Shirini M. et al.
April 2026
Urban Economics and Planning
Volume 7, Issue 1

Explaining the role and status of integrated urban management in crisis management with a passive defense approach in karaj metropolis

Mostafa Shirini[1], Hassan Ahmadzadeh[2*], Ali Panahi[2]

1. Ph.D. Candidate, Department of Geography and Urban Planning, Ta.C., Islamic Azad University, Tabriz, Iran
2. Associate Professor, Department of Geography and Urban Planning, Ta.C., Islamic Azad University, Tabriz, Iran

Original Article

Received: 2025/07/15
Revised: 2025/10/01
Accepted: 2025/10/04

HOW TO CITE THIS ARTICLE
Shirini M. Ahmadzadeh H. Panahi A. Explaining the role and status of integrated urban management in crisis management with a passive defense approach in karaj metropolis. *Urban Economics and Planning* 7(1):98-117.

DOI: 10.22034/uep.2025.534734.1668

Abstract

Due to rapid population growth, physical expansion, and infrastructure vulnerabilities, Karaj metropolis faces significant natural, environmental, and human-induced risks. Traditional urban management in Iran has proven insufficient in handling such crises, whereas governance models in developed countries emphasize the need for a comprehensive framework, specifically integrated urban management (IUM). This study aims to identify and assess key indicators of IUM that enhance urban resilience against crises by integrating passive defense components, providing an accurate assessment of current conditions and main challenges. This applied research employs a descriptive survey method for data collection. In the initial phase, relevant documents and academic sources were reviewed to identify core indicators and develop a theoretical framework. Data collected through questionnaires were analyzed using statistical and structural equation modeling techniques. The analyses were performed using SPSS, Smart PLS, and LISREL software to ensure accuracy and validity. Results indicate that Karaj's integrated urban and crisis management systems face structural and operational limitations. Weak institutional coordination and inefficient infrastructure undermine the city's resilience. The Friedman test and Interpretive Structural Modeling (ISM) show that quality of life, empowerment, and local and social participation are key factors. However, a lack of operational implementation and limited public involvement have resulted in a reactive crisis management approach, reducing the effectiveness of passive defense measures and the city's ability to withstand future crises.

Keywords

Crisis Management
Integrated Urban Management
Metropolis of Karaj
Passive Defense
Urban Resilience

* Corresponding Author: hassan.ahmadzadeh@iau.ac.ir

1. Introduction

Integrated urban management, as a comprehensive approach, helps coordinate urban resources and policies, significantly contributing to improved quality of life and environmental sustainability (Mohammadian et al, 2025). Given the challenges of population growth and climate change, this approach becomes increasingly important. Integrated urban management contributes to better decision-making, efficiency, and resilience of cities by promoting synergy between institutions and preventing parallel work. Iranian urban management is limited only to city administration, far from the concept of urban governance in European countries, which acts as a governing body in city affairs (Saeednia, 2001).

Urban management impacts all organizations within the city and requires a systemic view of issues. Integrated urban management and institutional coordination are essential for identifying threats while ensuring security and stability (Kummer, 2010). Nature has always threatened humans throughout history with destructive phenomena, including avalanches, floods, and earthquakes. With the development of societies and understanding of the causes of these events, humans have found ways to cope with and mitigate risks (Karamy, 2004). Statistics show that casualties and damages caused by environmental hazards have increased in recent decades, highlighting the imperative for access to safe facilities (Eelagh, 2024).

Iran is one of the most susceptible regions to natural disasters due to its geographical location and specific conditions. Poor management has made Iran one of the most vulnerable countries in the world (Ahmadi and Manoochehri, 2018: 24), and Alborz province and Karaj metropolis are no exception to this. Natural hazards can turn into natural disasters by negatively impacting society and infrastructure (Kiani Dehkiani, 2015). Given the unpredictable nature of natural disasters, urban crisis management requires comprehensive and long-term planning to reduce the destructive effects of natural disasters and control their negative impacts (Hetu et al, 2018: 18). Crisis management is of great importance, requiring the attention of officials and directly affecting the future and sustainability of the economic and social system (Tokakisa et al, 2019). The main objective of crisis management in Iran is to minimize crisis risk and evaluate the situation at various stages, including before, during, and after the incident (Manafi et al., 2018).

The number of crises has increased from 100 cases in 1975 to more than a thousand in recent years. The majority of victims are located in the metropolises of developing countries. Since the establishment of cities, paying attention to the passive defense of cities against natural and human threats has been crucial (Movahhedinia, 2009: 24). City managers take necessary measures to prevent crises (Zaboli, 2011: 23). The rapid growth of urban areas and the shift towards more urbanized environments present various natural, technological, and social challenges for cities (Mohammadi, 2016, p. 212).

Because of their geographical size and the concentration of facilities and human resources, cities are particularly vulnerable to natural, industrial, and human-made threats, which can interact and exacerbate (Mohhammadian et al, 2018: 70). Appropriate planning can play a fundamental role in risk management and reducing the vulnerability of cities to disasters (Parizadi et al, 2010: 191). Given the impossibility of accurately predicting events such as earthquakes, preventive measures, including improving structures, empowering crisis management, and strengthening social networks, are crucial in increasing resilience to earthquakes and mitigating the destructive effects in cities (Shabankare et al, 2025). Understanding the factors that contribute to reduced safety requires prevention, preparation, and protection of the human environment against crises (Zhou, 2011: 17). Also, preventive defensive measures and the need for passive defense against crises are essential (Movahhedinia, 2009: 2). Passive defense measures, with self-reliance measures, increase defense capacity and improve the ability to rebuild damaged areas (Lane, 2003: 263).

Rezek believes that the use of information and communication technology in managing mass casualty incidents has multifaceted effectiveness. These technologies include innovative triage protocols, aerial surveillance with drones, telehealth systems, and advanced training methods, which can help reduce complex challenges (Rezek, 2024). Mohammadian also believes that urban crisis management today requires modern digital tools, such as the metaverse, which can help urban managers as a virtual simulation technology. However, successful adoption of the metaverse requires training of managers, standardization of regulations, and government support (Mohammadian et al., 2025). Given the importance of city and citizen safety, urban passive defense should focus more on prevention and the idea

of invasion and establishing safety rather than relying solely on fortification of structures (Kamran et al., 2011: 5). Passive defense requirements should be observed in accordance with contemporary needs and future crisis planning. Studying the integration of Crisis Management Plans (CMP) in Poland, Wiśniewski has addressed the importance of quantifying the differences in crisis management plans for assessing public management readiness. The study demonstrates the importance of quantifying the differences in crisis management plans for assessing public management readiness (Wiśniewski, 2022).

It seems that the position and role of integrated urban management during widespread crises are not clearly defined and need further investigation, particularly in countries with weak infrastructure and management. As a dynamic and multidimensional process, crisis management necessitates the careful organization of resources, swift decision-making, and effective responses under uncertain conditions. Lack of coordination and coherence between relevant institutions during a crisis can exacerbate human, financial, and social losses. Passive defense, which encompasses preventive, reactive, and reconstructive measures, is crucial for reducing the vulnerability of cities to various threats. By focusing on preparedness, prevention, resilience, and post-crisis reconstruction, the passive defense approach can significantly enhance the effectiveness of countermeasures and urban response capacity when combined with integrated urban management.

The economic approach of this study focuses on reducing the costs of crisis and increasing the productivity of urban resources through the establishment of integrated urban management. By creating coordination between different institutions and integrating passive defense policies, we can minimize resource waste, rework, and post-crisis reconstruction costs, achieving the optimal allocation of urban capital. The main innovation of this article is the combination of three key areas: integrated urban management, crisis management, and passive defense, within a local analytical model for the Karaj metropolis. This model not only identifies essential indicators for each area but also offers a comprehensive and measurable framework, employing both qualitative methods (Delphi and content analysis) and quantitative methods (structural equation modeling). This framework can serve as a foundation for economic decision-making and urban policy development, aimed at reducing vulnerability and enhancing urban resilience.

