

URBAN SPRAWL IN IRANIAN CITIES AND ITS DIFFERENCES WITH THE WESTERN SPRAWL

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Recently a number of studies have focused on urban sprawl in the Iranian cities and the negative impacts of such development pattern. Although in a general view the phrase “urban sprawl” is used for fast and sometimes uncontrolled urbanizations, but there are dissimilarities between the urban sprawl in the western societies with the so-called Iranian urban sprawl. This paper discusses these differences as part of five main aspects that are mentioned in the internationally recognized urban sprawl definitions. Suburban sprawl, single-use developments/zoning, disconnected street network, low accessibility of the new developments, and commercial strip development are the aspects that are descriptively discussed as the main differences between the two types of sprawl. The main point of the discussion is that due to the wide range of similarities, which are briefly introduced, the type of the fast outward urban growth that is observed in the periphery of the Iranian cities can be defined as a part of the universal urban sprawl trend. Finally a definition is suggested for explaining urban sprawl in Iran.

Key words: Urban sprawl, development pattern, density, urban growth, Iran.

INTRODUCTION

There is evidence that some of the Iranian cities are experiencing urban sprawl. The presence of urban sprawl within urban development patterns and the resulted negative impacts have been studied in a number of studies. Although the observations are limited in number but they cover large metropolitan areas like Tehran (Roshan *et al.*, 2009), Mashhad (Hosseini *et al.*, 2010a) and Kerman (Hosseini *et al.*, 2010b) to small large cities like Yazd (Shahraki *et al.*, 2011; Ebrahimpour-Masoumi, 2012) and Urmia (Mobaraki *et al.*, 2012) and also mid-sized cities like Kashan (Ebrahimpour-Masoumi, 2012).

In an urban development pattern point of view, urban sprawl in the Iranian cities has particular characteristics. Today's massive sprawl is only a part of urban transformations that aimed at preparing the urban form of the cities for car use. These governmental efforts that took place between 1930 and 1960 not only changed the urban textures of the traditional and organic cities, but also influenced the life style of the urban dwellers by easing motorized travels.

Nevertheless the main part of urban sprawl, particularly in the central parts of the country, took place after 1980 (Ebrahimpour-Masoumi, 2012). During the past one hundred years the Iranian urban textures have transformed from compact traditional morphologies to less compact patterns and lower population densities. The street networks have changed from curvy streets and dead-end allies in the traditional textures to semi-gridiron networks in 1950s and 1960s and complete gridiron after 1980. The population densities decreased continuously during the last decades and the length of the urban trips became longer. Today for residents living in new districts, many destinations are not within the walking distances. On the other hand the new urban planning system emphasized on motorized transportation. Thus most of the planning efforts are put on improving the quality of wide streets and highway systems, while drawing people to local centers and planning neighborhood amenities are almost forgotten.

A basic idea that is targeted in the contemporary literature for limiting unsustainable development patterns like urban sprawl and its impacts is compactness (Cavrić, 2004). Compact urban form is repeatedly discussed as a sustainable method of urban development for reducing the environmental impacts of

urban sprawl like ecological footprints (Petrić, 2004). However this compactness seems to diminish in the development pattern of the Iranian cities. Today most of the Iranian cities, especially the more historical ones, include a compact core. The second type of textures that are located around the core are the less compact areas that were built about the years 1940-1970. The dominant idea behind the plans of these parts was to provide streets suitable for car use. However the streets of these areas still did not have complete gridiron network, but the pattern had less compactness and population density. These figures continued to decrease in the districts built after 1980. The urban development pattern of these quarters that are located around the previous



Figure 1: Location of Kashan and Yazd in the center of Iran.

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ones contains complete gridirons and low population density. Finally a type of development has been shaped during the last three decades, which is the result of joining the villages and previously settlements outside the cities to the new urban boundaries. These areas have very dispersed development patterns. Also several cities have experienced growth along the roads to other cities. These places also have low density and compactness. Many of the sprawling areas that were mentioned as the fourth type are unplanned.

