between the daily sale of commercial premises on Maidan-e-Pahlavi and four major surrounding Khabans compared with the old part of Karaj.

	M. Pahlavi	KH. Tehran M. side	KH. Tehran S. side	Daneshkadeh E. side	Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Karaj)
M. Pahlavi	1000									
KH. Tehran N. side	0.662	1000								
KH. Tehran S. side	0.317	0.546	1000							
KH. Daneshkadeh E. side	0.712	0.827	0.831	1000						
KH. Daneshkadeh W. side	0.811	0.827	0.743	0.907	1000					
KH. Pahlavi S. side	0.934	0.746	0.574	0.902	0.994	1000				
KH. Pahlavi N. side	0.866	0.794	0.592	0.933	0.866	0.981	1000			
KH. Chalus W. side	0.627	0.598	0.347	0.655	0.699	0.727	0.775	1000		
KH. Chalus E. side	0.882	0.831	0.539	0.915	0.848	0.973	0.992	0.726	1000	
Deh-e-Karaj (Old Karaj)	0.170	0.252	0.743	0.325	0.370	0.010	0.020	0.147	0.050	1000

Significance Level: 5% = 0.811 2% = 0.882 1% = 0.917

3.14: The correlation coefficients between sum of sarqofli (key money) of commercial premises on Maidan-e-Pahlavi and four major surrounding Khabans compared with the old part of Karaj.

	M. Pahlavi	KH. Tehran M. side	KH. Tehran S. side	Daneshkadeh E. side	Daneshkadeh W. side	KH. Pahlavi S. side	KH. Pahlavi N. side	KH. Chalus W. side	KH. Chalus E. side	Deh-e-Karaj (Old Karaj)
M. Pahlavi	1000									
KH. Tehran N. side	0.820	1000								
KH. Tehran S. side	0.463	0.808	1000							
KH. Daneshkadeh E. side	0.748	0.978	0.912	1000						
KH. Daneshkadeh W. side	0.814	0.998	0.839	0.988	1000					
KH. Pahlavi S. side	0.893	0.988	0.727	0.944	0.983	1000				
KH. Pahlavi N. side	0.554	0.883	0.988	0.959	0.906	0.812	1000			
KH. Chalus W. side	0.544	0.855	0.995	0.943	0.882	0.786	0.994	1000		
KH. Chalus E. side	0.553	0.853	0.994	0.943	0.882	0.886	0.994	0.999	1000	
Deh-e-Karaj (Old Karaj)	0.556	0.401	0.280	0.398	0.412	0.432	0.344	0.297	0.346	1000

Significance Level: 5% = 0.878 2% = 0.934 1% = 0.959

APPENDIX 4

General Characteristics of the labour force in the eight
factories studied. (Percentage of Frequency Distribution).

(See Table 6.4).

	A=10 %	B=10 %	C=10 %	D=10 %	E=10 %	F=10 %	G=10 %	H=10 %	Mean %
V.I Sex									
1 = Male	100	100	100	100	100	90	100	100	
2 = Female	-	-	-	-	-	10	-	-	

V.II Age Groups

1 = Less than 20 years	-	40	-	-	-	10	-	-	6
2 = 20 - 25	10	10	30	30	30	10	-	50	21
3 = 26 - 30	20	-	20	30	10	30	30	30	21
4 = 31 - 40	40	20	10	20	40	20	30	10	24
5 = 41 - 50	20	30	40	20	10	20	20	10	21
6 = More than 50 years	10	-	-	-	10	10	20	-	6

V.III Birth Place

1 = Karaj City	30	20	10	30	10	40	20	40	25
2 = Karaj Shahrestan	-	20	-	10	-	40	10	10	11
3 = Tehran	10	10	-	10	10	-	10	-	6
4 = Qazvin	-	-	-	-	-	-	-	20	2
5 = Yazd	10	30	60	10	-	-	40	-	19
6 = Tabriz	-	-	-	10	-	-	-	-	1
7 = Other Places	50	20	30	30	80	20	20	30	35

