Evaluation of seismic vulnerability of urban sprawl physical variables using TOPSIS model (Case Study: Urban separate area Babariz Sanandaj)

Katayoun Behzad afshar*
Assistant professor, Dep. of Physics, Yadegar-e-Imam Khomeini (RAH) Shahre Rey Branch, Islamic Azad University, Tehran, Iran

Parviz Akbari
Ph.D. Candidate of Urban Planning, Dep. of Urban Planning, Shahr-e-Qods Branch, Islamic Azad University, Tehran, Iran

Received: 22/06/2017 **Accepted:** 09/12/2017

Extended Abstract

Introduction

The occurrence of the earthquake has caused a lot of damage to urban structures due to the lack of attention to the identification of the basic factors in vulnerability to earthquakes. Therefore, it is necessary to study and analyze the physical variables in seismic vulnerability and the role of each which measures to reduce vulnerability. This article introduces a process in which accurate levels of seismic physical vulnerability of urban structures, physical levels of physical interventions are carried out in a constructive manner. In spite of such a process, the waste of resources and facilities, the displacement of uninhabitable settlements and the adoption of immediate and unwise approaches are avoided and ambiguities in decision making and planning for the future of the city are also resolved. In this regard, the following article seeks to answer the following questions:

- What is the seismic vulnerability of Sanandaj Babaris urban detachment in the neighborhood of the possible earthquake?

Which of the structural variables are most likely to be vulnerable?

The purpose of this paper is to study the principle of identifying vulnerabilities to earthquake hazards in the region with respect to structural measures such as the type of structure and materials, the quality, the age and composition of the building, the number of building floors, land use, and passageways. Reduced earthquake damage and provided the right planning. Also, the construction of settlements with the lowest urban-structural principles, high population density in urban marginal urbanization, increasing population and urban growth, in the urbanized area of Baba Riz Sanandaj and the bitter experiences of the earthquake caused by the earthquake in the last decade, the importance of this research is shown.

Methodology

Research method is descriptive-analytical and case study. The technique of collecting statistics and information, using the library methods, is the use of statistics sheets. The TOPSIS model utilizes GIS and excel software as well as information analysis.

Results and discussion

According to the necessity of the subject and the findings of the research, the investigations revealed that in the urbanized area of Babariz Sanandaj, based on the earthquake hazard zonation map in the Zagros region, Sanandaj is located in the low to moderate danger zone and the probability of earthquakes devastating It is low. In total, the maximum intensity of areas

* Corresponding Author: katayoun.behzadafshar@iausr.ac.ir

under pressure in the area in Sanandaj is between 6 and 7 degrees Celsius in the change. While in some districts of the city, this rate is up to about 10 degrees Celsius, and the earthquake is likely to occur. 6th and 7th magnitude magnitudes are 13.5 percent in the entire period of frequent occurrence of earthquakes of magnitude 5, 6, 24, and 93 years. Therefore, it is possible to apply intensities of 8 and 9 degrees in the periphery. The boundary range of the Bábárz urban area is located near the high severity of earthquake points. If the severity of the earthquake reaches 6 mercilesses, only Zone 2, about 4% of its buildings will be damaged. However, if the magnitude of the earthquake is greater than 7, more than 65% of the buildings in area 2 are vulnerable to earthquake damage. Also, area 3 has a structural damage less than 30% and area 1 below 18%. Statistically, the TOPSIS level in the region was 1.807% and in the region 2, 0.6330 in area 3, 0.698% in area 3, and in the area of 4, it was 0.297.

Conclusion

As a result, the 2nd, 4th and 1th zone of Sanandaj city of Babariz are the most vulnerable and most resistant areas in earthquake. In this study, using standard indices, the vulnerability of different neighborhoods of Babaris urban area of Sanandaj was determined. Considering the purpose of this paper, the identification and identification of vulnerable points against the earthquake risk in the region according to structural criteria such as (Type of structure and materials, quality, age and building's magnitude, number of building floors, land use, passageways), the results of the methods and their integration with the GIS are specified in the vulnerability neighborhoods after answering the research questions. The vulnerability level of each area was determined from the results, with the highest vulnerability in the region 2, 4.3, and zone 1 has the least vulnerability. In general, the northwest of the city and the central texture of the city are high risk areas and eastern regions, except for low-risk areas at the time of the earthquake. According to structural (structural) variables, the most likely physical damages in the order of roads, structures and materials, the number of construction classes will be inaccuracy of the earthquake, and the least important role will be the quality and life of the building and land users. According to the calculations performed in multiple stages, the model of the proposed region 2 has the least distance with the positive ideal and the maximum distance with the negative ideal and the region 1 has the maximum distance with the positive ideal and the minimum interval with a negative ideal. Of course, It was noted that urban planning and utilization by locating urban activities and functions, allocating adequate and suitable spaces for different uses, preventing increased density in areas with high vulnerability, restoration and erosion of buildings, separation and the aggregation of parts plays the most role in decreasing the vulnerability of cities.

Key words: seismic vulnerability of urban buildings, physical, model of TOPSIS, Sanandaj