SPATIAL ANALYSIS OF PHYSICAL BLIGHT IN TEHRAN CITY

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Abstract

As a response to urban decline and deterioration in cities, especially over the past 50 years, government policies and programs have been developed to confront this problem. This event has occurred not only in developed countries but also developing countries such as Iran. Urban decline has been studied in different dimensions: physical, economical, environmental and social. Also studies have focused on defining urban blight indicators. Review of literature also shows that studies have focused on defining causes of urban blight and solutions to urban blight. This research takes the first step which is a spatial analysis of urban blight, to define urban physical blight in Tehran city. Geographic Information System was used to define Tehran physical blight. Three criteria: High percentage of non-durable buildings in a block, high percentage of small houses (less than 100 square meter land area) and high percentage of alleys with less than 6 meters width were used to define obsolete fabric.

The results of analysis show that Tehran's city physical growth follows Burgess Model or Concentric Zone Model. It means that city has expanded from a core (from inner zone) toward the edges (outer zone). Also, the result of study shows that obsolete fabrics are located in the core of Tehran city wherethe origin of the city, which is the oldest fabric is located. Tehran's Old bazaar is also located in the core. Around the core zone, a transitional zone is developed where the old residential units are converted into bazaar's warehouses.

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Introduction

Very dynamic urban change is observed in many North American and European cities and in developing countries such as Iran. Two processes of urban changes are occurring simultaneously:growth and decline processes. Suburbanization and expansion of residential and commercial areas are developing in the urban fringe. On the other hand, urban decline is happening at the central parts of the cities. Urban decline is happening in different dimensions: physical, economical, social, and environmental. In the central parts of the city, the population is declining, the economy is stagnating, environmental quality is deteriorating and also social problems are increasing. The urban fabric is also obsolete.

This paper focuses only on spatial distribution of physical urban blight in Tehran city. Obsolete fabric can bedefined as a fabric that no longer is used as before. In Oxford English Dictionary, it is defined as outmoded, out of date, worn out, and eroded. As a noun, it is defined as theprocess of becoming obsolete, outdated and falling into disuse (OED, 2010).Merriam-Webster's dictionary defines the word as no longer current and old-fashioned (M-W, 2010).

Physical blight is partly a physical phenomenon. It is essentially a function of human action of disregard. Buildings are man made artifacts and can only survive by means of regular investments in maintenance and adaptation. Physical blight can be approached from different perspectives such as causes and effects. This paper focuses only on spatial analysisof physical blight in Tehran city. In inner parts of European compact cities, we find a declining population (density) and, an increasing number of residential and commercial vacancies. This process is opposite of suburban areas that are experiencing continuous growth. So, two opposite events are occurring. Most cities declining during the last 50 years are located in western industrial countries, particularly in the US (59), the UK (27), Germany (26) and Italy (23). Since 1990, shrinking cities have increasingly been found in the states of the former socialist Eastern Europe such as Russia (13), the Ukraine (22) and Kazakhakstan (13). Between 1950 and 2000, there have also been an above average number of shrinking cities in South Africa (17) and Japan (12). But hot spots of this phenomenon have been in Europe or in the USA and some of the southern countries will be facing a general decrease in population (Banzhaf, Ellen et al, 2007). This event is occurring in Iran too.

Literature Review

Review of literature shows that studies have focused on the causes of decline (Breger, GE,1967; Baum-Snow, N, 2007; Bradbury et al, 1980; Bradford, et al, 1973; Mieszkowski, P, et al, 1993; and Mills, E.S,et al, 1984) and responses to decline (Lichfield, D, 1992; Shultz, M, M, 1990; Pritchett, WE, 2003). The first step for analyzing the urban blight is to do a spatial analysis of urban decline. Numerous studies have studied urban blight according to different criteria(Ellen Banzhaf et al, 2007; Brown, A.R. and Perrott, K.J. 2004, Longley, P.A. 2002). According to Longley (2002), Brown and Perrot (2004), the use of GIS can provide valuable methods for the study of urban revitalization.

Three schools of thought have tried to explain and understand how and why neighborhoods change: ecological, sub-cultural and political economy. These three schools have had varying levels of influence in policy and practice. The ecological school was most influential during the early decades of community development policy in relocation policies such as Urban Renewal. The sub-cultural approach was largely a reaction to the determinism of ecological urban theory and its influence is evident in the various calls for more decentralized decision making and community participation in community development policy. Political economy is the third school that is reflected in two dominant areas of study in urban sociology, namely the growth machine and urban restructuring/global cities that come from those in the political economy school (Pitkin, 2001).

Current research uses the work of urban ecologist from the University of Chicago, School of Sociology. Ecological models tend to present neighborhood change as a part of a natural, deterministic process based on rational, economic choice. Urban neighborhoods decline, improve, or remain the same due to structural forces – primarily economic and social. Because ecologists see neighborhood change as a natural process, they have developed a series of models of how cities and neighborhoods change over time.

Burgess (1925), applying theories from plant ecology to urban growth, pioneered this effort with his invasion/succession model, which portrays neighborhood change as inevitable result of competition for space. The city, according to Burgess, is made of six concentric rings: the innermost ring being the central Business District (CBD), surrounded by the transitional zone, working – class housing, higher status dwellings and finally commuter housing. As the city grows outward, each ring places pressure on the ring surrounding it to expand. In general, then,

neighborhoods deteriorate as lower-income residents move into them and push the growth of the city outward. This is presented as a natural process of competition and selection, similar to theories of evolution in the biological sciences. Burgess's model was fundamental for establishing neighborhood change as an inevitable, natural process (Pikin, 2001).

