The Role of Corridor Development and Transit –Oriented based on Rail-Centered in the Sustainability of Mashhad Metropolis

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Extended Abstract

Introduction

Today, as a result of the urban revolution, the growing urban population and the domination of modern urbanism, the form of urban development is a horizontal dispersion that has undesirable effects on the sustainability of societies. Therefore, in the last decade of the 20th century, the sustainability principle was confirmed in urban development programs and led to move toward sustainable urban development patterns, including corridor and transit-oriented development. This development pattern is in fact a kind of functional integration between land use and transportation, usually located within a radius of ¼ to ½ miles (400 to 800 meters) from transit station, which is suitable scale for pedestrians. Among the cities of Iran, Mashhad also isn’t safe from the results of urban revolution and modern urbanism. In years 1976 to 2011, this city was faced with the irregular population increase and physical development, which have had numerous negative results, including: the destruction of prime agriculture resources, the increased demand for inter-urban trips, especially by cars, increased fuel consumption and increasing the air pollutants. Also, it is predicted that in 2025, the city’s population will be increased to 3666000. Therefore, the main issue facing Mashhad’s Construction and Development Plan is how to restrain the uneven physical development, traffic management and to decrease the increased demand for daily trips, to decrease the fuel consumption and environmental pollutions, especially air pollutants, and thus to achieve a level of sustainability. So, this research surveys the sustainability of Mashhad’s urban environment based on corridor development and transit – oriented based on rail-centered approach. Rail corridors have been considered because, they are a part of main infrastructure, and it is important to pay attention to interrelationship of this system with other public transport systems and land uses located around it in order to achieve sustainability. In line with the main purpose of the research, sub-objectives are as follows:

1- To identify the relationship between land use variables, density and access to public transport with the pattern of work trip pattern of Mashhad’s citizen.

2- To evaluate the ecological footprint of a variety of transportation option kinds in Mashhad.

Materials and Methods

In this study, the research method is descriptive-analytic. For data collection, library, field, questionnaire and database are used in GIS. The surveyed indicators are: degree of mixed land use, population density and growth, access to the public transport station (especially rail stations), work trip pattern and ecological footprint of all types of motor-transportation option. The relative Entropy coefficient has been used to analyze the land use statuses. In this Study, the statistical community is the population living in the 800 meter radius of four districts around urban train stations. According to Cochran formula, the total sample size is 319 people and its work trip pattern has been surveyed. Also, Ecological Footprint (EF) model was used to analyze the environmental impacts of transportation kinds.

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Discussion and Results

Studies show that Mashhad Structure is such that during the period of 1976-2011, with the growth of 1.4% of population, the body of city also expanded irregularly with a growth of 9.3% as sprawl (in the horizon), most of which derives from politics related to comprehensive plans based on separating land uses, relying on auto-city pattern and the marginal expansion. The mixed degree of land uses extent to area is medium to high and the population density is at both low and moderate levels. Also, it is even lower than the lowest level of corridor development and transit-oriented expectation (180 people per hectares). In fact, it can be said that city areas are still far from the most desirable sustainability level in terms of mixed level of land uses and population density.

Also, the studying of the daily work trips in Mashhad shows their increasing demand. More than 60% of work trips are done outside of the area of residence and often by using the car (22.35%) or mix of LRT, car and bus (15.97%). According to this, the exception of LRT, fossil fuels are used more, which have an increasing role in air pollution. Studies show that despite the existence of LRT Stations, the share of this system is very low in doing the daily work trips. One of the main reasons for this is the low number of wagons, using only one line and a lack of high access to the work place for most of the workforces by this system as well as a lower level of access to Light Rail Transit stations for most of the workforces, which it is due to network pattern and land uses (so that only 55.31% of residents have high access). Environmentally, the results of inside-city transportation ecological footprint indicate that total carbon production per capita is about 0.0013 tons and total ecological footprint per capita of this section is 7.3076 m², which the lowest share belongs to the Light Rail Transit (0.0026 m²) and the most share belongs to the bus (2.2 m²). But regarding total number of daily moved passengers, the most ecological footprint is for car (5123332 m²) and the lowest belongs to the light rail transit (338 m²). In fact, the share of car is most in the environmental pollution.

Conclusions

Since rail transport has the least ecological footprint among transportation options, urban planners and managers can pay attention to rail corridors especially in order to future development of Mashhad; because these corridors are able to attract 2022907 people and as a result they have high potential for future development of Mashhad. In fact, the attention of urban planners and managers to rail corridors and planning, that leads to attend to both land use and transportation utilities simultaneously, can provide the possible of overcoming most of economic, social, functional, transport and trip pattern problems which are the result of auto-city pattern and sprawl of Mashhad and improve the environmental problems. In the other words, restructure of land and transportation in Mashhad based on the corridor and transit-oriented development pattern, especially along the rail corridors sounds to be necessary to achieve sustainable urban development.

Keywords: Urban Sustainability, Corridor and Transit-Oriented Development, Mashhad.
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