For suggesting a diagnosis for the car-oriented sprawling patterns, the thing that is seen in the related literature is the practices that mostly come from western countries. The question that arises is can we use the same sprawl containment policies that the western countries take or should we develop stand-alone independent strategies based on the local context? To give a good answer to the question, we should have a comparison between these two styles of sprawl. In order to have an understanding of what is called sprawl in the massive literature concerning urban sprawl in Western Europe and North America just the most used definitions are referred.

The notion that has been mentioned in almost all of the western urban sprawl definitions is low density. It is the most important specification of a sprawled area in the definition of Sierra Club (1999) and the US Department of Housing and Urban Development (1999), Ewing (1997), Ewing *et al.* (2002), and Burchell and Galley (2003). The sprawled areas are believed to have lower population, construction and employment densities in comparison to central cities and downtowns. The U.S. Department of Housing and Urban Development has defined urban sprawl as a particular type of suburban development (1999), so they are expected to be found firstly in the periphery of the cities and secondly as planned areas. The definition has also emphasized on the connection of sprawl with personal automobile use. In fact this type of development encourages the residents to use personal cars, while mass production and presence of cars supports planning sprawled and dispersed districts. Therefore there is a reciprocal relationship between sprawl and car use. Most of the specifications that are attributed to urban sprawl are related to the development pattern and layout. Large expanses of single-use development and leapfrog/scattered development are some of these attributes. Also poor accessibility is noted as a specification of the street network and land use in sprawled patterns (Ewing, 1997). Some of other features associated with

sprawl are "lack of transportation choices, relative uniformity of housing options or the difficulty of walking" (Ewing *et al.*, 2002). Since the type of sprawl that we discuss comes from the industrialized countries and regions, it has close connections with urban economy and industry. Therefore commercial strip development is another aspect that is seen in western urban sprawl (Ewing, 1997). Western urban sprawl has also created problems regarding social interactions such as lack of sense of community, belonging and place. One of the noticed points is that sprawled districts have lack of functional public open spaces and thriving activity centers (Ewing, 1997; Ewing *et al.*, 2002). A phrase seen in the definition of Burchell and Galley (2003) is that the western sprawled areas are developments "characterized by unlimited outward extension". This attribute can be in association with urban boundaries and limitations.

The European cities have grown rapidly after 1950 (Kasanko *et al.*, 2005). The growth of population and employment decreased in the inner cities and increased in the suburbs after The World War II in 6 of the 7 examined cities (Antwerp, Copenhagen, Hamburg, Milan, Paris, Rotterdam, and Liverpool) (Jansen, 1993). In a European context, urban sprawl is considered to work in parallel with deindustrialization, decay of the inner cities and urban shrinkage, urban land use change, deterioration of the housing, and migration (Couch *et al.*, 2007). The urban shrinkage-related problems and decrease in population and jobs combined with peripheral low-density growth in the inner cities are clearly seen in the cities of east of Germany such as Leipzig and Halle (Nuissl, Rink, 2003; Rink *et al.*, 2010). The population density of Leipzig dropped from 3600 to 2400 inhabitants per square kilometer between 1991 and 2000 because of the special economic and societal challenges of the aftermath of the German unification (Rink, *et al.*, 2010, 11). The European Commission's Fifth Framework Programme titled "The project Urban Sprawl: European Patterns, Environmental Degradation and Sustainable Development" emphasizes on density gradient to differentiate between urban growth and urban sprawl. The density gradient of a natural urban growth is steeper than that of an urban growth (Pichler-Milanović, 2007). The project identifies three urban patterns for the 1991-2001 period: "growth and containment" in Copenhagen and Stockholm; "growth with sprawl" in Amsterdam, Athens, Berlin, Brussels, Dublin, Lisbon, Ljubljana, Luxembourg, Vienna, and Warsaw; and finally "decline with sprawl" in Birmingham, Bratislava, Budapest, Leipzig, Liverpool, Prague, and Rome (URBS