V.IV Marital Status

1 = Single	-	50	-	10	-	10	-	30	13
2 = Married	100	50	100	90	100	90	100	70	87

Appendix 4 (Continued)

	A=10	B=10	C=10	D=10	E=10	F=10	G=10	H=10	Mean
	%	%	%	%	%	%	%	%	%
<u>V.V Number of Dependents</u>									
1 = None	-	60	-	10	-	10	-	30	13
2 = 1 person	-	-	-	-	-	-	-	-	-
3 = 2 - 3 persons	30	20	10	40	20	10	20	30	25
4 = 4 - 6 persons	70	20	50	30	30	30	70	40	42
5 = 7 persons and more	-	-	40	20	40	50	10	-	20

V.VI Educational Status

1 = Illiterate	-	30	-	-	20	20	-	-	9
2 = 1 - 3 class	30	20	70	30	20	30	40	10	31
3 = Primary School Certificate	10	40	10	20	50	40	40	50	32
4 = 7 - 9 class	10	10	-	30	10	10	-	30	12
5 = Secondary School Certificate	50	-	20	20	-	-	20	10	15

V.VII Year of Employment

1 = Less than 3 years	-	30	20	30	20	10	-	-	14
2 = 3 - 5	50	20	30	10	10	30	30	40	27
3 = 6 - 10	20	30	20	40	70	30	60	60	41
4 = 11 - 20	-	20	30	20	-	30	10	-	14
5 = More than 20 years	30	-	-	-	-	-	-	-	4

V.VIII Employment Status

1 = Unskilled	20	80	50	60	60	80	50	70	59
2 = Skilled	80	20	50	40	40	20	50	30	41

V.IX Employment Security

1 = Temporary	-	-	-	-	-	10	-	-	1
2 = Permanently	100	100	100	100	100	90	100	100	99

Appendix 4 (Continued)

	A=10 %	B=10 %	C=10 %	D=10 %	E=10 %	F=10 %	G=10 %	H=10 %	Mean %
<u>V.X Earning Situation</u>									
1 = Less than 6,000 Rials	-	80	40	10	20	20	10	10	22
2 = 6,000 - 12,000	20	20	50	50	60	70	50	30	44
3 = 12,000 - 18,000	60	-	10	40	10	-	40	30	24
4 = 18,000 - 25,000	20	-	-	-	10	10	-	20	7
5 = 25,000 and more	-	-	-	-	10	-	-	10	2

V.XI Overtime

1 = Yes	100	80	80	10	70	100	100	60	75
2 = No	-	20	20	90	30	-	-	40	25

V.XII Housing Conditions

1 = Owned House	10	20	50	50	70	80	60	20	45
2 = Factory House	90	60	10	20	-	20	-	10	26
3 = Rented House	-	20	40	30	30	-	40	70	29

V.XIII Number of Rooms

1 = 1 Room	-	30	30	10	10	10	-	20	14
2 = 2 rooms	-	70	20	60	40	30	30	30	35
3 = 3 Rooms	90	-	50	20	30	20	50	50	39
4 = 4 Rooms and more	10	-	-	10	20	30	20	-	11
5 = unknown	-	-	-	-	-	10	-	-	1

V.XIX Piped Water

1 = Yes	100	100	30	80	10	40	80	70	64
2 = No	-	-	70	20	90	60	20	30	36

V.XV Electricity

1 = Yes	100	100	100	100	90	90	90	90	91
2 = No	-	-	-	-	10	10	10	10	9

Appendix 4 (Continued)

	A=10	B=10	C=10	D=10	E=10	F=10	G=10	H=10	Mean
	%	%	%	%	%	%	%	%	%
V.XVI <u>Journey to work</u>									
1 = Less than 1 km	60	60	60	-	-	-	80	-	32
2 = 1 - 5 km	40	40	40	80	70	70	20	90	56
3 = 5 - 20	-	-	-	10	-	-	-	10	2
4 = 20 - 40	-	-	-	-	-	-	-	-	-
5 = More than 40 km	-	-	-	10	30	30	-	-	9