Another influential model in the model in the ecological perspective of neighborhood change is the filtering model. Hoyt(1933) builds on Burgess's model by applying economic theory to argue that neighborhoods naturally decline as property owners invest less in aging properties due to rising maintenance costs and move to new housing on the periphery. He uses a similar concentric circle structure to Burgess but explains expansion outward as due to the attraction of new neighborhoods on the periphery, not as the result of a push mechanism from the inner circles as in the invasion/succession model. As Temkin and Rohe characterize the filtering model, neighborhood decline, then is a function of the aging housing stock as well as the construction of more appealing housing on the periphery (1986). A very well known application of the filtering model is stage theories of growth, in which neighborhoods decline is viewed as part of a linear, evolutionary process.

Obsolescence: Spatial analysis

Development and renewal organization in Tehran city has defined three criteria for defining the obsolete fabric in Tehran city:

1- At least 50 percent of the parcels in a block have less than one hundred square meter land area.
2- At least 50 percent of the buildings in a block are obsolete.
3- At least 50 percent of the alleys in a block are less than 6 meter wide.

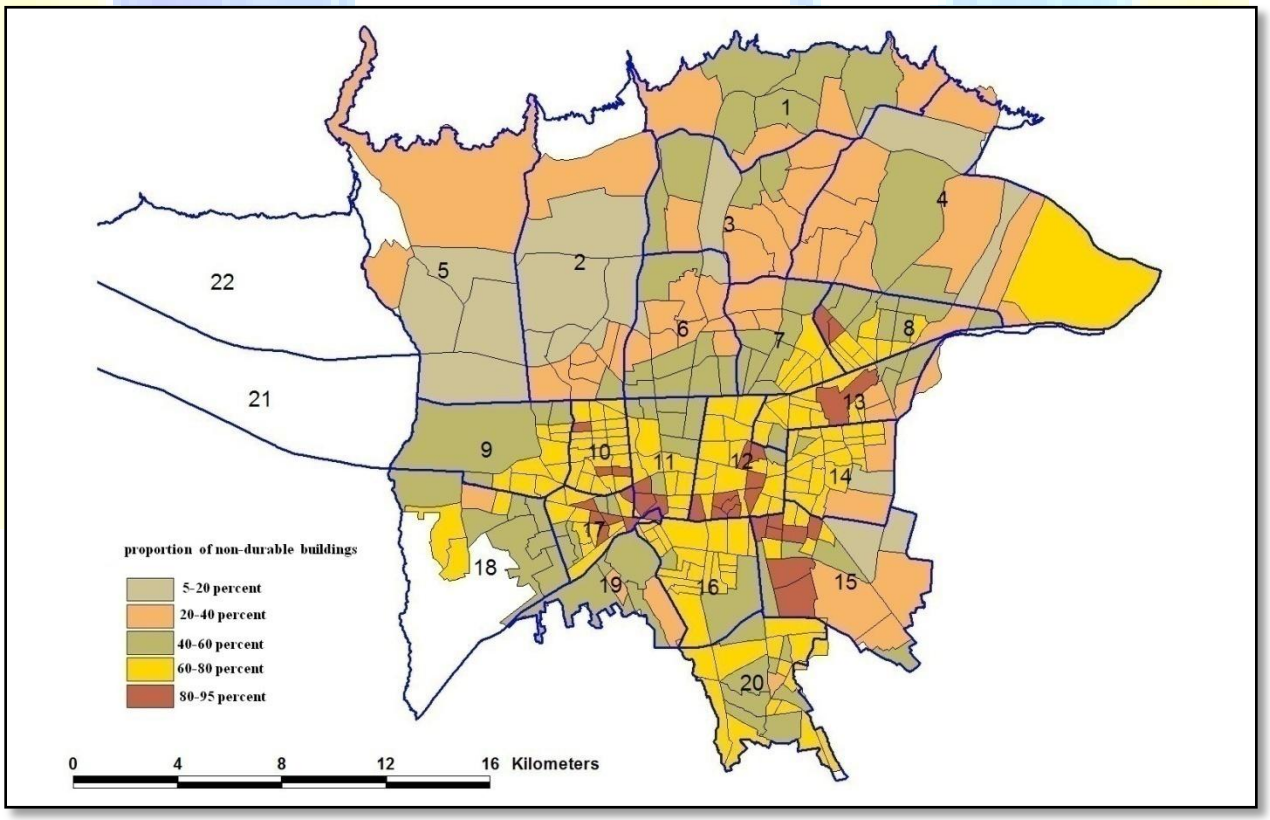
Tehran municipality has divided the city into 22 regions for administrative purposes. Municipality divisions will be used for this research.

To determine the obsolete buildings in a block and their degree of obsolescence, buildings were classified according to the type of materials, framework type and ceiling type. Buildings were also classified on the basis of degree of durability into: 1-not durable, 2- some durability, 3-semi-durability, 4-durable.

Table (1): Classification of Tehran city's Neighborhoods on the Basis of Durability

Classifying Neighborhoods	Criteria: Proportion of Non-durable Buildings	Number of Neighborhoods	Percentage of Neighborhoods
1- Neighborhoods inLittle Danger	5-20%	18	5.1
2-Neighborhoods inAverage Danger	20.40%	52	14.9
3- Neighborhoods in High Danger	40-60%	89	25.4
4- Neighborhoods in Very High Danger	60-80%	160	45.7
5- Neighborhoods in Complete Danger	80-95%	31	8.9
Total	-	350	100

Map (1): classifying of Tehran city's Neighborhoods on the Basis of proportion of non-durable buildings in each neighborhood.



Source: Census data- The proportion of Tehran's properties built with non-durable materials.

