

Zonation of civil defense spatial planning using Analytic Network Process (ANP) A Case Study of Tehran

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Extended abstract

Introduction

Over the past 3 decades, major wars have taken place in our country and the areas around it, including the 8-year imposed war by Iraq against Iran, the First and Second wars of the Persian Gulf (1991, 2003), the war of Afghanistan (2003), the 33-day war of Lebanon with the Zionist regime (2006), the 22-day, 8-day and 40-day wars of the Zionist regime against the people of Gaza, the war of the ISIS terrorist group against Syria over the past 7 years and against Iraq over the past 3 years, and the war in Yemen over the past 3 years. The war of Yemen and the fight against ISIS are still going on, and it has become more difficult to resolve these conflicts due to the formation of a controversial coalition led by the United States of America. Due to its prominent position in its geopolitical and anti-arrogance policy, the Islamic Republic of Iran has always been subjected to threats by the United States of America, the Zionist and other totalitarian regimes in recent years. The expedients and guidelines of the Supreme leader of revolution are based on strengthening all infrastructure of the country against the enemy's threats. In this regard, passive defense is considered as a complementary part for active or armed defense, which includes unarmed measures to increase deterrence and decrease vulnerability, sustaining vital activities, promoting national sustainability and favorable effectiveness of crisis management against threats and armed actions by the enemy. Civil Defense planning (Spatial organization) is a process which leads to the reduction of vulnerability and the increase of defensive reversibility, sustainability and tolerability against enemy's attacks through reorganizing and rearranging spatial elements of a city. This research examines the passive defense indices in land use, urban texture and structure by taking the passive defense principles and requirements into consideration and then, zones the metropolis of Tehran from the civil defense planning perspective in an analytical manner, specifies its vulnerable and secure areas and provides solutions to increase its defensive sustainability. In this regard, this research tries to zone different geographical regions of Tehran metropolis in the form of homogeneous classes based on their vulnerability conditions from the passive defense. For this purpose, 8 criteria were extracted after studying the literature and the history of the subject in the field of natural and man-made crisis management. Then, 48 indices or sub-criteria were determined, and classified under 8 predefined criteria in order to make these criteria measurable, based on accessible data. Afterward, using experts' opinions, the criteria and sub-criteria were weighed by ANP method through paired comparisons in the form of questionnaire and then adjusted and modified in the Super Decision software (in order to maintain inconsistency rate of the comparisons within the acceptable limits). In addition to that, each indicator was categorized into 5 classes of desirability in order to achieve a result with greater accuracy of comprehensiveness and more flexibility. Then, the maps related to each index

were produced by inserting the indices into ArcGIS 10.5 and applying them to the city domain. By integrating and combining the sub-criteria maps related to each criterion, the zoning map based on that specific criterion, and finally, by combining the maps of these 8 criteria, the ultimate zoning map of civil defense spatial organizing was generated qualitatively (in 5 desirability classes).

Materials & Methods

Since this research seeks to discover causal relationships between indices and their effects on the city, based on the basic sources of research method, it is an exploratory research which uses an analytical-descriptive method with an applied goal to study and interpret the data. This research uses both qualitative and quantitative procedures that means using quantitative methods along with qualitative approach in data analysis to facilitate classifications, calculations, and deductions. The study area involves all 22 regions of Tehran municipality. Regarding the collection of data and information, this research is a documentary study that uses Persian and English books and articles, related maps, internet portals and other documents. In addition, questionnaires and interviews with experts have been used. Finally, the integration and classification of the exploratory and documentary findings and research analyses are carried out using inferential statistics, then, research suggestions are presented. M.S. Excel, ArcGIS 10.5 and Super Decision were the software used to prepare tables, maps and to analyze data. Making use of the experts' opinions to weigh the indices, these indices were inserted into M.S. Excel the elimination of the scale differences and normalization as well. Then, they were categorized into 5 distinct classes of desirability. In order to obtain the final weight and priority of indices considering ANP method, their pairwise comparisons were inserted into Super Decision software. Finally, the results in ArcGIS 10.5 environment were assigned to different areas of Tehran metropolis, and the final zoning map of the defensive vulnerability was generated as a Likert spectrum based on 8 criteria and their 48 sub-criteria on 5 levels, through the combination and integration of the weighted indices layers.

Results & Discussion, Conclusion

According to the surveys, only 10% of the city of Tehran is in perfect, 27% is in moderate and appropriate, and about 63% is in completely inappropriate conditions.

These numbers represent the critical state of passive defense in this metropolis, a densely populated city which is the capital city of a sensitive country in the geopolitics of the region and still has a centralized management method and has a serious and urgent need for attention and reorganization in this regard. Therefore, suggestions and solutions are proposed to increase the defensive tolerability and reduce the damages and losses following the occurrence of a possible attack. Some of the results of the research are as follows:

- Providing the context to identify the vulnerable zones and to invest in order to increase their level of defensive tolerability.
- Making use of secure zones in order to locate temporary habitation sites at the time of a possible attack and to copy the patterns of their defensive space organization in future developments.
- Thinking of immediate measures to promote the level of defensive tolerability in inappropriate zones by building shelters, developing public safe havens, and developing permanent relief and rescue centers or temporary relief and rescue sites.
- Locating important, sensitive and vital uses with regard to the performed zoning and determining the security effects resulting from them on the surrounding areas.

Keywords: Spatial organizing, Civil defense, Passive defense, Zoning, ANP