PANDENS, 2005). As seen here, although many large European cities employ sprawl containment policies, but the cities are still sprawling. In another European project under the Sixth Framework Programme, urban sprawl is defined by means of the concept of "peri-urban areas" that include towns and villages located between urban settlements and their rural hinterland. They can be situated in large agglomerations and have their land use and landscape are changing rapidly. These areas are defined as "discontinuous built development, containing settlements of less than 20,000, with an average density of at least 40 persons per km² (averaged over 1km² cells)" (Piorr, 2010). One of most referred European definitions of urban sprawl is suggested by European Environment Agency (EEA): "the physical pattern of low-density expansion of large urban areas, under market conditions, mainly into the surrounding agricultural areas", and "sprawl is the leading edge of urban growth and implies little planning control of land subdivision" (European Environment Agency, 2006). The European urban sprawl includes scattered, patchy, and discontinued settlements that have been partially resulted by uncontrolled growth.

Regarding the presence of urban sprawl in the development pattern of the Iranian cities and having the basic attributes of the western sprawl in mind, this study aims at finding the main differences between the Iranian and western sprawl patterns. The main result that is expected is providing the planners of Iran and other countries of MENA (Middle East and North Africa) region with a basic concept for developing sprawl containment strategies. Of course such strategies are not discussed in this paper, but only the first step which is the specifying the local sprawl and its differences with other types of sprawl are presented. A definition for the local form of urban sprawl is suggested as well.

RESEARCH METHOD

This study uses a descriptive and qualitative approach to explain the differences between two types of sprawl coming from different geographical places. The general characteristics of the western sprawl are derived from widely-used urban sprawl definitions that were discussed in the introduction section. On the other hand, the specifications of the Iranian sprawl come from the author's PhD dissertation completed in Technical University of Dortmund, Germany, which is referred to throughout the paper.

Five aspects of the general characteristics of

urban sprawl are targeted and examined for the case of the Iranian cities (specifically the cities of central Iran). These aspects include suburban development, single-use developments and zoning, street network, accessibility, and commercial strip development. These characteristics are seen the U.S., Canada and Australia, and some of them are the specifications of the European sprawl. Suburban development is a basis for urban sprawl in North America and Australia. Single-use development, commercial strip development, and poor accessibility seen in Ewing's definition (1997) for the American sprawl. Large-scale, single-use developments outside the urban areas are patterns that contribute to urban sprawl in Europe (Lloyd-Jones, 2004). There are differences between the street network of the normal, compact and sprawling cities in the U.S. and Europe (Jia, Jiang, 2011). Large-scale commercial development is seen in sprawling areas both in Europe (Nuisss, Rink, 2003; Nuisss *et al.*, 2005; Pichler-Milanović, 2007) and the U.S. (Ewing, 1997).

The mentioned topics are believed to be different in the western and Iranian urban sprawl. The reasons and explanations are presented separately in the next section. The presence of urban sprawl in many Iranian cities is taken as the hypothesis of the study. It has been discussed in a number of previous studies that were mentioned at the beginning of the introduction section and is partially examined in this paper.

DIFFERENCES BETWEEN THE IRANIAN AND WESTERN URBAN SPRAWL

The differences that are discussed in this paper are in connection with the basic idea behind the Iranian urban planning or the physical attributes of the existing dispersed areas in the periphery of the large and mid-sized cities of the country.