The distribution of Neighborhoods with highest percentage of non-durable buildings show that majority of these Neighborhoods are located in the center and south of Tehran city where the original core of the city is located(regions 10, 11, 12) with highest percentage of non-durable buildings. Regions 5, 2, 22 which are new regions, have the least percentageof non-durable buildings (table 2).

Table (2): Classification of buildings in Tehran city on the basis of Durability

Region	*Total Number of Buildings*	*Durability- Number*			*Durability-percentage*		
		Durable	*Semi-durable*	*Non-durable*	*Durable*	*Semi-durable*	*Non-durable*
1.	*37969*	*16434*	*4905*	*16630*	*43.3*	*12.9*	*43.8*
2.	*51551*	*27191*	*13784*	*10576*	*52.7*	*26.7*	*20.5*
3.	*34241*	*16719*	*5941*	*11581*	*48.8*	*17.4*	*33.8*
4.	*102447*	*33106*	*23870*	*45471*	*32.3*	*23.3*	*44.4*
5.	*38393*	*22546*	*10325*	*5522*	*58.7*	*26.9*	*14.4*
6.	*33800*	*15273*	*5438*	*13089*	*45.2*	*16.1*	*38.7*
7.	*53190*	*17480*	*4714*	*30996*	*32.9*	*8.9*	*58.3*
8.	*54468*	*15461*	*3758*	*35249*	*28.4*	*6.9*	*64.7*
9.	*36709*	*8252*	*4294*	*24163*	*22.5*	*11.7*	*65.8*
10.	*123561*	*16839*	*2144*	*104578*	*13.6*	*1.7*	*84.6*
11.	*54744*	*13092*	*3223*	*38429*	*23.9*	*5.9*	*70.2*
12.	*59445*	*13098*	*2546*	*43801*	*22*	*4.3*	*73.7*
13.	*48475*	*16379*	*5440*	*26656*	*33.8*	*11.2*	*55*
14.	*74643*	*21361*	*6836*	*46446*	*28.6*	*9.2*	*62.2*
15.	*114654*	*28458*	*22672*	*63524*	*24.8*	*19.8*	*55.4*
16.	*72239*	*16923*	*5519*	*49797*	*23.4*	*7.6*	*68.9*
17.	*64242*	*11304*	*6779*	*46159*	*17.6*	*10.6*	*71.9*
18.	*69967*	*15749*	*15148*	*39070*	*22.5*	*21.7*	*55.8*
19.	*46222*	*17343*	*7656*	*21223*	*37.5*	*16.6*	*45.9*

20.	*70050*	*17809*	*9484*	*42757*	*25.4*	*13.5*	*61*
21.	*26807*	*7061*	*7166*	*12580*	*26.3*	*26.7*	*46.9*
22.	*4682*	*2155*	*1529*	*998*	*46*	*32.7*	*21.3*
total	*1272499*	*370033*	*173171*	*729295*	*29.1*	*13.6*	*57.3*

Source: Census data of Tehran's properties

Table (4): Conditions of Each Region on the basis of durability

Region	Classifying neighborhoods on the basis of durability					Total Number of Neighborhoods in Each Region in Danger	Percentage of neighborhoods classified as 3,4,5
	1	2	3	4	5		
1.	1	4	5	-	-	10	50
2.	6	7	1	-	-	14	7.1
3.	1	6	4	-	-	11	36.4
4.	1	8	2	1	-	12	25
5.	4	2	-	-	-	6	0
6.	2	8	8	-	-	18	44.4
7.	-	3	7	6	-	16	81.3
8.	-	1	8	9	2	20	95
9.	-	-	4	9	-	13	100
10.	-	-	-	23	3	26	100
11.	-	-	7	9	3	19	100
12.	-	-	1	16	9	26	100
13.	-	3	4	11	1	19	84.2
14.	1	2	1	20	-	24	87.5
15.	2	3	4	5	7	21	76.2
16.	-	-	2	20	-	22	100
17.	-	-	5	10	6	21	100
18.	-	1	9	5	-	15	93.3
19.	-	2	4	-	-	6	66.7

20.	-	1	7	13	-	21	95.2
21.	-	1	6	3	-	10	90
22.	-	-	-	-	-	0	-
Total	18	52	89	160	31	350	80

Conditions:

1- Neighborhoods with 5-20 percent non-durable buildings in low danger.

2- Neighborhoods with 20-40 percent non-durable buildings in average danger.

3- Neighborhoods with 40-60 percent non-durable buildings in high danger.

4- Neighborhoods with 60-80 percent non-durable buildings in very high danger.

5- Neighborhoods with 80-95 percent non-durable buildings in complete danger.

Map(2): Distribution of Tehran city blocks with more than 50 percent obsolete buildings

The second criteria for classifying Tehran city's blocks on the basis of obsolescenceis percentage of the buildingswith a land area of less than 100 square meter in each block.