V.XVII Means of Transport

1 = Walking	100	70	60	10	30	10	50	10	42
2 = Bicycle	-	-	20	30	30	30	10	-	15
3 = Motorbike	-	-	10	-	10	10	30	20	10
4 = Bus Service	-	-	-	-	30	50	-	30	14
5 = Service Taxi (or Taxi)	-	30	10	60	-	-	10	30	17
6 = Private Car	-	-	-	-	-	-	-	10	1

V.XVIII Time Spent

1 = Less than 15 minutes	50	60	10	20	20	-	70	10	30
2 = 15 - 30	50	40	70	60	50	70	30	70	55
3 = 30 - 60	-	-	20	10	-	10	-	20	7
4 = More than 60 minutes	-	-	-	10	30	20	-	-	7

Source: Author's Fieldwork

- A = Sugar Factory
- B = Jahan Chit
- C = Jahan Vegetable Oil
- D = Iran Wool Washing
- E = Kadour
- F = Vita Fruit Conserving
- G = Internol Motor Oil
- H = Armeh

APPENDIX 5

Percentage frequency distribution of households
characteristics in Gohar Dasht and Golshahr Villa
(See Figure 8.4)

	<u>Gohar Dasht</u>	<u>Golshahr Villa</u>
	%	%
I. <u>Age groups of household head</u>		
1. Less than 30 years old	7	5
2. 30-44 years old	56	51
3. 45-64 years old	32	40
4. 65 and above	5	4
<hr/>		
II. <u>Birth place of household head</u>		
1. Karaj	2	2
2. Tehran	30	30
3. Other parts of Central Ostan	12	11
4. Other parts of Iran	55	56
5. Abroad	1	1
<hr/>		
III. <u>Educational Status of household head</u>		
1. Illiterate	6	5
2. Traditional studies	14	11
3. Primary school studies	26	22
4. Secondary school studies	38	32
5. Higher education studies	16	30
<hr/>		
IV. <u>Occupational Characteristics of household head</u>		
1. Unemployed	2	4
2. Professional and technical	12	11
3. Administrative and managerial	29	41
4. Sales work	17	12
5. Agricultural and orchard work	2	2
6. Service work	7	0
7. Production and related work	24	24
8. Retired	7	6
<hr/>		

Appendix 5 (Continued)

	<u>Gohar Dasht</u>	<u>Golshahr Villa</u>
	%	%
<u>V. Employment status of household head</u>		
1. None (unemployed or retired)	9	10
2. Employer	7	4
3. Self employed	47	39
4. Government employee	31	46
5. Private wage earner	6	1
<hr/>		
<u>VI. Total number of persons per household</u>		
1. Households with 1-2 persons	5	6
2. Households with 3 persons	9	15
3. Households with 4 persons	15	20
4. Households with 5 persons	17	21
5. Households with 6 persons	17	14
6. Households with 7 persons	15	11
7. Households with 8 and 9 persons	14	9
8. Households with 10 persons and over	8	3
<hr/>		
<u>VII. Children under 7 years old per household</u>		
1. Households with no child in this age group	49	57
2. Households with 1 child in this age group	31	24
3. Households with 2 children in this age group	15	17
4. Households with 3 children in this age group	4	2
5. Households with 4 children in this age group	1	0
<hr/>		
<u>VIII. Children 7-17 years old per household</u>		
1. Households with no child in this age group	28	37
2. Households with 1 child in this age group	13	15
3. Households with 2 children in this age group	24	17
4. Households with 3 children in this age group	19	20
5. Households with 4 children in this age group	11	8
6. Households with 5 children and more in this age group	5	3

IX. Children above 18 years old living with partents

1. Households with no child in this age group	72	66
2. Households with 1 child in this age group	12	15
3. Households with 2 children in this age group	5	8
4. Households with 3 children in this age group	6	6
5. Households with 4 children in this age group	3	3
6. Households with 5 children and more in this age group	2	2