Suburban development

Urban sprawl in North America and Western Europe is so largely associated with suburban development that the phrase "suburban sprawl" is used as a replacement. The idea that comes to mind by this phrase is that the existing consequences behind the western planning (like urban infrastructures and transportation technologies) have pushed the planning organizations to design suburbs to create a utopia with the advantages of both urban and rural settlements. However the form of the fast and dispersed developments in the periphery of the Iranian cities has little in

common with suburban development. In fact the urban sprawl of the country can hardly be called "suburban" or "development". The observations show that there has been no or little organized effort for planning typical suburbs on the edge of the Iranian cities like the ones that are seen in western cities. The main barriers seem to be mobility problems like weak accessibility to central urban amenities and also high costs of infrastructure construction outside the cities. This is while some of the cities of the country such as Yazd in the center of Iran experienced migrations from the historical cores to newer districts. The proportion of the city center's population to the population of the whole city of Yazd fell from 51282 people (22.2% of the city's population) in 1986 to 47624 (14.1%) in 1991. The figure was still decreasing in 1996. 46,553 people lived in the city center at this year, which made up 14.2% of the city's population (Kalantari Khalilabad, Hatami Nejad, 2006, 57). It is likely that a number of other cities like Yazd had outward flows of migration in the recent decades. However due to absence of efficient public transportation, difference in car ownership rates with the ones in western countries, and governmental planning strategies looking to plan new districts attached to the cities, no western-style suburbs were planned. In fact this outward flow has been one of the reasons for urban sprawl in Iran, but this has not led to suburbanization because of difficulty of accessing city centers.

In many cases the sprawling areas are the result of lack of control on the land uses. Such defragmented constructions cannot be called development because no intention is seen behind the growth style of these areas. Good examples of such places are the unplanned constructions along the intercity roads. Roads oriented to outside of Tehran in the west, southwest and eastern parts have these characteristics. Such growth has not been foreseen in the master plans so they have nothing in common with planned development but they are just the outcome of fast urbanization and lack of strict control.

Single-use developments and zoning

According to some of the definitions that were considered, single-use developments are of the main specifications of urban sprawl in industrialized countries. It has roots in the dominant planning concept of the twentieth century, which has been zoning. Although zoning has been effective in protecting people's health, but it is often named as a primary cause of urban sprawl in the western cities (Lamer, 2003). The separation between

uses particularly in the suburban areas has made the origins and destinations of the urban travels far from each other; both commute and non-commute travels became long.

Nonetheless the urban development plans in Iran have not been influenced by zoning laws. Therefore zoning is obviously not a cause for the form of fast outward development in the country. Many new residential districts that have recently built in the periphery of the cities have insufficient facilities like retail and shops, public spaces, green spaces, local recreation amenities and so on. This has made many neighborhoods mainly contain residential function and have little mixing of uses. Also concentration of industrial uses on the edge of the intercity roads just outside of the cities has created unpleasant urban landscape in many cities. The examples are seen near the roads connecting the mid-sized city of Kashan to the nearby settlements like Aran/Bidgol, Ravand and Fin (Fig. 2). Another example is the city of Yazd that has sprawled along the northwestern road of Yazd-Tehran and southeastern road of Yazd-Kerman-Bandar Abbas, while traditionally the natural growth direction of the city has been towards west to be safe from the summer hot winds that blow from the central parts of the country.

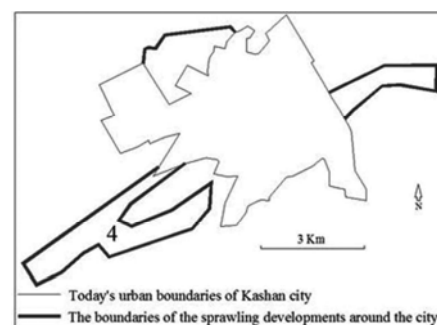


Figure 2: Location of sprawled areas in Kashan: orientation of the sprawling developments along the roads to Aran and Bidgol in the east, Fin in the southwest, and Ravand in the northwest

However none of the above has the characteristics of the western single-use developments or zoning. In case of the mentioned residential neighborhoods, the main cause of monotonous residential textures is ignoring necessity of envisaging local facilities in the scale of neighborhood in the development plans. The Iranian master plans often use the scale of "District" for allocation of needed per capita functions. So the result is that many neighborhoods may remain without local centers and amenities. Also the concentration of industrial functions along the intercity roads is not an outcome of zoning legislations but is because of lack of control on development plans.