The insufficient understanding of the systematic relationship among these three areas has hindered the effective utilization of their potential in crisis management. This issue becomes more evident when many cities lack integrated and coherent management frameworks during times of natural crises, such as earthquakes and floods, as well as human crises, including security threats. This gap results in fragmented responses, diminished effectiveness of passive defense policies, and the inability to rebuild damaged areas swiftly. A precise understanding of the connections between sustainable urban development, quality of life, urban services, social capital, and urban safety, as well as crisis management mechanisms and passive defense policies, is essential. Recognizing these links can create a solid foundation for preventive planning, designing resilient structures, and efficient crisis management, significantly enhancing a city's preparedness for unexpected crises.

In light of this, the present study examines the role of integrated urban management in crisis management, with a focus on a passive defense approach in the Karaj metropolis. It aims to identify key indicators within each of these areas and examine how they interact and influence one another.

2. Research Background

A review of urban management and crisis management in the Karaj metropolis reveals that overlapping responsibilities and inconsistency in service provision have caused numerous problems in the local management system. This metropolis requires effective crisis management due to the natural disaster threats, including earthquakes. Developed countries have achieved coordination in urban management through integrated and coordinated management, as well as a clear division of responsibilities. However, in Karaj, the absence of this integration has created problems, making it imperative to establish integrated urban management to eliminate obstacles and shortcomings in times of crisis. Limited studies have been conducted on the role of integrated urban management in crisis management, with a passive defense approach, as follows.

Foreign studies highlight that urban resilience and crisis management are promoted globally through the use of integrated approaches, new technologies, and civil society participation. Through a systematic literature review, Almulhim identified key factors for resilience in smart cities as inclusiveness, stakeholder collaboration, sustainability, governance, and public

consent, emphasizing that strategic planning and integrated urban systems require interdisciplinary and public participation (Almulhim, 2025). Jiang et al. underlined the integration of an emergency management framework into telecommunications regulations to address climate-related disasters. They identified gaps in financing and inter-sectoral coordination that necessitate strengthening infrastructure resilience and policy alignment (Jiang et al., 2025, 49). Nurdiyana highlighted the role of civic education in preparing urban communities for climate crises, showing that integrating disaster reduction strategies into educational programs can enhance resilience (Nurdiyana et al., 2025). Awan also demonstrated the significance of route prediction and infrastructure management in strengthening urban resilience through GIS in post-earthquake emergency response management in Turkey (Awan et al., 2024, 111). Eelagh examined the optimization model for post-earthquake emergency shelter allocation, emphasizing the need to use multi-criteria analysis and spatial data to enhance citizen safety (Eelagh, 2024). Rezek considered using ICT in mass disaster management to be effective and proposed tools such as drones, innovative triage, and telehealth systems as solutions to address complex challenges (Rezek, 2024). Chaudhary and Sardana examined the importance of an integrated disaster management approach, with stakeholders' participation and the use of technology, to mitigate the effects of disasters (Chaudhary and Sardana, 2023). Appanna and Managanvi introduced an integrated urban management framework for risk reduction and sustainable development, presenting five key components: risk assessment, stakeholders' coordination, participatory planning, capacity building, and continuous evaluation (Appanna and Managanvi, 2022). Wiśniewski highlighted the differences quantifying in crisis management plans to assess public preparedness (Wiśniewski, 2022). Fitriani underlined the role of crisis leadership and integrated urban management, with a passive defense approach, in urban areas (Fitriani, 2021). Wolf argued that crisis preparedness requires integrated collaborative management operations with documented protocols and methods (Wolf, 2021). Ziyodullaev recommended the optimal use of forces and facilities in crises, emphasizing the importance of a passive defense approach in urban management (Ziyodullaev et al., 2021). Gueben et al. proposed crisis management as an evolved socio-technical infrastructure (Gueben et al., 2020). Manafi introduced spatial data infrastructure as a basis for realizing integrated management in reducing the risk of potential crises (Manafi et al., 2018). Tadeusz emphasized the integrated crisis management model for large urban densities (Tadeusz et al, 2018). Additionally, examining earthquake crisis management preparedness in Taiwan, Chui et al. demonstrated that changing orientations through suitable tools can enhance responses (Chui et al., 2014).

In addition, domestic studies highlighted that integrated urban management and crisis management in Iran encounter numerous challenges, and various researchers have investigated solutions to improve urban resilience. Farhang designed a model for improving crisis management with a focus on the role of social media, identifying five main functions of media, including guiding public opinion, monitoring and surveillance of the environment, training, informing, and creating public solidarity, which can play an effective role in the country's crisis management (Farhang, 2025). Mohammadian et al. emphasized that effective urban crisis management today necessitates the use of modern digital tools and technologies. They noted that technologies such as the metaverse can aid managerial decision-making during a crisis. However, for successful adoption, it is essential to provide training for managers and to receive support from government institutions (Mohammadian et al., 2025). Shabankare et al., studying the city of Ahram, demonstrated that appropriate pre-crisis planning, institutional empowerment, strengthening social networks, and promoting physical and economic infrastructure lead to increased urban resilience (Shabankare et al., 2025). Additionally, Abdulmajed et al. developed a model for effective crisis management in organizations through organizational learning, identifying key factors in crisis management (Abdulmajed et al., 2024). Talebpour et al. revealed that the development of urban planning in accordance with urban management enhances the capability to cope with crises and rebuild afterwards (Talebpour et al., 2024). Mirzaei et al. developed a knowledge management model for crises, introducing variables such as knowledge transfer, sharing, production, and acquisition, as well as utilizing past experiences as important variables for effective crisis management (Mirzaei et al., 2023). Manafi emphasized the role of spatial information infrastructure in mitigating potential crisis risk, illustrating that the effective use of spatial data can facilitate decision-making before, during, and after the incident (Manafi

et al., 2021). Studying the city of Ardabil, Rashid Kolver argued that improved crisis management performance requires training, research, establishing inter-organizational communications, and investing in information infrastructures and decision-making support systems (Rashid Kolver, 2021). Talebpour and Mujahiddini demonstrated that integrated urban management plays a significant role in crisis management preparedness, inter-sectoral coordination, and the quality and speed of service provision (Talebpour and Mujahiddini, 2019). Bashiri demonstrated that passive defense and crisis management are interconnected areas that should be integrated into a strategic urban planning model to reduce vulnerability and enhance resilience (Bashiri, 2019). Amanpour et al. revealed that a considerable portion of land use in the Ahvaz metropolis is at risk due to heavy and semi-heavy industries, highlighting the need for comprehensive and practical planning (Amanpour et al., 2018). Karimi Shirazi and his colleagues identified the lack of coordination among crisis management headquarters as a key factor contributing to the inefficiency of crisis management. They suggested that implementing comprehensive urban security strategies could be beneficial (Karimi Shirazi et al., 2014). Nazarian and Rahimi analyzed the management model in Tehran, demonstrating that effective urban management directly relates to addressing urban issues (Nazarian and Rahimi, 2011). A review of both domestic and international studies reveals that no comprehensive research has been conducted to explore the role and significance of integrated urban management in crisis management, particularly from a passive defense perspective, within the Karaj metropolis.

2.1. Introduction to the Study Area

The Karaj metropolis, the capital of Alborz Province, is situated in the northwestern part of Iran, on the southern slopes of the Alborz Mountains, approximately 36 kilometers from Tehran. As one of the country's major metropolitan areas, Karaj plays a vital role in the economic, social, and cultural development of the region. Karaj's geographical location near Tehran has turned it into one of the most populous and immigrant-friendly regions in Iran. According to an unofficial estimate for 1404, its population is over 2 million people, making Karaj the fourth most populated city in Iran. These characteristics give Karaj significant importance in various management areas, particularly in crisis management and passive defense.

