

Analyzing and measuring the vulnerability of urban buildings against earthquake using statistical analyses Case Study: The Worn Texture of Boroujerd City

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Extended abstract

Introduction

Urban old fabrics are supposed to be one of the most vulnerable parts, which are affected in natural disasters mostly earthquakes. The buildings in such areas have no sufficient resistance because of long age and life span and in case of earthquake they are collapsed and may follow the losses of life and property. The main purpose of this article is to analyze and investigate the vulnerability of old fabrics in the downtown Boroujerd city to countermeasure the earthquake and to manage the crisis after the occurrence. The nature of this research is theoretical and practical and the research method is descriptive-analytical. The required data have been collected from library and through field work. In this study, AHP method is used to analyze the area under investigation. The extracted indices are analyzed with the help of GIS and Arcmap. The results indicate high and intensive vulnerability of buildings, if an earthquake occurs. The majority of buildings are suffering from low quality materials, high population density and the establishment of organic tissue and narrow alleys, which results in the rise of destruction and therefore, causes heavy losses of life and property. The readiness to counter the crisis can mitigate the earthquake effects and by knowing the special dimensions of vulnerable buildings, population and also road networks, can speed up the process, and by using time, reduce the casualties which is possible only when parameters are available for making geospatial data basis

Materials & Methods

The research method was applied in terms of the aim, and descriptive-exploratory in terms of conduct. The pivotal principles of this investigation is based on vulnerable points in order to countermeasure the earthquake hazards. The collection of data is accomplished through library noting and field survey. In this study, the evaluation criteria and their weights were determined with acceptable accuracy by reviewing the literature, experts and paired in the form of AHP. The AHP method is used in this study to determine the vulnerability of old fabrics of the central Boroujerd city. This consists of six parameters and indices which include population density, passages width, building material ages, quality and the number and finally the number of floors. Weighing such parameters is carried out with the help of Expert Choice 2000 software and the weights are logged in the GIS software and in an Arcmap environment. The

required analyses are observed on them. The area of this investigation is the old fabrics in downtown Boroojerd. The focus on this area is mainly due to old ages and the presence of significant historical places. The vulnerability factors are numerous, which are either natural, physical, social, economical, fundamental, rules and regulations, etc., but the most important boosting factors of the cities risk probabilities and their vulnerability enhancement can be summarized as Placement and locating of the city on various faults, Population concentration, failure to comply with retrofit rules and regulations, the lack of people's knowledge of local citizen in facing emergency conditions and unexpected crises.

Results & Discussion

The results of the research show that in order to find the most suitable pattern of intervention to countermeasure the vulnerability of old fabrics in the city downtown is to reduce the time laps after every local crisis like an earthquake, to reduce the effective factors by creating a spatial data basis for vulnerable buildings, congested population in buildings and a proper knowledge about the communication networks in the old fabrics to minimize the Consequences. Weighing of these parameter, are carried out with the help of Expert Choice 2000 software and the weights are logged in the GIS software and in an Arcmapenvironment. The required analyses are plotted and observed on them.

Conclusion

It is concluded that, in the southern, western and central parts of old fabrics in Boroojerd city, the relief operations and crisis management efforts should be extended and the precautionary measures and preparedness must be augmented. Several suggestions have been proposed in order to minimize the casualties and damages in case of any probable threats and crisis, which include the renovation and reconstruction of structures with high ages and the improvement along with strengthening the old fabrics and their reinforcement. It has also been concluded that the majority of buildings are suffering from low quality materials, high population density and the establishment of organic tissues and narrow alleys, which results in the rise of destruction and therefore, causes heavy losses of life and property.

Keywords: Earthquake, Old fabric, Vulnerability, Downtown Boroujerd, GIS software.