Classifying Urban Brownfield Areas in Mashhad: Providing a Basis for Investment of Lands

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1. Introduction
As a result of the urban sprawl, Brownfield areas are accessible in all the cities of the world as well as the Iranian cities such as Mashhad. These vacant lands provide cities with the possibilities of the inner development and more compact cities. In other words, Brownfield areas can promote the compactness by promoting cities in terms of economy durability, social inclusion, and environment sustainability. The Brownfield areas can also be described in terms of Foreign Direct Investment (FDI), which itself is a consequences of globalization and the areas of flow formation.

In Mashhad, there is a tendency to attract FDI and promote the place of the city on the globalization scale. Moreover, the amount of the Brownfield in the city is high. Therefore, the city authorities decided to develop the Brownfields through the private investment. The present study aims to investigate the Brownfield areas and classify them for the model of investment as it is one of the major issues of concern.

2. Theoretical Framework
Globalization has been defined as the free movement of capital, money, human, idea, technology and, etc. all over the world and this process is known as the flow formation. In this process FDI is really important and cities compete to invest a lot of money on a global scale.

On the other hand, industrial cities have led to an enormous physical growth inside the cities. As a result of the urban sprawl, lots of vacant land inside the cities can be identified. These vacant lands are identified as Green lands, Gray Lands, or Brownfields while each one has some specialties in terms of the urban planning.
3. Methodology
In order to provide a classification of Urban Brownfield, first we have to recognize Mashhad’s Brownfield using GIS by checking it with Google Earth software to complete the database on five indicators. The main indicators for the cluster analysis include; 1- Average household income in the urban areas around the Brownfield, 2- The economic function of the urban tissue where Brownfield is located, 3- The distance between the land and the city center (which is also a holy shrine and a religious center), 4- Land ownership, and 5- The level of natural vulnerability in the Brownfield. In the second phase, cluster analysis will be conducted based on the five mentioned indicators using SPSS software.

4. Discussion and Conclusion
Neo-liberalism and globalization is going to be universal. In fact as a result of the free movement of almost anything, cities try to promote their economic and social situation. The vacant lands, which are were abundant inside the city, open up a good opportunity to be rebuilt and to provide a new circulation for the global or national capital. As a result, the Urban Brownfield Redevelopment is one of the city authority’s strategies in Mashhad. But the so called developing city of Mashhad needs a more detailed plan for the Brownfield, hence, we attempted to conduct a detailed study of Mashhad’s Brownfield to provide some suggestions for the investment by considering the investment models on the one hand and the present status of each Brownfield on the other hand.
Firstly, it was identified that there are 1591 Brownfield in Mashhad which are more than 1000 square meter. These lands, which consist of 13.22 percent of the city area, are 3863 Hectare and would show a special spatial distribution in the city.
In intersection with three type of investment (Public investment, Private investment, and Public-Private investment), and when the Cluster Analysis was done, we recognized that the Brownfields could be identified in three major clusters, which include:
The first cluster includes 38 percent of the Brownfield areas which are located in Eastern part of the city where basically there is a major informal settlement of the city and they suffer from the lack of public spaces and infrastructure. The people who live in these lands are low income groups. So the investor for these lands should be the Public investment model.
The second cluster covers 57 percent of the city which is the larger scale (by average 2.6 hectare). They are located in the areas where the city growth is determined by greater plans. Besides, the people who lived in these areas are middle income groups. As these lands usually need more investment, transparency, and accuracy due to their large size the suggested investment model is Public-Private Partnership.
The third cluster includes 5 percent of the city area and is located in high income zones of the city. So their investment could be transferred to the Private sector.

**Keywords:** Brownfield, Classification, Investment, Mashhad city

**References**


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