

Evaluation and zoning of Sanandaj city's worn out texture neighborhoods seismic vulnerability, with passive defense considerations, using the IHWP and GIS model

Fallahi, Farhad^g

Charehjoo, Farzin (PhD)^h

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Abstract

According to the rapid global growth in urban population and the concentration of facilities and infrastructure in cities, in the event of an earthquake, the city's vulnerability is very widespread and it would threaten so many lives and properties. Therefore, providing logical solutions and applying passive defense principles can be an effective way to meet citizens at the event of crises. The research has been done on the basis of documentary methods, in Sanandaj. In order to achieve goals of the research, using the library studies, and existing documents, the necessary indicators to determine the vulnerability of urban textures to earthquakes were identified and extracted. In the next step, using the multi-criteria decision-making techniques such as the hierarchical analysis process and using Delphi fuzzy method, the level of importance of the effective indicators on the degree of vulnerability was identified. The purpose of using Delphi method is to reach an agreement between experts in relation to a particular topic, which is done by using a survey of experts on a variety of occasions and with regard to their feedback. The advantages of this method is providing unbiased answers, frequency and statistical analysis of the results of questionnaires. Results show that with the movement to the depths of neighborhoods, magnitude of the vulnerability of the monuments has been increased. The results also show that 26.87% of the buildings had the highest vulnerability, 36.6% had high

^g Master Student of Urban Design, Department of Urban Planning and Design, Sanandaj Branch, Islamic Azad University, Sanandaj.Iran

^h Assistant Prof. of Urban Planning, Department of Urban Planning and Design, Sanandaj Branch, Islamic Azad University, Sanandaj .Iran . f.charehjoo@iausdj.ac.ir

vulnerability, 23.03% had a moderate vulnerability, 9.69% had low vulnerability and 36.4% Had the least vulnerability.

Introduction

The earthquake is known as one of the most dangerous natural disasters in the current era, which in a short time has put miserable harms to human societies. Meanwhile, due to the rapid growth of urbanization and encountering of cities with a greater concentration of the population; in the event of an earthquake, the city's vulnerability would be very widespread and threatens enormous number of lives and property of people. Therefore, providing clear and logical solutions for proper planning, recognizing urban spaces and their proper design can be considered as an effective way to meet the different needs of citizens at the levels of prevention, coping and post-crisis measures.

Materials and Methods

In order to achieve the desired goals of research, in the first step, using the library studies, existing documents and evaluating the results of previous studies, the necessary indicators to determine the vulnerability of urban textures to earthquakes were identified and extracted. In the next step, using the multi-criteria decision-making techniques such as the hierarchical analysis process and using Delphi fuzzy method, the level of importance of the effective indicators on the degree of vulnerability was identified. The purpose of using the Delphi method is to reach an agreement between experts in relation to a particular topic, which is done by using a questionnaire and a survey from experts on a variety of occasions and with regard to their feedback. The advantages of this method is providing unbiased answers, frequency and statistical analysis of the results of questionnaires (converting subjective data to objectives).

Results and Discussion

Results show that the old and worn-out nature of these neighborhoods and their low quality of architecture and urban design characteristics have made them unsustainable in terms of earthquake sustainability, and this is just because of weakness in street networks, low width of passageways, especially in the depths of the neighborhoods, old buildings, and unsustainable structural materials. So it is clear that implementation of effective guidelines in order to enhance building resiliency in this neighborhoods should be considered as the necessities of urban management actions, in order not to be faced with such a dilemmatic circumstance after occurring earthquakes.

Conclusion

Overall, the results of this study show that physical spatial features of urban spaces such as buildings and their physical features, urban design and planning, spatial distribution of land uses all play a decisive role on the

severity of cities and vulnerabilities. And it needs to be addressed in order to prevent irreparable damages.

Key words: Vulnerability, Earthquake, IHWP, Passive Defense, Sanandaj Worn Out Texture.

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