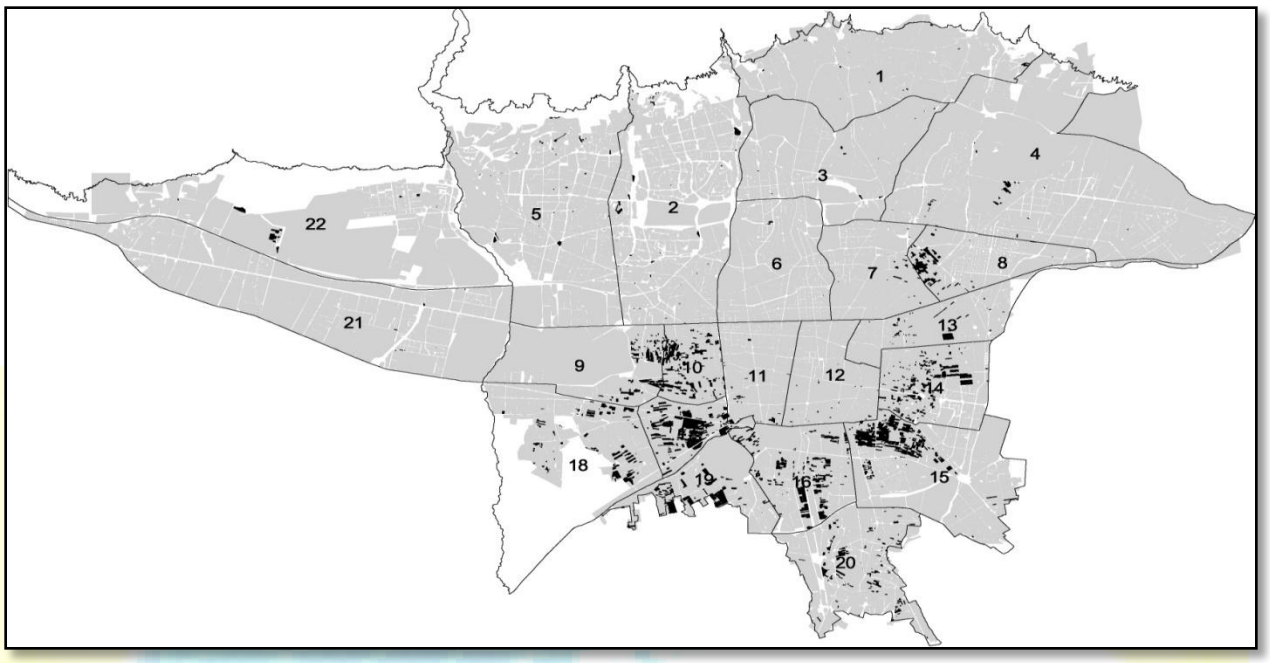
Table (4): Classification of the residential and commercial parcels in Tehran City, on the basis of each parcel's land area.

Parcel land area	Number of Parcels	Land Area	ParcelsPercentage	Land AreaPercentage
Less Than 50 Square Meter	31813	1235339	4.2	0.7
50-100 Square Meter	207331	16060207	27.5	9.6
100-150 Square Meter	199104	24139791	26.4	14.4
150-200 Square Meter	95866	16673600	12.7	9.9
200-300 Square Meter	113242	27181162	15	16.2
300-400 Square Meter	47135	16170790	6.2	9.6
400-500 Square Meter	22256	9912834	2.9	5.9
500-1000 Square Meter	29339	19698051	3.9	11.7
1000 Square Meter and More	8854	37094666	1.2	22
Total	754940	168166439	100	100

Source: research center's data

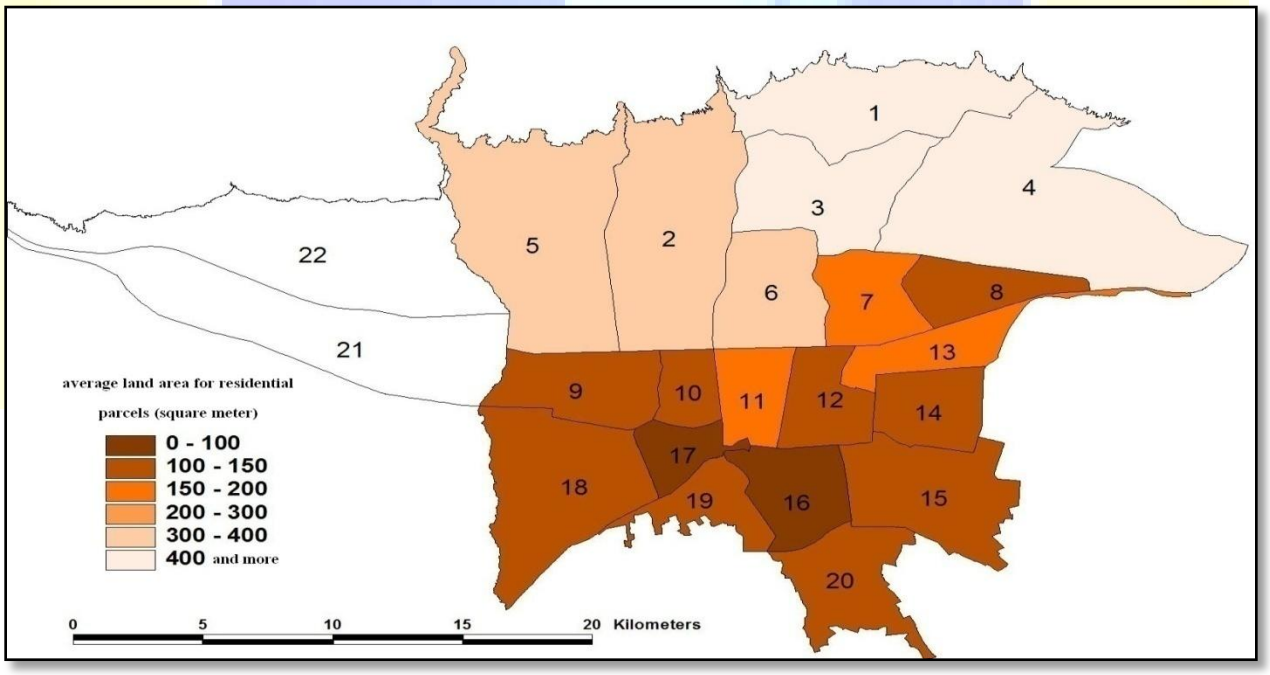
Out of 755000 residentialand residential-commercial parcels in Tehran city, 58 percent have less than 150 square meter land area and only 5.1 percent have a land area of more than 500 square meters. Average land area in the category of 500-1000 square meters is 671 square meters and in the category of above 1000 square meters, average land area is 4189 square meters.