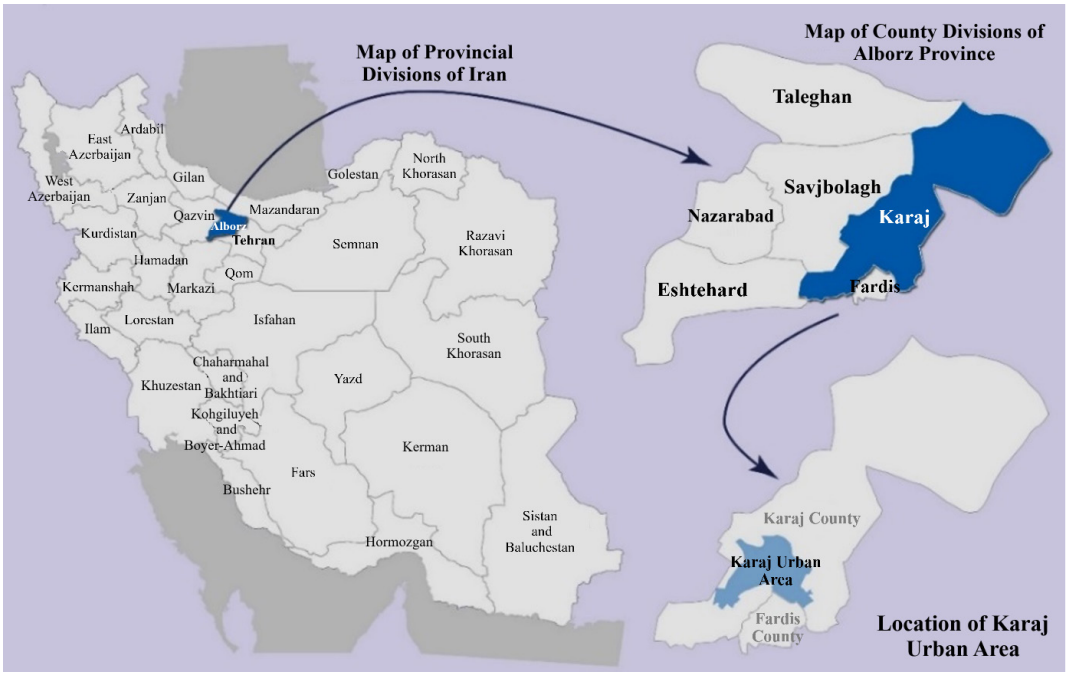

Figure 1. Geographical location of alborz province and the city of karaj

2.2. Faults and earthquakes in Karaj

According to official statistics, more than 700 hectares of Karaj are located in dilapidated textures, more evident in Islamabad, Akhtarabad, Sohrabieh, Khat Chahar Hesar, Qalamestan, and other neighborhoods. The lack of renovation and strengthening of buildings against earthquakes increases the risk of severe accidents. In terms of geomorphology and morphology, Karaj is situated in the central Alborz range, on numerous northwest-southeast and west-east faults, and its land is not integrated and solid. According to the Geological and Geophysical Organization, Karaj city is located in an earthquake-prone zone with an estimated intensity of 7 on the Richter scale.

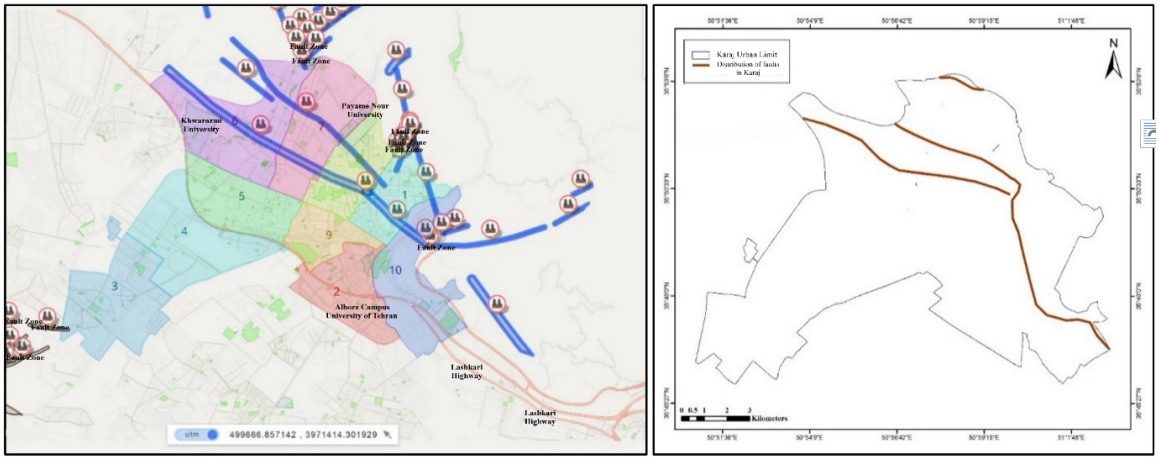

Figure 2. Distribution of the main faults of karaj

The most important faults that have put Karaj city at risk and the earthquake records in Karaj and its surroundings include:

- The North Tehran fault, in an east-west direction, passes north of Karaj city and connects with the Baghestan fault approximately fifteen kilometers near Kordan. A branch of this thrust extends in a northwest-southeast direction for about fourteen kilometers, but its effects are not visible beyond the Kordan River. From the village of Chandar, the direction of this fault shifts westward and continues towards the Hashtgerd region.
- The Baghestan fault is an extension of the Vardij-Pourgan fault. This thrust fault initially runs in an east-west direction. After about 5.7 kilometers, it branches off into other segments that follow a southeast-northwest direction, continuing for approximately ten kilometers.
- The Eshtehard fault also runs in an east-west direction and spans roughly 35 kilometers in length.
- The South Gorgan Fault and the Jaro Fault run in an east-west direction and slope towards the north.
- The Kazemabad Fault is situated two kilometers east of Kalak, north of the Karaj-Tehran Highway, and extends in the northwest and southeast directions.
- The Mahdasht-Karaj Fault
- Between these main faults, numerous small and local vertical or inclined faults cover much of the land in the city of Karaj. Hundreds of thousands of housing buildings are constructed on these fractured lands.

The fundamental faults and hidden seismic trends in the Tehran and Karaj areas, along with the potential for destructive earthquakes along these fault lines, underscore the importance of paying special attention to this zone, which has a high risk of earthquakes. Although most of the main faults are located in the northern Alborz and Karaj, the southern part of Karaj is also particularly vulnerable due to the high density of housing and population, insufficient open space for emergency relief, non-resistant buildings, elevated groundwater levels in some areas, the granular nature of the soil, and the alluvial composition of the sediments.

2.3. Vulnerable areas of Karaj city

By reviewing existing maps and considering threat scenarios, types of threats, risk exposure of different parts of Karaj metropolis, and importance and priority, the vulnerable areas of Karaj city are as follows:

a) Areas of population and texture density
b) Areas adjacent to faults and dilapidated textures
c) Areas around bridges and river banks
d) Areas around fuel stations, facilities, and urban infrastructure (electricity, water, gas, etc.)

e) Areas of access to communication networks
f) Areas with high vulnerability in Karaj city: In 1401, a research was conducted to identify the appropriate location for a crisis management center using GIS, and a map of areas with high vulnerability risk in Karaj metropolis was identified (Nasiri et al., 2023).

Figure 3. Population density (right), distribution of residential uses (middle), and dilapidated textures (left)

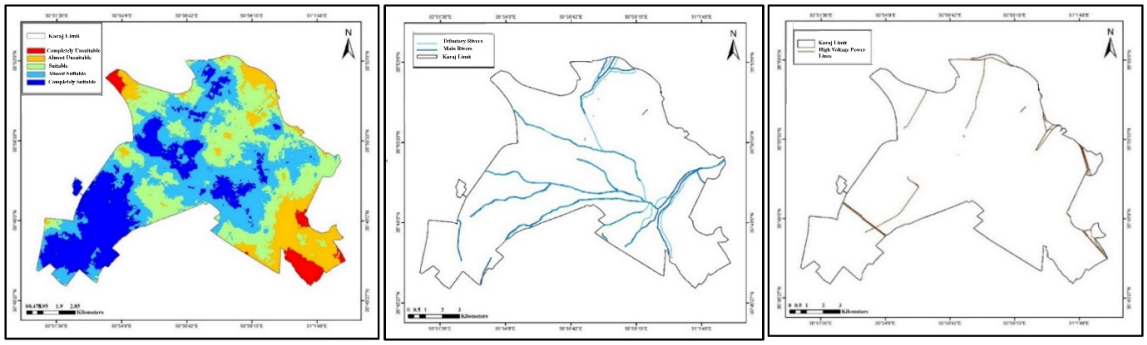

Figure 4. High voltage power line routes (right), river distribution (middle), and high to low vulnerability areas for establishing the central crisis management support base in karaj (left)

Additionally, by combining the maps of vulnerable areas, one can take a closer look at the overlap of risk layers with faults and the Karaj River, as well as dilapidated textures.