Street network

The street networks in the sprawling cities of North America, Australia and Western Europe are mostly shaped by cul-de-sacs and other less connected streets. This is more obvious in the cities of North America. The absence of complete or semi-gridiron networks has caused the suburbs have low connectivity and accessibility. That is why the smart growth advocates emphasize planning more connected structures to encourage people to use alternative modes of transportation like walking and biking (Duany, Plater-Zyberk, 1992; Calthorpe, 1993; Katz, 1994; Duany, 2001). The American urban street networks have transformed from complete and semi-gridiron networks of nineteenth century to the cul-de-sacs of after World War II.

In contrast the way that the street networks in the Iranian cities, specifically the historical cities, have gone is somewhat opposite. The Iranian historical cores consist of dead-end allies and curvy main routes that connect the neighborhoods to each other, as seen in Fig. 3 about the historical core of Kashan. Such a structure was dominant until the early twentieth century, when the government tried to prepare the urban streets of the historical cities for automobile use. This happened in 1930s in Yazd and in 1940s and 1950s in Kashan. The next round of transformations was in the new developments were executed after the Second World War. These developments had the form of semi-gridiron networks and enabled the cars to move more freely (Fig. 4). Since 1980 the street structures have been planned in almost complete gridiron forms (Fig. 5). This perhaps has origin in the speed of the developing housing projects during 1980s and the early 1990s. The developments outside of the urban boundaries such as the old villages that are gradually becoming part of the cities, the planned housing projects, and the unplanned industrial functions altogether shape the outer sprawled areas (Fig. 6). Although the street network of these areas are more connected than the old city centers, but they only give better movement space to cars due to more width and in some places straight direction.

Moving in the streets has been easier for cars as time passed in the twentieth century. This has transformed the street networks of the old Iranian cities from curvy routes and dead-end allies to complete gridirons. This process is different from what happened during the same time in the western suburbs. The result is that in absence of efficient revitalization projects in the historical cores of the Iranian cities, living in them has become hard for the resident that

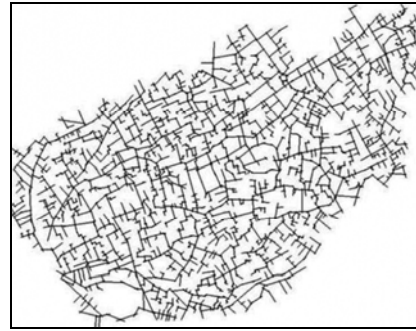


Figure 3: The street structure of the historical core of Kashan without the new wide streets that have been built during the past 60 or 70 years. Curvy streets connect the neighborhoods to each other and the dead-end allies are considered as semi-private spaces that are used by the residents of the houses that are opening to them.



Figure 4: An example of the street network built in 1940-1980 in Kashan; A semi-gridiron network that was built to ease the movement of cars.

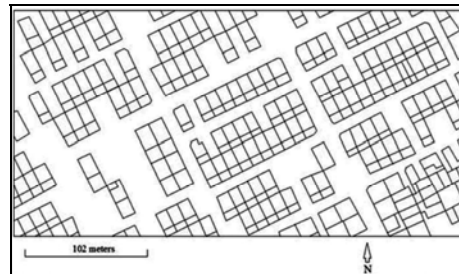


Figure 5: An example of the new developments of Kashan built after 1980; small-scale leapfrog developments are seen within the new district of Naji Abad in the western part of Kashan. The network is complete gridiron.



Figure 6: An example of the old village that is almost attached to the city of Kashan. The combination of houses and gardens is observable. The figure illustrates the places that need planning and control in case the city develops toward the nearby villages.

want to use personal cars as is common in the modern life style. This has become a disadvantage for the old city centers.