Map (3): Distribution of blocks whose parcels (more than 50 percent of each parcel) have a land area of less than 100 square meters.



Average land area for residential parcels is 224 square meters. The smallest average land area(103square meters) for residential parcels are located in region 17 and the largest average land area (540 square meters) for residential parcels are located in region1.

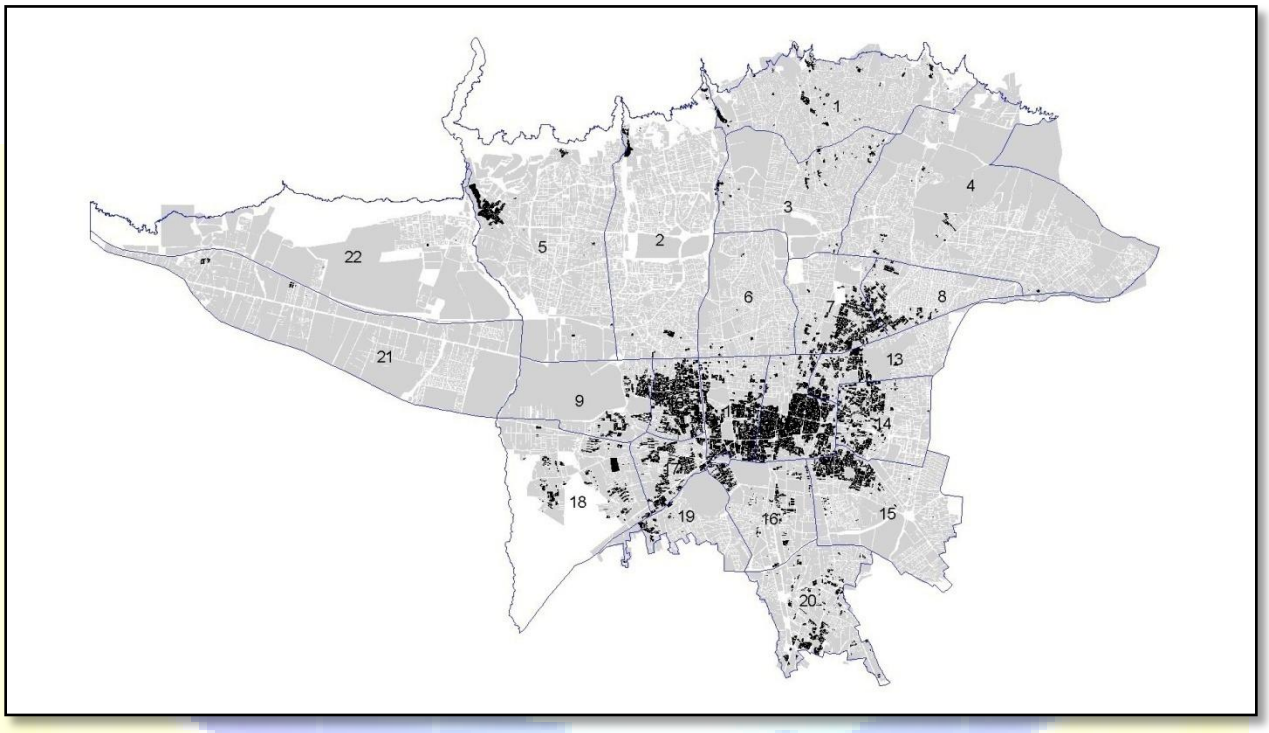
Map (4): Average land areaof residential parcels in each region