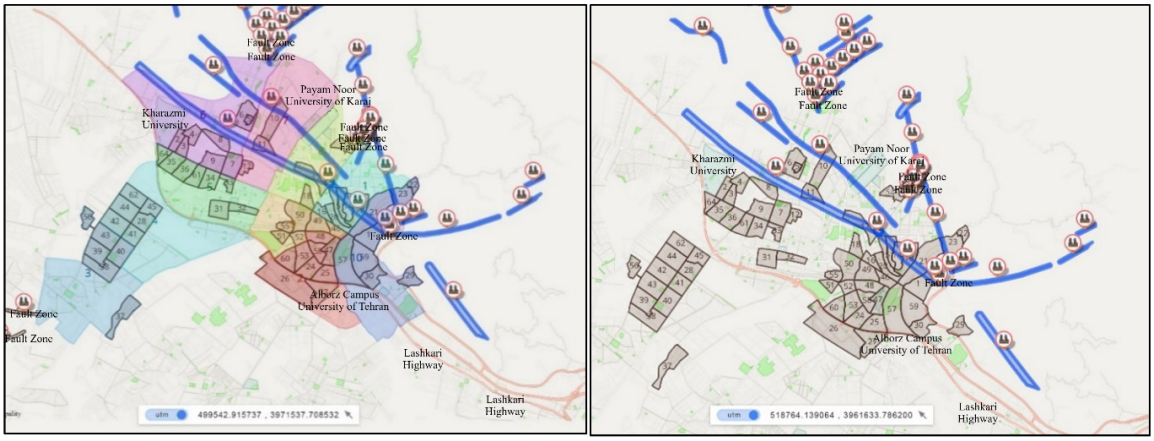

Figure 5. Overlap map of the dilapidated neighborhood layer with the faults in karaj (Karaj Municipality ICT Organization, 2024)

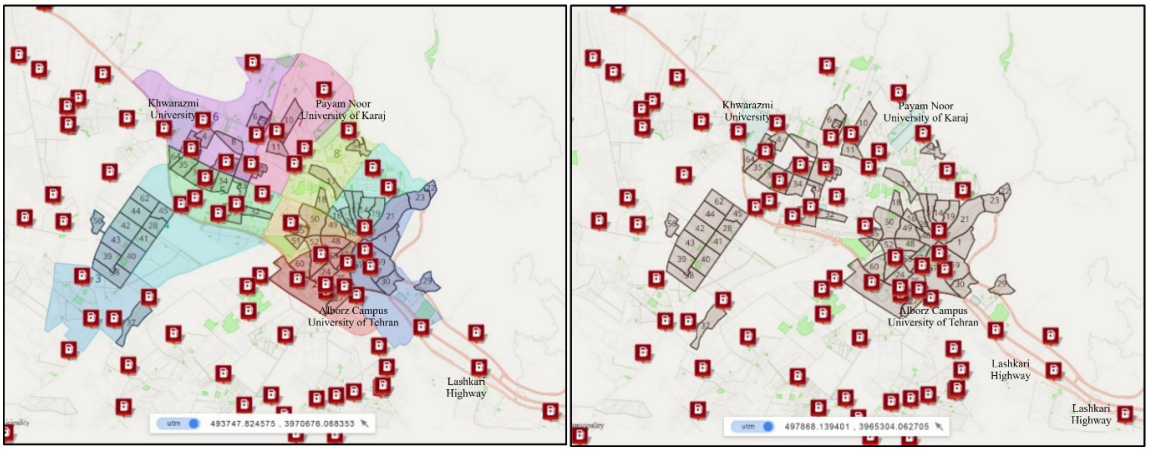

Figure 6. Overlay map of the dilapidated neighborhoods layer with the gas stations in karaj (Karaj Municipality ICT Organization, 2024)

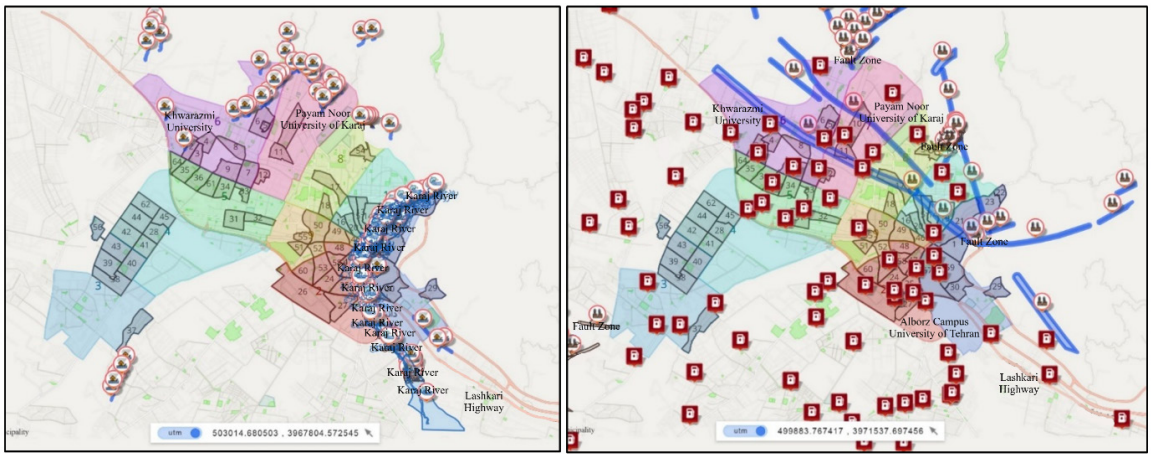

Figure 7. Overlap map of the fuel stations layer with the dilapidated neighborhoods and faults of karaj (right), overlap map of the dilapidated neighborhoods layer with the rivers and streams of karaj (left) (Karaj Municipality ICT Organization, 2024)

3. Materials and Methods

The present study is an applied research with a descriptive survey methodology. It initially reviews various aspects and topics related to the subject, as well as similar previous studies. The research then follows up with field studies to clarify the model associated with the research title and objectives. According to the four methods of theorizing (expanding or improving existing theories, comparing different theoretical perspectives, examining a specific phenomenon using various theoretical perspectives, and finally examining a documented and repeated phenomenon in a new environment and conditions), the present study falls into the fourth group. The statistical population of the study consisted of academic experts and senior managers in urban management, crisis management and passive defense of Karaj, the Red Crescent Organization of Alborz Province, and the General Directorate of Crisis Management of Alborz Governorate. To determine the sample size, the number 384 was obtained using the Cochran formula with an unlimited statistical population size. For greater certainty, 400 questionnaires were distributed using a random cluster sampling method, of which 387 were collected correctly to perform the final analysis.

This study employed a sequential exploratory mixed approach (qualitative-quantitative). The research stages are as follows:

1) Qualitative (exploratory) stage:

Objective: Identifying indicators of integrated urban management, crisis management, and passive defense appropriate to the conditions of Karaj.

Tool: Semi-structured interviews with 10 experts selected from among crisis managers, passive defense officials, and university faculty members (experts

selected using snowball sampling). The data collection process continued until theoretical saturation was reached, when no new points emerged in the final interviews.

Analysis: Open, axial, and selective coding with MAXQDA software and using a two-stage Delphi technique to refine the indicators.

Reliability and validity: Based on the Lincoln and Guba method (transferability, validity, reliability, and confirmability). The agreement rate between the coders was higher than 70 percent.

2) Quantitative stage (confirmation):

Objective: Validation of extracted indicators and measurement of relationships between structures.

Statistical population: Managers and experts in organizations related to urban and crisis management in Karaj metropolis.

Sample size: 387 people based on the Cochran formula; stratified random sampling.

Instrument: Closed questionnaire based on qualitative stage indicators. The questionnaire consisted of three main sections: integrated urban management, crisis management, and passive defense, using a five-point Likert scale.

Data analysis: Kolmogorov-Smirnov normality test, confirmatory factor analysis, and structural equation modeling with SPSS and Smart PLS software.

3) Model validation:

Calculation of Cronbach's alpha and composite reliability (CR), convergent validity (AVE), divergent validity (Fornell-Larker), and overall fit index (GOF).

In this study, rather than concentrating exclusively on broad and abstract concepts, such as integrated urban management, crisis management, and passive defense, we identified and operationally defined key measurable variables. We then assessed the functional relationships between these variables in the context of the Karaj metropolitan area, to ensure that the results are reliable and practical.