Accessibility

Poor accessibility is a result of fragmented street networks in the sprawling areas of the United States (Ewing *et al.*, 2002). In many of the western suburbs it is hard to live without personal cars because of a combination of street network, land use measures and lack of public centers. In western cities the downtowns give more accessibility and connectivity in comparison to the sprawling areas and suburbs. Also the neo-traditionalist urban planners have designed communities with higher accessibility and connectivity based as simulations of the traditional western settlements. There is evidence that the connectivity of such plans is more than that of the sprawled areas and automobile-oriented suburbs (Kim, 2007).

The difference that is observable in the Iranian cities is that the city-level accessibility (accessibility from a point to every other destination in the city) is less in the historical city center rather than in the periphery and sprawled areas. This has been proven in a comparison made between the historical core of the city of Kashan with a new development constructed after 1980 that enjoys complete gridiron network by means of Space Syntax analysis². The accessibility of the new development including integration and connectivity was quite more. This was also tested for Yazd. The street connectivity and integration of a new development of after 1980 was more than the historical core. Interestingly the accessibility measures of an area with a combination of an old organic village and a new planned development was more than the accessibility of the historical core (Ebrahimpour-Masoumi, 2012). The study shows that in a chronological view, the newer development patterns provide with higher connectivity and integration measures. That is

² Space Syntax theory was developed by Bill Hillier and Julienne Hanson in 1970s and 1980s in University College London (Hillier, Hanson, 1984; Hillier, 1999). The theory and the related computer software are used as spatial analysis tools to examine the spatial structure of the urban spaces and their relationship with the human behaviors. The use of Space Syntax in the author's PhD dissertation (Ebrahimpour-Masoumi, 2012) that is referred here has been linking the form of the streets and allies in the historical core and the new quarters of the Yazd and Kashan in the center of Iran with the mobility patterns. The connectivity and integration Space Syntax measures have been applied to show the degree of accessibility in the case study areas. The more connected and integrated the urban configurations are, the more it is expected to have mobility in the streets.

in contrast with the suburban sprawl in the western societies. The above observation was made in the city scale. If the study scale remains limited to neighborhood level, then the old neighborhoods of the city centers have shorter walking distances compared with the new developments.

Commercial strip development

Another aspect of the western urban sprawl is commercial strip development. Under the effect of capitalism, large commercial centers and department stores have become the main source of raising the daily needs of suburban dwellers, who go shopping by their automobiles. "Huge arterial roads lined with shopping centres, gas stations, fast food restaurants, drive-through restaurants, office complexes, parking lots and many large signs" (Gillham, 2002:5) that are the main elements of this type of development leaves no way for the users except driving personal cars. This method of attracting people to large shopping centers and malls has prolonged the non-commute travels. In contrast there is no such an urban economy in Iran. There are few drive-through centers even in the large cities. The majority of daily needs are raised not in large department stores, but in grocery stores, supermarkets, and retail shops.

DISCUSSION

The basic differences between the Iranian and the western urban sprawls were introduced in the past section. The western sprawl is basically caused by suburban development with zoned single-use areas that contain disconnected streets. Such an urban morphology results in very low connectivity and accessibility. Large commercial strips are mainly designed for personal car travels. Very few of these characteristics are seen in the areas of the urban Iran that are introduced by the scholars as sprawled. The question that is raised here is "are the Iranian cities experiencing urban sprawl or is the contemporary pattern of the urban growth natural?".

This study gives a conditional answer to the question. With a look to the previous literature about the issue and the discussion of this paper it is logical to accept that the Iranian cities, especially the older ones that are located in the central parts, are sprawling. There are enough evidences in this case. In reviewing the urban transformations it is clear that the area growth rate of the cities of central Iran has been more than the population growth rate of the same cities. For Yazd the proportion of these two has been 285% between 1981 and

2001. This percentage is calculated based on area of 710, 1800, and 11000 hectares in 1956, 1981, and 2001 respectively. The city has had 63502, 181000, and 388107 inhabitants in the same years. The above proportion is 138% for Kashan in the 1932-2006 period. This figure is based on the area of the city in 1932 and 2006 which were 511 and 4470 hectares. The population of the city has been 40000 and 253731 inhabitants in the same years.