Source: Municipality consulting agency

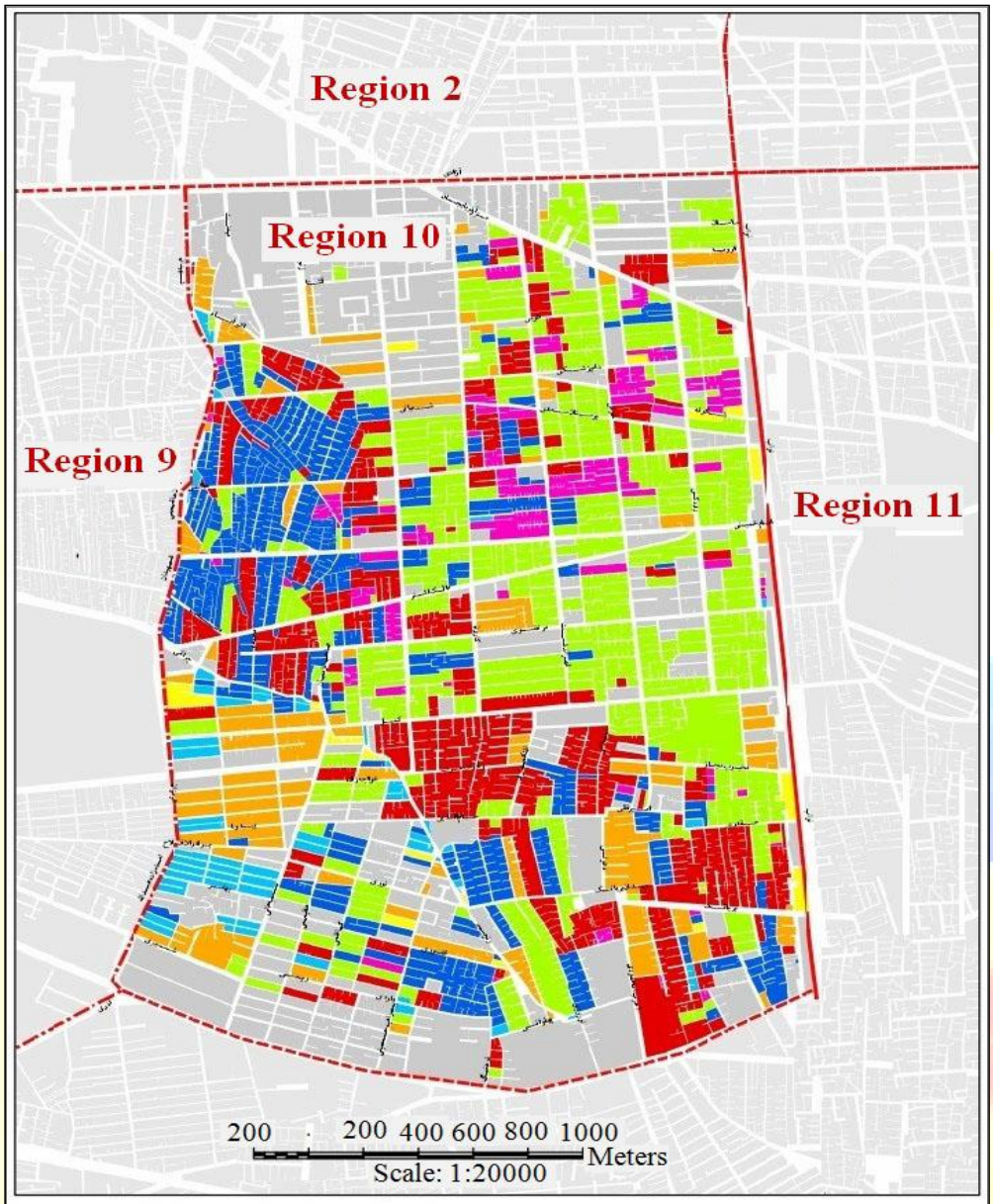
Third criteria for determining the obsolete fabric in Tehran city are the blocks whose alleys (more than 50 percent)have less than 6 meters width.

Map (5): Distribution of blocks with alleyswhich (more than 50 percent of alleys in each block) have less than 6 meter width.



Maps of three regions with highest danger of obsolescence are presented with more details,map (6), map (7) and map (8):

Map (6): Region 10: Map of blocks with highest degree of Obsolescence:

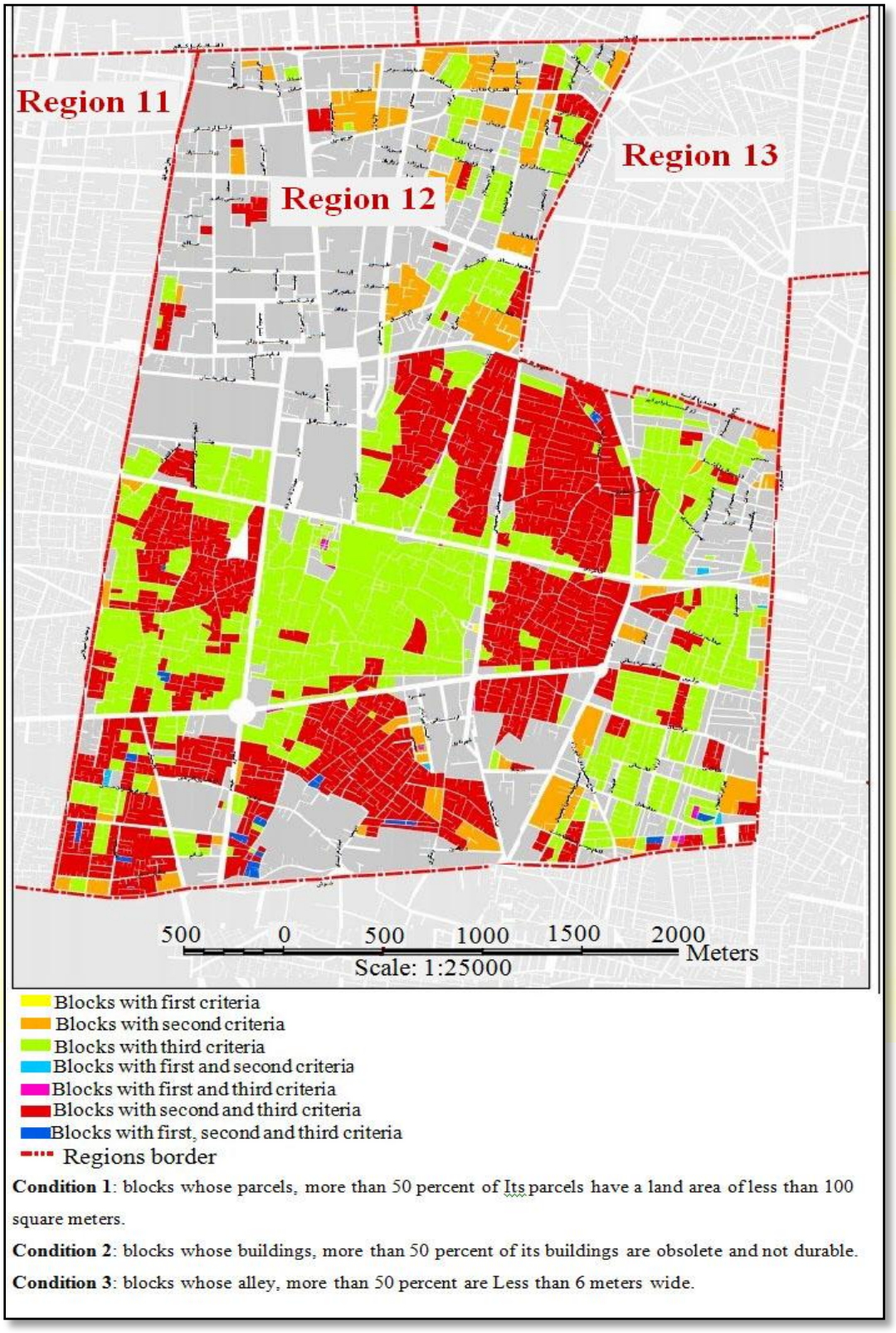


Condition 1: blocks whose parcels, more than 50 percent of Its parcels have a land area of less than 100 square meters.

