8th International Conference on Seismology & Earthquake Engineering
11-13 Nov. 2019, Tehran, Iran

DESIGN OF MASSIVE RESIDENTIAL BUILDINGS WITH THE APPROACH OF FLEXIBLE SPACES FOR POST-EARTHQUAKE SETTLEMENT: CASE STUDY KERMANSHAH CITY

Hooria NADERIAN
MSc. Student, Islamic Azad University (East Tehran Branch), Tehran, Iran
hooria.naderian@yahoo.com
Hossein EMAMJOMEH
Assistant Professor, Islamic Azad University (East Tehran Branch), Tehran, Iran
hossein.emamjomeh@gmail.com

Keywords: Emergency management, Temporary accommodation, Multipurpose container set, Kermanshah

Earthquake is one of the natural phenomenon in which the stored energy in the ground is evacuated and in the other words it acts like breathing of earth. Iran is located on one of the most seismic belts in the world while due to ordinary building materials in Iran, the weight of building constructions are large, so they are affected large seismic forces. Therefore, the seismic design of structures and retrofitting the existing structures are the most important issues in the Iran's construction industry. Previous earthquake disasters in Iran, like earthquakes in Roodbaar, Bam, and Kermanshah showed the importance of emergency management.

Crisis management is one of the critical sections of management before and after of any disaster like earthquake. At the macro level of the national management, it can play a significant role in reducing casualties, financial losses and even external threats. Crisis management is not even limited to the after earthquake's time, but also includes pre-earthquake periods such as public education, predictions to provide shelters, suitable housing in case of incident outreach ways, food forecast, first aid, etc. Therefore, one of the main tasks of crisis management organization is planning of emergency housing, temporary accommodation, and then permanent habitation of injured people due to the earthquake.

Based on social and cultural conditions, architecture, also available materials in the region, and common construction methods in the damaged areas, various methods for temporary accommodation have been proposed. Experiences of using these methods in previous earthquakes are available in the literature such as clad structures, temporary building structures, containers, etc. among all the methods. In this research, a new method using multipurpose containers is suggested for temporary accommodation after seismic disaster as a useful tool in crisis management. In this method, several proper locations are suggested for both urban and rural population centers with high potential seismic risk, and then based on the estimation of population affected by earthquake, enough containers should be prepared and design, so that having other usages before the crisis time such as educational centers, hostels, therapy units, startup hubs, seasonal exhibition, etc. Because of usage of these containers before crisis, the proposed method has logical economic benefits while government does not face a lack of temporary housing at the crisis time. As a practical example, based on the proposed method, a container set designed as a temporary accommodation for the one of the metropolitan areas in Kermanshah city of Iran in this research.

The six parameters include managerial, social, psychological, economic, architectural, structural and functional issues. This research has investigated the components extracted from the research literature in order to investigate the question and hypothesis research using AHP Analytical Method. Following the hierarchical analysis of these six variables, the following results by using a questionnaire from victim of earthquake and earthquake specialists in Kermanshah were obtained.

Crisis management issues with 33.9% are the most important of all other parameters. The next item that comes after management is performance issues with 23.8% being the next important parameter. Therefore, we should care about this parameter in our designing, which is related to the multi-use set. The next criterion is psychosocial issues, which ranks third with 17.6%. After earthquake mental issues is one of the concerns that that should be considered as important as

other issues that can play its role in relief of the injured. The next parameters are structural issues with 11.9% and architectural design with 4.9% which are respectively less important. Therefore, the goal of this set of flexibility is to make the most of both the crisis and non-crisis times.

Table 1. Final weight of the indices.

	Management Issues	**Functional Issues**	**Architectural Design**	**Economic Issues**	**Socio-psychological Issues**	**Structural Issues**	**Weight**
Management Issues	0.39	0.58	0.22	0.20	0.38	0.27	33.9%
Functional Issues	0.13	0.19	0.19	0.26	0.38	0.27	23.8%
Architectural Design	0.10	0.05	0.06	0.02	0.04	0.03	4.9%
Economic Issues	0.13	0.05	0.17	0.07	0.04	0.03	7.9%
Socio-psychological Issues	0.13	0.06	0.19	0.23	0.13	0.31	17.6%
Structural Issues	0.13	0.06	0.17	0.23	0.04	0.09	11.9%

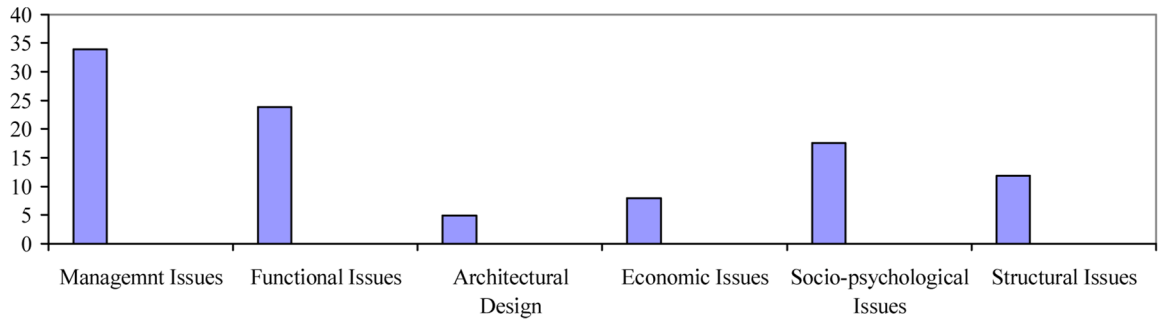

Figure 1. Weighting of each indicator.

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