4. Findings

In the descriptive statistics section, the demographic and main research variables (individuals' education, age, and gender) in the statistical sample were described and analyzed using descriptive statistics. Education data indicated that, out of a statistical sample of 387 individuals, 7 hold a diploma, 11 hold a post-diploma, 197 have a bachelor's degree, 138 have a master's degree, and 34 hold a doctorate. Additionally, 64 percent of the participants belonged to the youth age group, 64 percent were male, and 36 percent were female.

4.1. Qualitative analysis

Findings from experts' interviews

In the second part of the quantitative analysis, the initial constructs extracted from the sources were provided to the experts to collect their opinions. The results of interviews with 10 experts were collected, the dimensions and indicators of the research were identified, and the content of the interviews was analyzed.

Delphi technique for refining integrated urban management constructs

To refine integrated urban management constructs, the study was divided into two stages: In the first stage, the dimensions of integrated urban management were gathered through the review of documents and literature. In the second stage, relevant dimensions and indicators were clarified using qualitative research methods and interviews. The study employed a descriptive and qualitative approach, utilizing interviews to elaborate on the appropriate dimensions and indicators. Additionally, SPSS statistical software was used to analyze the data through various techniques. The results for explaining the indicators and criteria of integrated urban management in the first stage were obtained from the output of the T-Student and Friedman test as follows: All indicators were confirmed, except for the four indicators of judgment, reaction, tourism, and employment, whose probability was greater than 0.05 and were discarded.

Delphi technique for refining crisis management structures

Two methods of literature collection and qualitative research were also used to refine crisis management constructs. Also, the Delphi technique was used in two stages to examine crisis management constructs.

In the first stage, the output of the T-Student and the Friedman test was calculated for the questionnaire. All constructs were confirmed with means above 4 and significance values of 0.000. The constructs included team building, justification strategies, decision-making, and empowerment of local communities. The means and standard deviations indicated the stability of the responses. Some constructs, such as the early warning system and the use of new technologies, achieved the highest scores. The results of the Delphi analysis and Friedman test confirmed the indicators, signifying their importance in multifaceted crisis management. The output of the Kendall test also demonstrated the same rank of crisis management

variables in the second Delphi round.

Content analysis technique to identify indicators of the passive defense approach

Content analysis was used to identify indicators of a passive defense approach. The findings were analyzed qualitatively, and model variables were extracted from the interviews, and their relationships were determined. The validity of the research was confirmed using the Lincoln and Guba method, which includes four elements: transferability, validity, reliability, and confirmability. Additionally, reliability was assessed through coding the interviews by two individuals who were not involved in the subject matter, resulting in an agreement rate of over 70%, which indicated an acceptable level of reliability.

Results of the Indicators Coding

In this stage, after extracting information, the qualitative findings were analyzed using the content analysis method to provide an integrated and systematic interpretation with a new approach. The identified codes were grouped into categories based on similar concepts. The table of codes and categories of research variables on integrated urban management included various themes, including sustainable economy and innovation, urban management and governance, participation and social capital, quality of life and social services, environment and urban sustainability, smart and sustainable infrastructure, crisis management and urban safety, and urban culture and communication. By combining these indicators, new themes emerged, including economic development and sustainable urban management, quality of life and environment, and community and urban safety culture.

Figure 8. Network of integrated urban management themes

The analysis of the table outlining the codes and categories of crisis management indicators revealed several themes. The newly identified codes pertained to the integration of these indicators, which included: team management and collaboration, decision-making and stress management, resilience and post-crisis recovery, local empowerment and participation, education and learning culture, as well as emotion management and psychological safety.

Figure 9. Network of crisis management themes

These categories focused on essential components and the ongoing monitoring in crisis management. By integrating these indicators, key themes emerged, including crisis management and inter-institutional cooperation, crisis response and resilience, and local empowerment and participation in managing crises.

By combining the indicators from the passive defense approach, several new codes were extracted, including preparedness and prevention in passive defense, crisis coping and response, post-crisis reconstruction and recovery, sustainable development and security, social participation and culture-building, enhancing resilience and security, as well as strengthening coordination and cooperation. Integrating these indicators led to the identification of three main themes: preparedness, prevention, and policy-making in passive defense; post-crisis reconstruction, recovery, and resilience; and social participation, culture-building, and cooperation. Throughout the analysis process, experts consistently reviewed and re-coded the extracted data.

Figure 10. Network of passive defense approach themes

Theoretical saturation

In the qualitative section, the data collection process continued until theoretical saturation was reached. This means that after conducting semi-structured interviews with selected experts through snowball sampling, no new concepts or indicators emerged during the final two interviews, and the identified themes began to repeat. Consequently, the researcher confirmed that the data were sufficiently rich and that adding a new participant would not yield any new codes or categories. Therefore, theoretical saturation was achieved, and the qualitative content analysis phase commenced.

Although this study aimed to assess the status of integrated urban management through quantification and numerical indicators, integrated urban management is a complex concept that requires the identification of key indicators, the determination of measurement criteria, and their validation before any quantitative measurement. Therefore, the numbers and values presented can only indicate general trends and do not provide an accurate or comprehensive representation of the actual state of integrated urban management.

4.2. Quantitative analysis

In this part of the research, confirmatory factor analysis was used to examine the validity of the obtained indicators and the constructs:

A) Measurement model of integrated urban management

The graphs in Figure 11 (model of integrated urban management dimensions in both standard and significant modes) confirm the membership of all the factors examined in this variable.

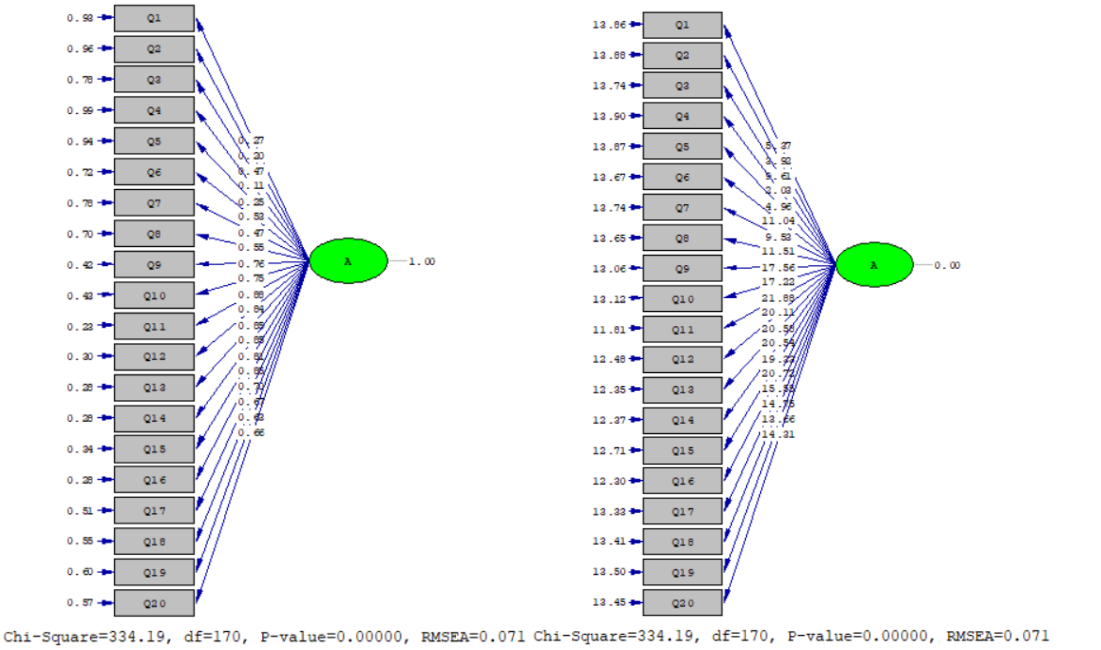

Figure 11. Measurement model of integrated urban management dimensions in standard mode (right) and in significant mode (left)

B) Measurement model of crisis management

The graphs in Figure 12 (model of crisis management dimensions in both standard and significant modes) confirm the membership of all the factors examined in this variable.