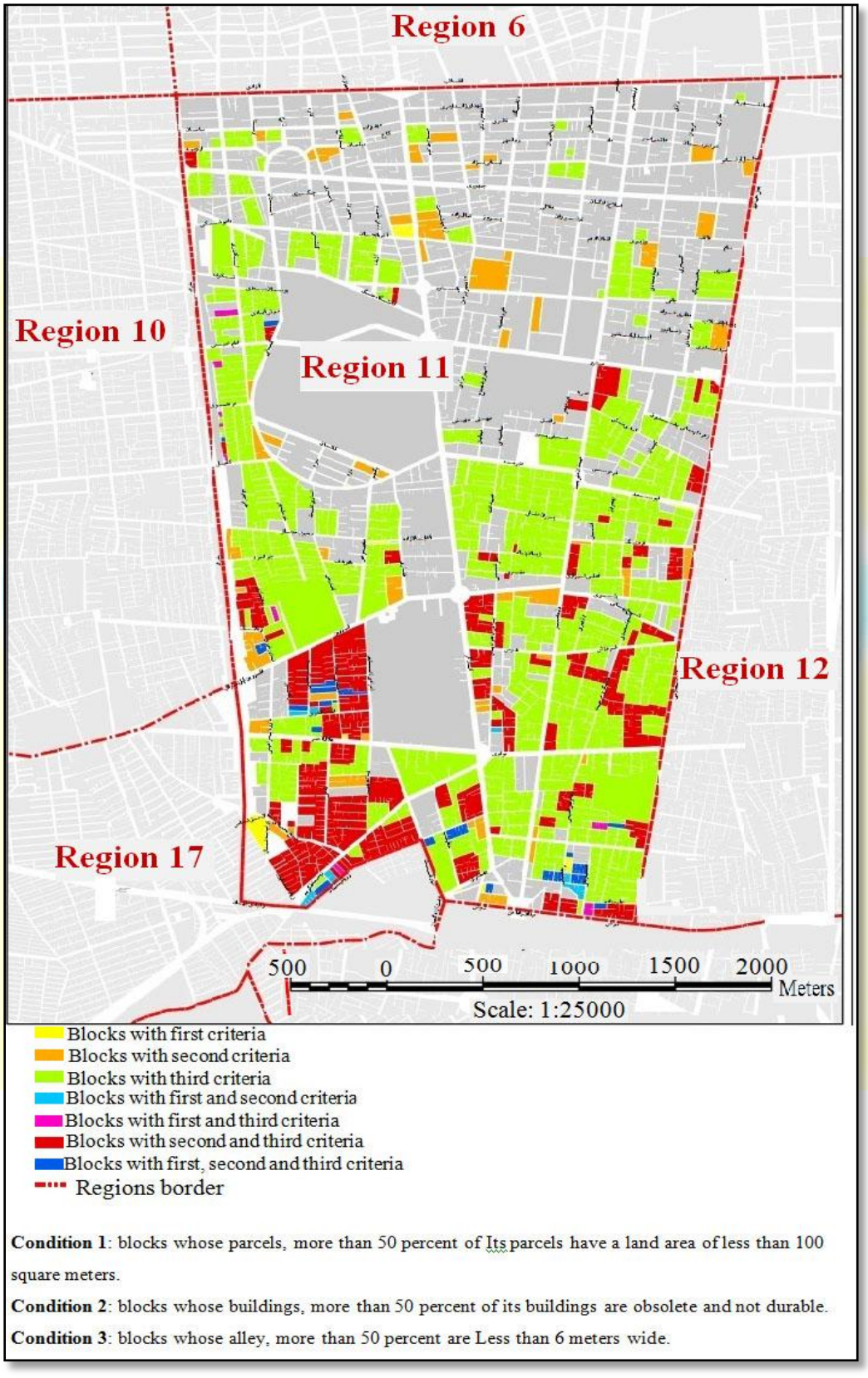
Condition 2: blocks whose buildings, more than 50 percent of its buildings are obsolete and not durable.

Condition 3: blocks whose alley, more than 50 percent are Less than 6 meters wide.