X. Type of housing occupancy

1. Owned house	89	88
2. Rented house	10	10
3. Others	1	2

XI. Number of rooms per household

1. 2 rooms	1	1
2. 3 rooms	6	1
3. 4 rooms	20	11
4. 5 rooms	43	22
5. 6 rooms	21	40
6. 7 rooms	7	17
7. 8 rooms and over	2	8

XII. Water supply

1. Piped water	68	58
2. Well	32	42

XIII. Length of time living at present house

1. Less than 1 year	51	58
2. Less than 1-2 years	22	23
3. 3 years and over	27	19

Appendix 5 (Continued)

	<u>Gohar Dasht</u>	<u>Golshahr Villa</u>
	%	%
XIV. <u>Previous residence address</u>		
1. Karaj	9	4
2. Tehran	85	88
3. Other parts of Central Ostan	2	1
4. Other parts of Iran	4	6
<hr/>		
XV. <u>Reasons for moving to this satellite</u>		
1. Low price of land, house or rent	24	20
2. Vicinity to work place	10	7
3. Natural attraction and less crowded	51	47
4. Low price and vicinity	1	2
5. Low price and natural environment	9	19
6. Vicinity and natural environment	3	2
7. Temporary stay, summer residence	2	2
8. Other reasons	1	1
<hr/>		
XVI. <u>Work place of household's head</u>		
1. None (unemployed or retired)	7	10
2. Local	11	13
3. Karaj	17	3
4. Tehran	58	65
5. Other places	7	10
<hr/>		
XVII. <u>Work place of household's wife</u>		
1. None (housewife)	78	72
2. Local	16	17
3. Karaj	4	2
4. Tehran	2	9
<hr/>		
XVIII. <u>Place of children's nursery and primary school</u>		
1. None (households with no child in this category)	39	52
2. Local	50	20
3. Local and Karaj	2	2
4. Karaj	6	2
5. Karaj and Tehran	1	13
6. Tehran	2	11

Appendix 5 (Continued)

	<u>Gohar Dasht</u>	<u>Golshahr Villa</u>
	<u>%</u>	<u>%</u>
XIX. <u>Place of children's secondary school</u>		
1. None (Households with no child in this category)	53	55
2. Local	14	3
3. Local and Karaj	3	1
4. Local and Tehran	1	2
5. Karaj	19	14
6. Karaj and Tehran	3	8
7. Tehran	7	17
<hr/>		
XX. <u>Food stuff shopping place</u>		
1. Local	41	25
2. Local and Karaj	7	2
3. Local and Tehran	15	18
4. Karaj	12	16
5. Karaj and Tehran	4	9
6. Tehran	21	30
<hr/>		
XXI. <u>Household goods shopping place</u>		
1. Local	5	0
2. Local and Karaj	0	1
3. Local and Tehran	2	0
4. Karaj	7	12
5. Karaj and Tehran	3	4
6. Tehran	82	82
7. Other places	1	1
<hr/>		
XXII. <u>Clothes shopping place</u>		
1. Local	6	1
2. Local and Karaj	0	1
3. Local and Tehran	3	0
4. Karaj	6	10
5. Karaj and Tehran	2	8
6. Tehran	83	79
7. Other places	1	1

Appendix 5 (Continued)

	<u>Gohar Dasht</u> %	<u>Golshhr Villa</u> %
XXIII. <u>Household goods repair</u>		
1. Local	26	8
2. Karaj	23	32
3. Tehran	51	60
<hr/>		
XXIV. <u>Car service and repair</u>		
1. Households with no car	22	15
2. Local	22	13
3. Karaj	13	16
4. Tehran	43	56
<hr/>		
XXV. <u>Recreation</u>		
1. Local	21	29
2. Karaj	8	4
3. Tehran	68	65
4. Other places	3	2
<hr/>		
XXVI. <u>Type of transport used</u>		
1. Private car	76	85
2. Mini-bus or bus	12	9
3. Other means	12	6
<hr/>		
XVII. <u>Route taken for going to Tehran</u>		
1. Karaj road	20	11
2. Karaj autobahn	80	87
3. Old Karaj road	0	2
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QUESTIONNAIRES

Questionnaire No.1 Commercial premises in Karaj City

1. Personal data of shopkeeper

Name.....Birth place..... Birth date.....