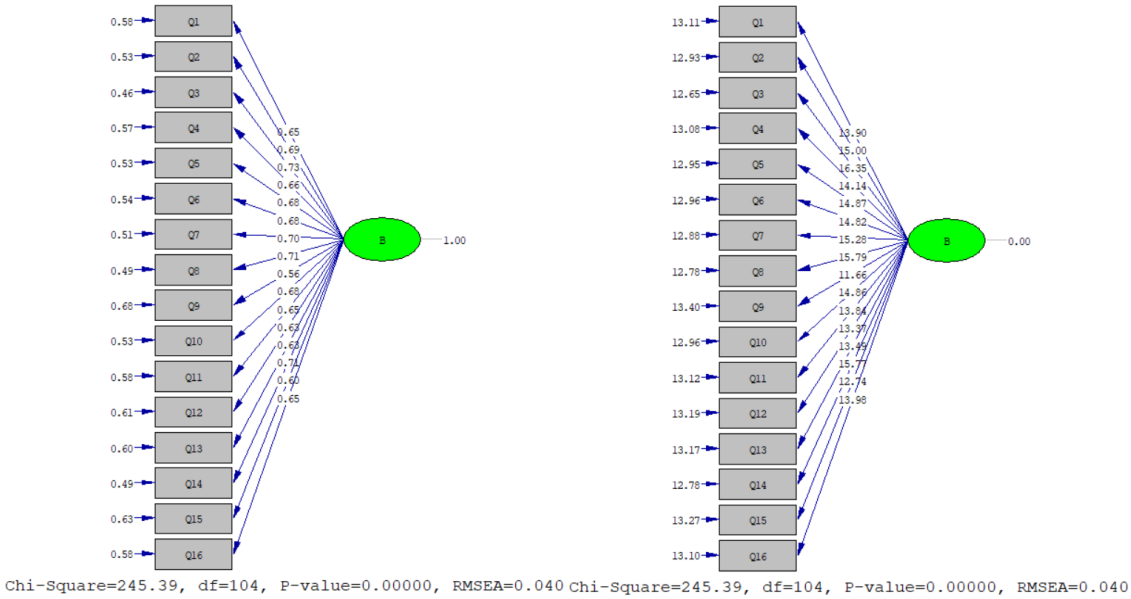

Figure 12. Measurement model of crisis management dimensions in standard mode (right) and in significant mode (left)

C) Measurement model with passive defense approach

The graphs in Figure 13 (model of passive defense dimensions in both standard and significant modes) confirm the membership of all the factors examined in this variable.

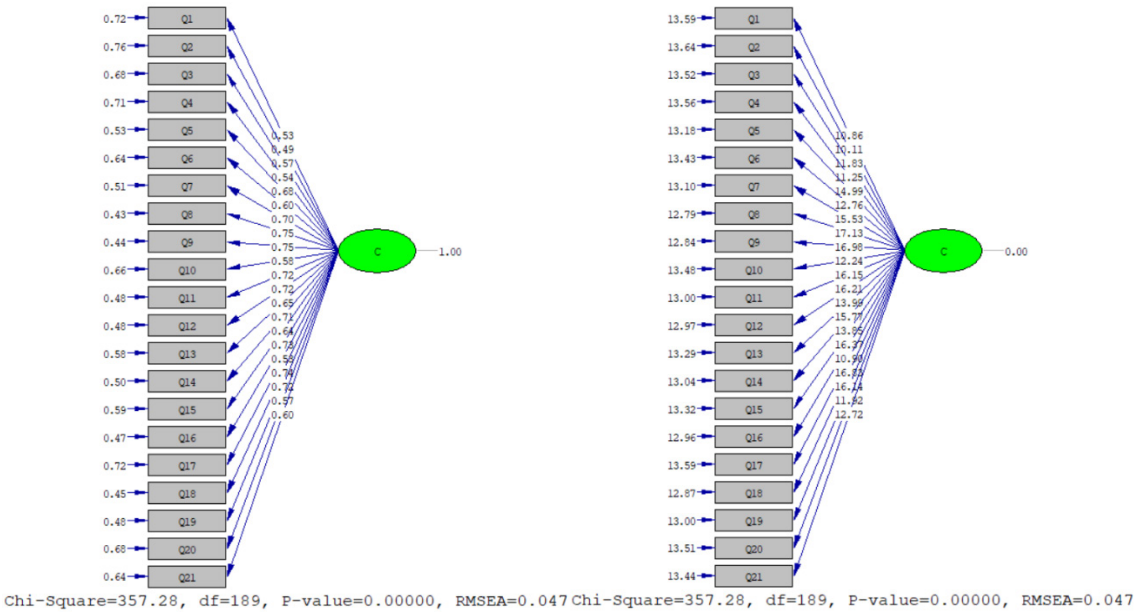

Figure 13. Dimensions measurement model with passive defense approach in standard mode (right) and in significant mode (left)

The results of the t-statistic (more than 1.96) and the significance level (less than the 0.05 error level) between the items and the latent variables confirmed the significance of the relationships between the items and their corresponding variables. The factor loading values for all the questions in the questionnaire were more than 0.4, indicating the reliability of the model. Therefore, there was no need to remove any items from the model. The confirmatory factor analysis conducted during the inferential analysis indicated that the model demonstrated a good fit. The desired indicators achieved suitable values. The RMSEA indicator was less than 8 percent; the index was less than 3; and the GFH, CFL, IFI, and NNFI indicators were all higher than 90. The T-value of the significant coefficients of each variable was also greater than 2 and less than -2. This means that the model accurately reflects real data and observations, demonstrating strong capabilities in describing and predicting phenomena. In other words, it effectively identifies and reproduces the patterns and relationships present in the data.

Interpretive Structural Analysis

Drawing on a literature review, extraction from official documents, qualitative content analysis, and validation by experts, the indicators used in the ISM analysis were designed. Following this, their hierarchical structure was determined using the ISM method. As a result, nine main indicators were identified. The main themes were as follows: economic development and sustainable urban management (N1); quality of life, environment, and urban services (N2); community, culture, and urban safety (N3); crisis management and inter-institutional cooperation (N4); crisis response and resilience (N5); local empowerment and participation in crisis management (N6); preparedness, prevention, and policymaking in passive defense (N7); reconstruction, recovery, and post-crisis resilience (N8); and social participation, culture-building, and cooperation (N9). Next, using the interpretive structural modeling (ISM) method, the influencing and influenced levels of the factors were examined. In the first step, the structural self-interaction matrix in the research was formed based on the opinions of experts, and the relationships between the criteria were determined through pairwise comparisons. In the second step, the initial achievement matrix was formed by converting the structural self-interaction matrix into a two-value matrix (0-1).

Table 1. Structural self-interaction matrix (left) and initial achievement matrix (right)

	N1	N2	N3	N4	N5	N6	N7	N8	N9
N1		A	V	O	A	A	A	A	X
N2			A	O	X	O	A	V	O
N3				V	V	O	A	V	O
N4					A	O	A	O	O
N5						A	A	O	O
N6							V	O	V
N7								A	V
N8									V
N9									

	N1	N2	N3	N4	N5	N6	N7	N8	N9
N1	۰	۰	۱	۰	۰	۰	۰	۰	۱
N2	۱	۰	۰	۰	۱	۰	۰	۱	۰
N3	۰	۱	۰	۱	۱	۰	۰	۱	۰
N4	۰	۰	۰	۰	۰	۰	۰	۰	۰
N5	۱	۱	۰	۱	۰	۰	۰	۰	۰
N6	۱	۰	۰	۰	۱	۰	۱	۰	۱
N7	۱	۱	۱	۱	۱	۰	۰	۰	۱
N8	۱	۰	۰	۰	۰	۰	۱	۰	۱
N9	۱	۰	۰	۰	۰	۰	۰	۰	۰

After generating the initial matrix, the consistency between the variables must be observed; otherwise, the matrix is modified, and new relationships are added. In Table 2, the cells marked with "*" represent the relationships created in the adjusted matrix.

Table 2. Adjusted initial achievement matrix

	N1	N2	N3	N4	N5	N6	N7	N8	N9	Influence
N1	1*	1*	1	1*	1*	0	0	1*	1	13
N2	1	1*	1*	1*	1	0	1*	1	1*	15
N3	1*	1	1*	1	1	1*	1*	1	1*	16
N4	1*	1*	1*	1*	1*	1*	1*	1*	1*	15
N5	1	1	1*	1	1*	0	1*	1*	1*	15
N6	1	1*	1*	1*	1	1*	1	1*	1	16
N7	1	1	1	1	1	0	1*	1*	1	15
N8	1	1*	1*	1*	1*	0	1	1*	1	15
N9	1	1*	1*	0	1*	1*	1*	1*	1*	15
Dependency	15	15	14	15	15	9	12	14	16	

At this stage, the input and output criteria were calculated. Common factors were identified. Their rows and columns were removed from the table, and the operation was repeated on the other criteria.

