Spatial Resilience Analysis in Mashhad Inefficient Texture Sites

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1. Introduction

At the global level, there are significant changes in attitudes toward hazards, so that the dominant view has shifted from focusing solely on reducing vulnerability to increased resilience to disasters. Mashhad like many of the Iran's cities is in a high potential risk. Active and powerful faults in the vicinity of the city testify to the high risk of earthquakes in Mashhad. Moreover, there are seventeen rivers in and around the city of Mashhad that increases the risk of flooding in this city. Overall, the city is in a high-risk in upstream plans from a natural hazard perspective and the existence of 6688 hectares of inefficient texture (worn-out and marginal) in the city has added to its vulnerability. Although some predictive tools are effective in reducing the impact of crises, but based on evidence, future risks cannot be predicted; so it is necessary to know the resilience of city neighborhoods to avoid vulnerabilities. Resilience, however, is not a feature that is evenly distributed across different parts of the city, and it can be said that inefficient urban textures are less resilient than other parts of the city, largely due to their distinct social and physical characteristics. In addition to severe burnout and poor quality of buildings, low levels of social and demographic characteristics such as literacy, education, and employment that are effective in restoring urban neighborhoods, after a crisis lead to increased vulnerability to natural hazards. Therefore, this research was conducted with the aim of investigating the spatial resilience pattern in inefficient (worn-out and marginal) textures of Mashhad.

2. Study Area

Mashhad is the capital of Khorasan Razavi province and situated in the northeast of Iran. This city is located at a longitude of 59 degrees and 2 minutes to 60 degrees and 38 minutes and a latitude of 35 degrees and 43 minutes to 37 degrees and 7 minutes between the Binaloud and Hezarmasjed Mountains. It is placed in a high-risk natural hazard zone. Mashhad has thirteen districts and 3057679 population. Of the 154 neighborhoods in Mashhad, all or part of 42 neighborhoods are inefficient. In general,

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about 6688 hectares of Mashhad are composed of inadequate (worn out and marginal) texture.

3. Material and Methods

The present study was conducted with descriptive-analytical and practical methods. The indicators were extracted through library studies. Eventually, by using the opinion of experts in the framework of the Delphi method, required data were collected. Furthermore, some data were Extracted from Mashhad Master Plan (Farnahad, 2006), Statistical Yearbook of Mashhad (2016), and Road, Housing and Urban Development Research Center (2014), these indices are divided into social and social-physical divisions. Social indices only reflect social and demographic characteristics and socio-physical indices emphasize the physical characteristics and shape of neighborhoods in addition to demographic characteristics. The population consisted of 42 neighborhoods with inefficient texture in Mashhad. At first, using the MOORA technique, the social and socio-physical resilience of the inefficient neighborhoods was investigated. Then, the relationship between the distribution of resilience and social indicators using ArcGIS software was determined. In order to analyze the resiliency pattern, spatial self-dependency technique was used. There are different models for measuring spatial self-dependency statistics, among which the Global Moran Model and the G_i statistics have been used. Finally, in order to evaluate the accuracy and importance of geographic weight regression, the output of this model was evaluated.

4. Results and Discussion

In order to calculate the resilience of each neighborhood, all data for each criterion were first standardized and evaluated using the MOORA technique. The findings show that the neighborhoods of Panjtan Al Abba, Shahid Avini, Hosseinabad, Ayatollah Khamenei, Valiasr and Abobargh have low social resilience, Imam Hadi neighborhood, Ivan, Torq, Mustafa Khomeini, Mohammadabad, Maaghoul, Arvand, Sajadiyyah, Onsory, Rezaei, Paien Khiaban, Dahdey, Amel, Sisabad and Bilal, have middle social resilience and the other are in the up social resilience of this category. Studding the social and socio- physical resilient spatial pattern of inefficient textures areas of Mashhad has been done by using the Global Moran method and general G statistics. Results show that the distribution pattern of these neighborhoods is clustering based on social resilience variables and is random based on socio-physical variables. In fact, there is statistically significant meaning in the social resilience of inefficient textures in Mashhad, On the other hand, this pattern does not exist in the socio-physical resilience. According to the Geographic weight regression, the variables of percentage of employed population, literacy rate and education level have an increasing effect on the level of social resilience of these neighborhoods, while the sponsorship rate and the mean age have a decreasing effect.

5. Conclusion

Much of Iran's urban area is suffering from burnout and inefficiency, causing the country's capital to face the dangers of natural disasters. A review of the theoretical foundations and global experience shows that indices of identification of inefficient textures have moved from purely physical to social and economic dimensions. A review of the past researches about the resilience of urban inefficient textures showed that most studies like the research ahead, emphasize the impact of education indices and the percentage of the employed population on social resilience of societies, given that these indices are subject to socioeconomic conditions, this conclusion is justified. Studying the spatial pattern of socio-physical resilience in inefficient neighborhoods of Mashhad shows that the distribution pattern of these neighborhoods is clustered based on social resilience variables and randomly based on socio-physical resilience variables. In fact, there is a statistically significant pattern of spatial autocorrelation in the social resilience of Mashhad's inefficient textures, while this pattern does not exist in their socio-physical resilience. Since some of the inefficient textures of the city are being revived, it is not unexpected to compare these two patterns in the neighborhoods studied. More precisely, the inefficient textures revitalization in Mashhad has been occurred according to economic and managerial conditions of the neighborhoods, which has led to improvement of physical conditions and subsequently the improvement of the physical resilience while the social aspects of these neighborhoods have been neglected. In fact, the social aspects of development have been neglected in the development of dysfunctional textures. However, recognizing the social characteristics of each neighborhood as the smallest social unit of urban planning is particularly important in order to achieve sustainable development.

The results of this study indicate that the inefficient neighborhoods in the city center and in the northern marginal areas of the city have a significant role in creating cluster patterns. In this regard, in order to increase the effectiveness of interventions, attention to the effectiveness of each of the variables in the targeting structure of interventions in this sector is necessary because the way these variables influence in different locations is different, and this should be considered in planning for inefficient textures regeneration.

Overall, according to the findings of this study, it can be said that in the development of inefficient textures, paying attention to the social and demographic characteristics of each textures is important in promoting the quality of life of residents and the sustainable development of neighborhood. Moreover, it is necessary to pay attention to the differences in the strategies adopted with respect to the worn out and marginal textures. Because worn out and marginal textures each have unique and distinctive social, economic and physical characteristics, so attention and focus on these features are very important in their development process. This can partly indicate the type of intervention and its extent in the textures and guide the experts in selecting the type of intervention. In this regard, the following measures are suggested to increase the resilience of inefficient urban textures in the face of natural hazards:

1. Revising and changing management practices
2. Increasing the economic ability of people to improve their quality of life

3. Providing community decision-making and local partnerships in neighborhood improvement
4. Applying scientific methods and mathematical logic in identifying effective indicators and the degree of impact of indicators and prioritizing neighborhoods

Keywords: Resilience, Inefficient texture, spatial dependence, Geographic weights regression

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