2. Occupational status

What is your business?..... Present business address.....

Previous address.....

Present home address.....

Are you a wholesaler? Yes No Are you a retailers? Yes No

Are you a manufacturer? Yes No

Within which guild are you classified?

Please indicate some of your major goods sold.....

From where and how are these articles obtained?

Are the goods wholly produced locally? Yes No Imported? Yes No

Are all the goods collected personally or delivered at your shop?.....

Is this shop owned by yourself? is it rented? is it "Vaqd"?

or other? (To be specified)

Are the majority of your customers residents of Karaj? Yes No

If yes, mainly from which parts of Karaj?.....

If no, are they from Tehran? If other places, please specify.....

In which month of the year are your sales highest and why?.....

.....

In which month of the year are your sales lowest and why?.....

.....

How much cash is taken per day?

If the shop is rented, how much do you pay per month? (In Rials)

How much Sargofli have you paid (In Rials).....

Years of business?.....

Questionnaire No.2 Industrial establishment in Karaj City

Name of factory

I. General Factors

1. History and location of factory

Name of factoryDate of establishment.....

Location..... Distance from the City Centre.....

Type of road connecting the factory to the city centre.....

Reasons for factory to be established here:

Type of products.....

2. Size and dimensions of factory

Total area..... Floor space..... No. of storeys...

Expenditure incurred on factory building (in Rials).....

II. Investment

What was the intial amount of investment?

Was it invested by the government? Yes No

If no, was it private invested? Yes No

Both government and private investment

Change in investment over the last 10 years(%)

Sum and per cent of the net profits during the last 5 years

III. Raw material supply, quality and total volume of different products

A: Raw materials

<u>Materials used</u> <u>(in order of importance)</u>	<u>Volume</u>	<u>Origin of supply</u>	<u>Transport mode and routes</u>
a.
b.
c.
d.

Questionnaire No.2 (Continued)

B: Fuel used (in order of importance)

- a.
- b.
- c.

C: Type of machinery

<u>In order of importance</u>	<u>Total number</u>	<u>Make and country</u>	<u>Means of Transport to the factory</u>
a.
b.
c.

D: Type and Volume of products

<u>Type</u>	<u>Volume</u>	<u>% increase since establishment</u>
<u>In order of importance</u>		
a.
b.
c.
d.

E: Waste materials

<u>Type</u>	<u>Volume</u>	<u>Method and place of disposal</u>
a.
b.
c.

IV. Marketing

Volume and mode of distribution for different markets and percentage of change compared with year of establishment.

<u>Market</u>	<u>Volume</u>	<u>Distribution mode</u>	<u>% Change</u>
a. Karaj
b. Tehran
c. Other parts of Iran
d. Foreign countries

Questionnaire No.2 (Continued)

V. Labour force characteristics and changes from the date of factory establishment

No. of labour force

start	{	skilled
		unskilled
present.....	{	skilled
		unskilled

VI. Staff welfare

No. of working hours per week..... Bus service (factory) Yes No

Canteen facilities Yes No

Insurance Yes No Stock/share profits Yes No

Medical facilities Yes No Pension facilities Yes No

Educational and training facilities for labourers Yes No

VII. Economic position of factory

Role of the factory in the national economy.....

How the factory copes with the competition from similar factories of the area?

What are the major problems of factory?.....

.....

VIII. Potential and proposed expansion programmes

For how long will the present factory size be sufficient?

Possibilities and plans for future expansion:

Is it possible to expand production within the present area? Yes No

If yes, for how long?

IX. Suggestions

.....

.....

Questionnaire No.3 Labour force characteristics

Name of factory:- _____

1. Personal characteristics

Name..... Male Female Birth date.....