Also the population density of these two cities has dropped during the past decades. Between 1956 and 2001 the population density of Yazd decreased from 89.4 persons per hectare to 35.28. The population density of Kashan decreased from 78.2 persons per hectare to 56.76 in 74 years leading to 2006 (Ebrahimpour-Masoumi, 2012). Also consideration of dispersed and leapfrog developments in smaller scales compared with the western cities shows major differences with the compact pattern of organic and traditional cities. In most of the neighborhoods that have been built after 1980 unbuilt lots are seen. This makes the urban texture disconnected and dispersed. Together with lack of public amenities like recreation centers and other neighborhood amenities, the dispersed textures pushes residents to have long car trips to farther destinations in central parts of the cities. Lack of local amenities includes public spaces that have been mentioned by scholars as one of the main deficiencies of the western sprawled cities. This shortcoming is vigorously felt in case of social open spaces. Such places used to be found in the traditional spaces of the country but today very few of them are planned and very little local transportation facilities are envisaged. Such spaces are limited to small neighborhood urban parks that are mainly planned to increase the per capita of green space. Normally very little effort is made to plan pedestrian public spaces that include social uses like recreation centers. The style of urban planning is highly automobile-oriented and neglects social activities, local centers, neighborhoods, and slow travels.

All the above show the common points between urban sprawl pattern in Iran and the western societies. The urban development pattern of the cities discussed throughout this paper is considered to be urban sprawl, but this does not mean that the sprawl in Iran and the like experience the same pattern and circumstances of the western sprawl. Consequently different definitions should be used for the urban sprawl in Iran and similar countries and cultures. The definition that this study offers is "planned and unplanned

automobile-oriented urban growth with lack of local public facilities and uses, public social open spaces, and relatively low population density that is caused by fast urbanization, poor growth control, and automobile-oriented planning”.

CONCLUSION

The fast outward urbanization of the Iranian cities that is recently called urban sprawl has basic differences with the urban and suburban sprawl of the North American, West European and Australian cities. These dissimilarities are mainly found in five aspects of the western sprawl including suburban sprawl, single-use developments/zoning, disconnected street network, low accessibility, and commercial strip development. The Iranian sprawl functions especially different in these five aspects. However the idea that were brought up in the discussion section of this paper is that despite these differences, the rapid urbanization of the Iranian cities has so much similarities with sprawling urban areas of the world that still can be categorized as sprawling urban development. Highly automobile-oriented urban planning, decrease in population densities in the new plans, leapfrog and dispersed developments, and lack of public spaces and facilities are some of these similarities. To limit such a development pattern a definition is suggested for the Iranian urban sprawl as “planned and unplanned automobile-oriented urban growth with lack of local public facilities and uses, public social open spaces, and relatively low population density that is caused by fast urbanization and poor growth control and automobile-oriented planning”.

The aim that this study and the similar papers follow is to identify the problem carefully so that the decision making and solution recommendation will be done with higher quality. According to the different nature of the urban growth and transformation in Iran, the recommended solutions should originate from the vernacular urbanism. The first step after identification of the nature of the problematic urban growth patterns is to find strategies to contain these trends. The fundamental aim of the sprawl containment strategies that this paper is suggesting for further research should be promotion of quality of life in the fast growing urban areas. Such strategies are better to have a special look to the periphery of the cities where less privileged social classes live.

There is strong need for research on differentiation between normal growth and urban sprawl. By having a better understanding of this border line, it is easier to focus anti-sprawl

strategies. There are a variety of possibilities to establish theoretical and functional framework to stop or slow sprawl. Some of them which are out of the scope of this study are stronger control on urban developments according to the master plans, densification of the inner cities and revitalization plans, gentrification of the historical cores, control on the urban services outside the urban boundaries, and control on the urban growth by using public transportation networks especially rail networks.

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