Table 3. Research criteria

Criterion	Output	Input	Communality
N1	N1-N2-N3-N4-N5-N8	N1-N2-N3-N4-N5-N6-N7-N8	- N1-N2-N3-N4-N5-N8
N2	N1-N2-N3-N4-N5-N7-N8	N1-N2-N3-N4-N5-N6-N7-N8	N1-N2-N3-N4-N5-N7-N8
N3	N1-N2-N3-N4-N5-N6-N7	N1-N2-N3-N4-N5-N6-N7-N8	N1-N2-N3-N4-N5-N6-N7
N4	N1-N2-N3-N4-N5-N6-N7	N1-N2-N3-N4-N5-N6-N7-N8	N1-N2-N3-N4-N5-N6-N7-N8
N5	N1-N2-N3-N4-N5-N7-N8	N1-N2-N3-N4-N5-N6-N7-N8	N1-N2-N3-N4-N5-N7-N8
N6	N1-N2-N3-N4-N5-N6-N7	- N3-N4-N6	- N3-N4-N6
N7	N1-N2-N3-N4-N5-N7-N8	N2-N3-N4-N5-N6-N7-N8	N2-N3-N4-N5-N7-N8
N8	N1-N2-N3-N4-N5-N7	N1-N2-N3-N4-N5-N6-N7	N1-N2-N3-N4-N5-N7-N8
N9	N1-N2-N4-N5-N6	N1-N2-N3-N4-N5-N6-N7	N1-N2-N4-N5-N6

Finally, the ISM interaction network was mapped using the obtained levels of criteria and variable relationships.

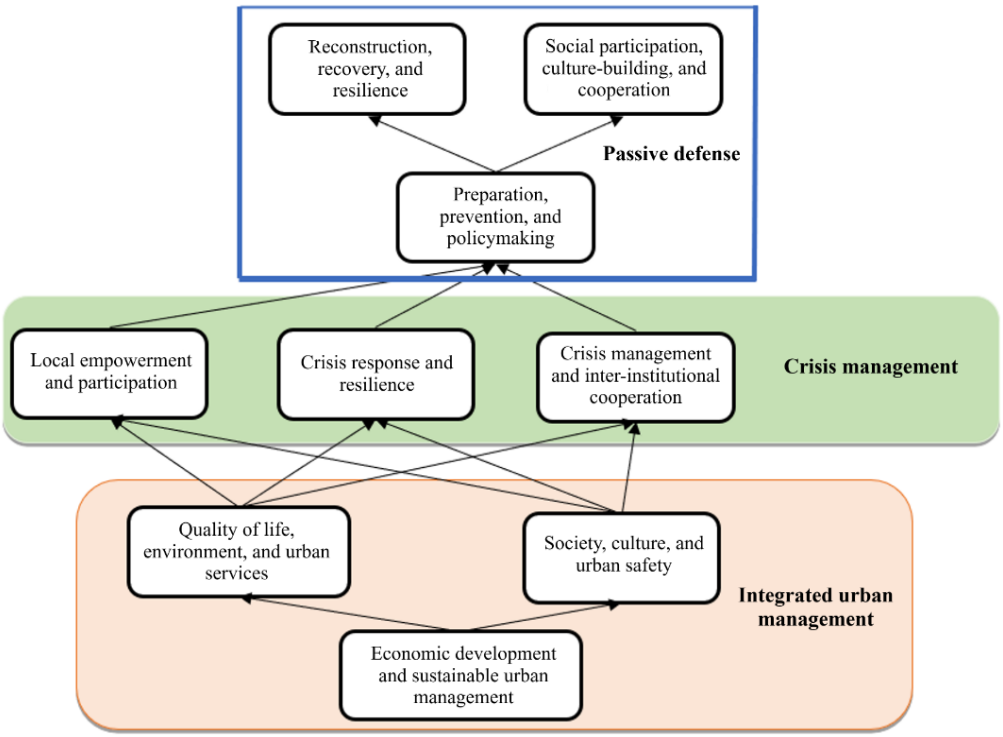

Figure 14. ISM research model (final research model)

Structural Equation Modeling

Structural equation modeling, using PLS software, was implemented to test the theoretical model and calculate the coefficients. After determining the measurement models, the research model was evaluated using structural equation modeling, and the results were demonstrated as graphs.

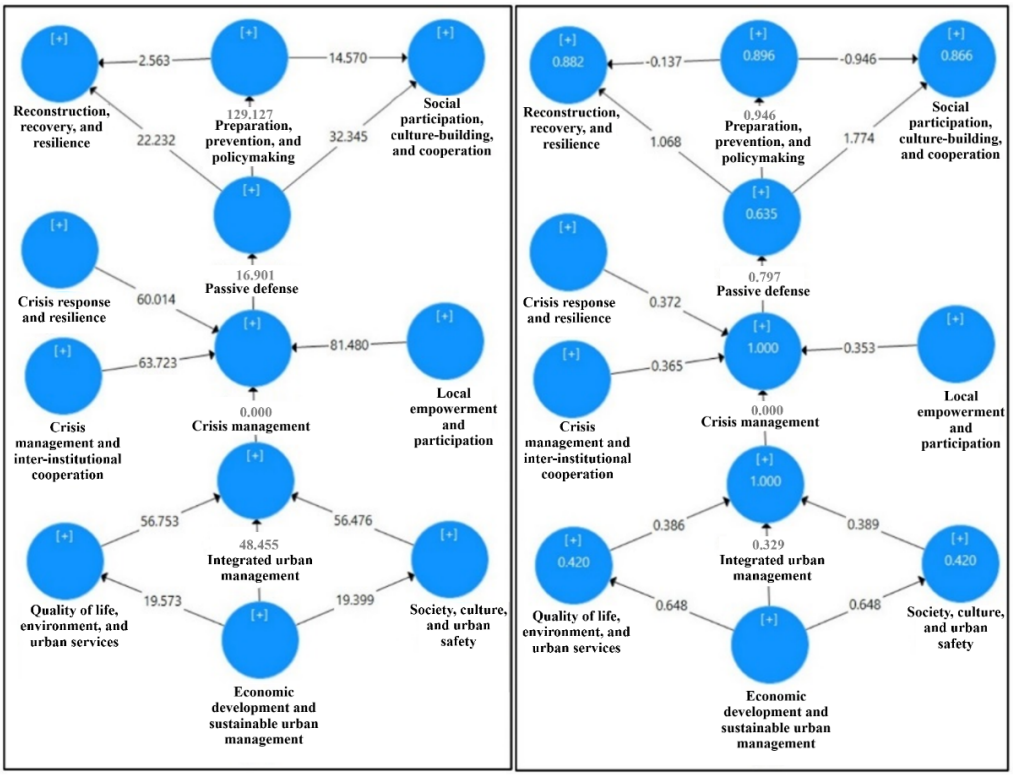

Figure 15. Overall model measurement in standard mode (right) and in significant mode (left)

Model validation test

Cronbach's alpha and composite reliability, convergent validity, and the GOF indicator were used to measure reliability, validity, and model fit, respectively.

1. Model reliability test: In the PLS algorithm, after measuring the factor loadings, composite reliability and Cronbach's alpha should be calculated. Cronbach's alpha increases with increasing correlation of questions and decreases with increasing variance. The closer the Cronbach's alpha is to 1, the greater the internal correlation between questions and, as a result, the more homogeneous the questions will be. Additionally, to examine the internal consistency of the measurement model in the PLS method, a more modern criterion, composite reliability (CR), can be employed. According to the results of these two criteria in Table 4, the value of Cronbach's alpha coefficient and composite reliability of variables were acceptable for all constructs.