Birth place..... Single Married No. of dependent persons

2. Education Status

Illiterate Literate Traditional studied

Up to 3rd class Up to 6th class Primary School Certificate

Up to 9th class Up to 12th class Secondary School Certificate

Further education (to be specified).....
(if any)

3. Employment and earning situation

Number of years working in this factory: Less than 3 years

3 - 5 years 6 - 10 years 11 - 20 More than 20 years

Are you a skilled labourer? Yes No Are you unskilled? Yes No

What is your field of specialization?.....

What is your job in this factory?

Are you a temporary labourer? Yes No

Are you a permanent labourer? Yes No

How much do you earn per month? Less than 6000 Rials

6000-15000 Rials 15000-30000 Rials More than 30000 Rials

Do you have over-time work? Yes No

If yes, how much do you earn?

4. Housing

When did you come to Karaj city? Less than 1 year 1 - 3 years

3 - 5 years 5 - 10 years More than 10 years

From which part of the country do you come?.....

In what part of Karaj city did you stay initially?.....

Questionnaire No.3 (Continued)

4. Housing(continued)

Have you ever since moved to another place? Yes No

If yes, where is your present home address?.....

Do you have a house of your own? Yes No

Do you live in a rented house? Yes No

Do you live in a factory"s house? Yes No

Others (to be mentioned).....

How many rooms do you have at your house?.....

Water supply: Piped water Well Others (to be specified).....

Electricity? Yes No

If you live in a rented house, how much do you pay per month?(In Rials).....

5. Journey to work

How far is your house from the factory? Less than 1 km. 1 - 3 km.

3-5 km. 5-10 km. 10-20 km. 20-40 km. More than 40 km.

Means of transportation: Private car Factory Bus Service City bus

Service Taxi Taxi Motor Bike Bicycle Walking

How long does it take you to reach the factory?

Less than 15 minutes 15-30 minutes 30 - 60 minutes More than 1 hour

6. Working time

How many hours a week do you . work?

Do you use your annual vacation? Yes No

If yes, where do you go for the vacation?.....

7. Satisfaction with job

Are you satisfied with your job? Yes No

8. Suggestions

.....

Name of satellite settlement.....

A. Characteristics of the household head

1. Personal and family characteristics

Male Female Age.....(years) Birth place.....

Single Married If married, No. of children.....Children's Age.....

Total No. of household.....

2. Educational Status

Illiterate Traditional studies Primary school studies

Secondary school studies Higher school studies

3. Occupational characteristics

Unemployed Professional and technical Administrative and Managerial

Sales work Agricultural and orchard works Service works

Production and related works Others (to be specified).....

Retired

4. Employment Status

Employer Self employed Government employee Private wage earner

Others (to be specified).....

B. Characteristics of housing

Is this house owned by yourself? Is it rented? Others (to be specified)

..... No. of rooms Water supply: Piped Water Well

Others (to be specified).....

Previous home address: Karaj Tehran Other parts of Central Ostan

Other parts of Iran

How long have you been living in this house? Less than 1 year 2-3 years

More than 3 years

Reasons for coming to this satellite: Low price of land or housing

Less crowded and favourable environment Vicinity to work place

Temporary stay or summer residence Other reasons (to be specified)

.....

C. Relationship and dependency on different places and services

	<u>Local</u>	<u>Karaj</u>	<u>Tehran</u>	<u>Other places</u>
<u>1. Place of work</u>				
Household head's work place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wife's work place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>2. Place of children's school</u>				
Nursery and primary school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Secondary school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>3. Place of shopping and different services</u>				
<u>(a) Shopping</u>				
Foodstuff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Household goods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clothes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>(b) Different services</u>				
Household goods service and repair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Motor car service and repair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>(c) Recreations</u>				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Type of transport and the road taken by head of household to go to Tehran

(a) Type of transport means

Private car. Service Taxi Bus or Minibus

(b) Road

Karaj Road Karaj Autobahn Old Karaj Road

What are the existing problems?

.....

.....

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The Bibliography is divided into three parts:

- 1 Governmental Publications
- 2 City-Region in Iran
- 3 General Books and Periodicals

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