Map (7): Region 12: Blocks with high number of obsolete fabric



Map (8): Region 11: Blocks with highest number of obsolete fabric



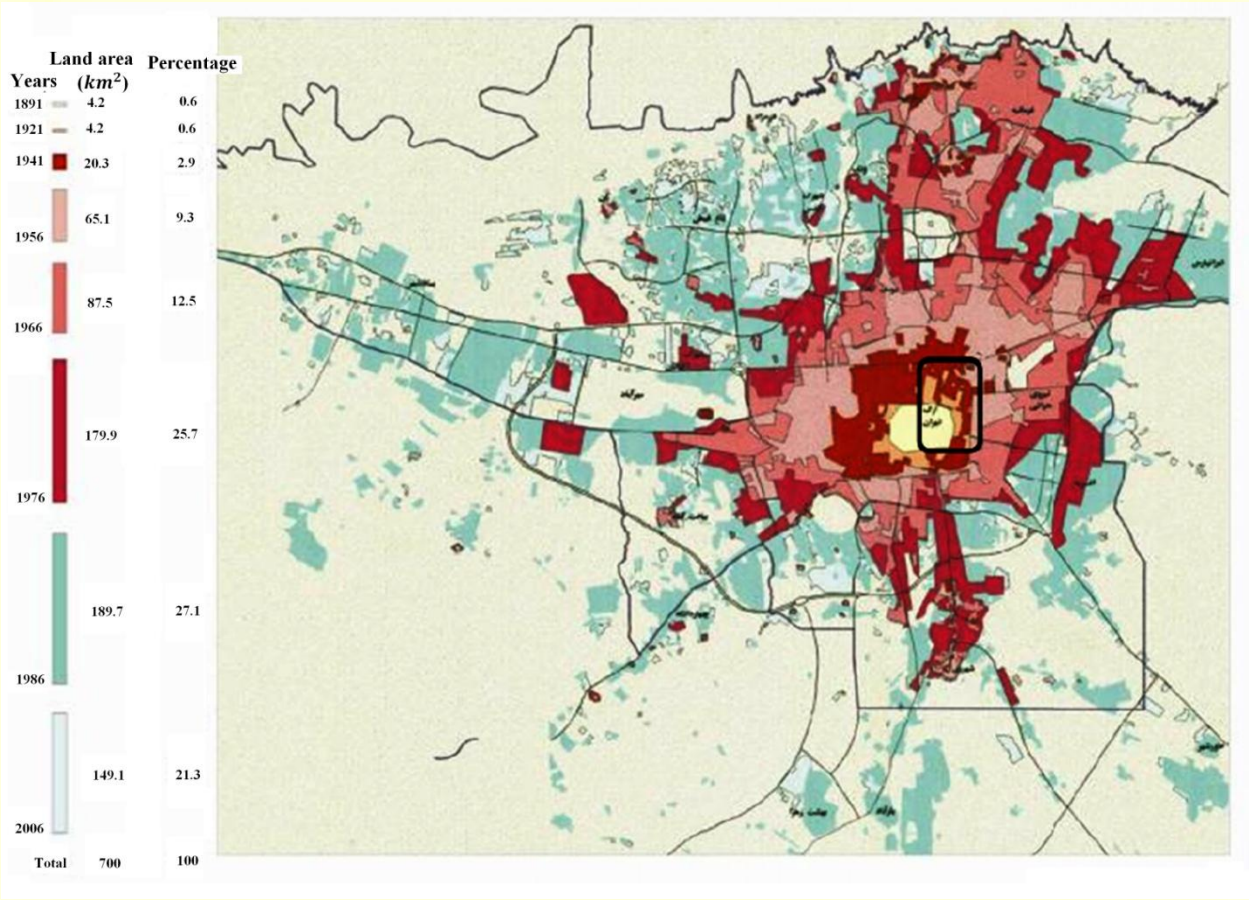
Condition 1: blocks whose parcels, more than 50 percent of Its parcels have a land area of less than 100 square meters.

Condition 2: blocks whose buildings, more than 50 percent of its buildings are obsolete and not durable.

Condition 3: blocks whose alley, more than 50 percent are Less than 6 meters wide.

Current research show that Burgess's model remains useful as a concept explaining concentric urban development, as a way to introduce the complexity of urban land use and to explain urban growth not only in American cities in the early-mid 20th century but also in developing country like Iran. Concentric zone model of growth is also observed in Tehran city. Map (9) shows Tehran's core center (yellow color) which started in 1891with a land area of 4.2 km^2, 20.3 km^2 in 1941,65.1 in 1956, 87.5 km^2 in 1966, 179.9 km^2 in 1976, 189.7 km^2 in 1986, and 149.1 km^2 in 2006 from an inner zone to an outer zone. Map (9) shows a concentric pattern.

Map (9): Horizontal Growth of Tehran Central City, Region 12, core of Tehran City's Growth.



The concentric zone model also known as the Burgess model or the CBD model is one of the earliest theoretical models to explain urban structures.

According to Burgess, urban growth is a process of expansion and reconversion of land uses, with a tendency of each inner zone to expand in the outer zone, creating a transition zone with reconversion of land use. As we can see in map (9), a concentric zone pattern of growth is observed with zones extending from inner areas to outer areas. Since the origin of Tehran city's

growth is located in the core or inner city, the obsolete fabrics are mostly located in these central areas. Tehran municipality has used three criteria to define urban physical blight. Fourth criteria can be added which is time, when the physical expansion of an area has happened in the city. Beside, Tehran's old bazaar is located in the core of city. Bazaar is surrounded by an obsolete fabric, which can be called "transition zone". In this area, old residential units are converting into warehouses. This event also conforms withthe zone II in Burgess model which is called transition zone.

Conclusions

Three indicators of physical blight were used to define the obsolete fabric in Tehran city. These criteria can also be considered as causes of physical blight. One internal factoristhe materials used for construction. Two external factors which are also indicators of an old organic fabric: (1) small land units without irregular patterns and (2) narrow, irregular alleys and streets with the lack of proper accessibility. Fourth cause of physical blight can be defined as time. With the passage of time and with the use of non-durable materials, deterioration of urban fabric is observed. The original core of Tehran city's growth is region 12 where the highest number of blocks with highest number of obsolete buildings, highest number of narrow alleys and highest number of small parcels exist.

Concentric zone pattern is observed inner city of Tehran city with a tendency of each inner zone to expand in the outer zone, creating a transition zone with reconversion of land use from residential to commercial. Therefore, concentric zone pattern of Burgess's theory is observed in Tehran city too.

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