Table 4. Results of cronbach's alpha and composite reliability coefficients

Research variables	Cronbach's Alpha (Alpha >0.7)	Composite Reliability (CR>0.7)
Integrated urban management	0.842	0.868
Crisis management	0.789	0.873
Passive defense	0.873	0.902

2. Model validity test: High correlation of test scores measuring the same characteristic indicates convergent validity. In PLS modeling, the construct should have the most common variance with its indicators. Using the average variance extracted (AVE) for evaluation is valid, and values of 0.5 and above are desirable, meaning that the construct in question explains about 50 percent or more of the variance of its indicators. Also, to confirm convergent validity, CR should be greater than AVE.

Considering that all variables had an average variance extracted (AVE) above 0.5 and CR>AVE, the research model had appropriate convergent validity.

Table 5. Results of the convergent validity test with ave

Variables	AVE	CR	CR>AVE
Integrated urban management	0.698	0.867	OK
Crisis management	0.718	0.925	OK
Passive defense	0.764	0.917	OK

3. Fornell-Larker test: Low correlation of tests indicates discriminant validity, also known as divergent validity. Divergent validity is a complement to convergent validity, measuring the degree of differentiation of latent variables through the Fornell-Larker test.

The results showed that the AVE square root of the latent variables was greater than the correlation between them. Therefore, latent variables had more interaction with their questions, and their divergent validity was appropriate.

Table 6. Divergent validity results using the fornell-larker method

Variables	Integrated Urban Management	Crisis Management	Passive Defense
Integrated Urban Management	0.816		
Crisis Management	0.569	0.654	
Passive Defense	0.387	0.482	0.754

4. Model fit assessment: After evaluating the measurement and structural models, the overall model (the sum of measurement and structural models) should be examined using the GOF indicator. This indicator is obtained from the geometric mean of communalities and the t-coefficient. The closer this index is to one, the higher the quality of the model.

According to the results, the GOF criterion was 0.513, indicating a strong fit of the model.

Table 7. Results of the overall model fit with gof

R^2	Communality	GOF
0.508	0.519	$\sqrt{0.519 \times 0.508} = 0.513$

5. Discussion and Conclusion

Integrated urban management, crisis management, and passive defense are crucial for increasing resilience and reducing the community's vulnerability to crises. Comprehensive approaches in urban management, improved policymaking through public participation and social capital, inter-institutional cooperation, and safe infrastructure are vital for reducing vulnerabilities. The findings of this study demonstrate that coordination among urban institutions is essential to minimize the impacts of crises, aligning with the work of Wiśniewski (2022) in Poland and Talebpour and Mojtahedi (2019) in Tehran, who highlighted the need for an integrated structure and unified management to boost crisis preparedness. However, unlike some international studies (such as Awan et al., 2024), which focus mainly on technological solutions like GIS and early warning systems, this study found that the primary challenge in the Karaj metropolis is not technology but institutional incoherence and the absence of an integrated decision-making process. This reflects Iran's local conditions, which necessitate reforming the governance structure and strengthening passive defenses for efficient crisis management. The results from analyses using SPSS and Smart PLS on the collected questionnaires not only extend theoretical understanding but also offer specific technical and scientific insights for urban crisis management in Karaj. First, the indicators across "integrated urban management," "crisis management," and "passive defense" were converted into a measurable model using structural equation modeling and the ISM technique, which is applicable as a decision-making tool for the Karaj Municipality and the Crisis Management Headquarters. This model suggests that "local empowerment and participation," "quality of life and urban services," and "social participation and culture-building" have the greatest impact on reducing crisis risks; therefore, planners can focus resources on these areas. Second, integrating spatial data—such as maps of faults, rivers, and dilapidated textures—with qualitative results enabled the simulation of critical points and prioritization of resilience projects, representing a key technical achievement. Third, statistical tests (AVE, CR, and GOF) confirmed the scientific validity of the model and support the development of indigenous crisis management frameworks across other Iranian metropolises. Thus, this research moves beyond a literature review to present a validated, practical, and locally relevant model that can serve as a foundation for technical policy-making and decision-making in crisis management and passive defense.

5.1. Conclusion based on qualitative analysis, Friedman test, and interpretive structural analysis - Karaj metropolis

The research findings demonstrated that a set of challenges and capacities impact crisis management in the Karaj metropolis. We can identify priorities and hierarchical relationships between indicators using qualitative analysis, Friedman's nonparametric test, and interpretive structural analysis (ISM). This analytical combination enabled the presentation of the scientific and practical conclusions.

1. Integrated urban management

The Friedman test showed that among the variables of integrated urban management, the highest rank belonged to the "quality of life", and the lowest rank belonged to the "economic development and sustainable urban management". Interpretive structural analysis revealed that institutional coordination, as the main indicator, is the prerequisite, and other variables (environment, society, culture, and urban safety) are subordinate to its effectiveness. Therefore, integrated urban management in Karaj must first reform and integrate the institutional structure so that other quality of life and urban development goals can be realized. During crises, the lack of coordination between the municipality, governorate, and other institutions hinders decision-making and reduces the effectiveness of preventive and reactive measures. Dilapidated textures, informal settlements, and inefficient infrastructures reduce urban resilience, increasing damage risk in natural disasters (especially earthquakes).

2. Crisis Management

In crisis management, the Friedman test assigned the first rank to "local empowerment and participation" and the last rank to "crisis response and resilience". The ISM analysis demonstrated that local empowerment and participation, as a driving factor,

directly affect institutional interoperability, crisis response, and resilience. These findings are consistent with the qualitative analysis, which suggests that without reforming the institutional structure and strengthening local capacities, other management interventions will not achieve the desired results.

Despite the high significance of local empowerment and participation, in practice, citizen participation and public education in Karaj remain limited, which makes the post-crisis response and resilience measures reactive and uncoordinated. The lack of a preventive approach and the focus on post-crisis relief and rescue indicate that the actual capacity of crisis management in Karaj has yet to reach the ideal level.

3. Passive Defense

Regarding passive defense, the Friedman test identified "social participation, culture-building, and cooperation" as the most significant factor, while "preparedness, prevention, and policymaking" received the lowest significance. ISM analysis also indicated that the people-centered variable is a prerequisite, and other indicators, such as reconstruction, recovery, and post-crisis resilience, are built upon it. Therefore, the success of passive defense in Karaj depends on strengthening social capacities and institutionalizing a culture of prevention. Moreover, this reveals that passive defense measures in Karaj are mainly limited to operational and documentary levels, making them less effective during a crisis. By combining qualitative analysis, the Friedman test, and ISM, we can conclude that enhancing Karaj's resilience requires the following actions:

1. Reforming and integrating the institutional structure as a prerequisite for the effectiveness of other measures;
2. Physical reinforcement and upgrading the critical infrastructure;
3. Strengthening social participation and culture-building in passive defense;
4. Developing preventive measures and public education; and
5. Local empowerment and participation in crisis management.

This hierarchy revealed that the effectiveness of the indicators in Karaj is chained and hierarchical: first, institutional reforms and social participation must be carried out to effectively implement other dimensions of integrated urban management, crisis management, and passive defense.

This analysis also suggests that planning and policymaking for integrated urban management and crisis management in Karaj should center on reforming institutional structure, reinforcing infrastructure, and enhancing social participation to continuously improve urban resilience.

5.2. Research limitations

- Lack of research conducted in this field;
- Administrative bureaucracy to receive data;
- Inaccuracy in providing statistical information and software limitations;
- Inability to generalize results to other statistical communities;
- Low willingness of respondents to the questionnaire and inaccuracy in responses;
- The effect of personal biases and judgments on self-reported data;
- Lack of training files on statistical analysis

5.3. Suggestions based on research findings

1. Develop joint upstream documents to integrate missions and reduce parallel work of organizations.
2. Establish a permanent inter-institutional coordination committee: Forming the "Karaj Integrated Crisis Management Headquarters" with representatives from the governor's office, municipality, Red Crescent, Gas Company, Electricity Company, Police Command, and so forth to determine roles and action scenarios in earthquake and flood incidents.
3. Develop a comprehensive Karaj crisis management regulation: Integrating the current laws of the municipality, the governorate, and service providers into a single regulation for crisis management and passive defense.
4. Establish a smart urban governance system for Karaj: Implementing an integrated digital platform for simultaneous monitoring of crisis data (such as the status of active faults and the water level of the Karaj River) and connecting it to the municipality's crisis management command center.
5. Improve the resilience of high-risk infrastructure: Immediate retrofitting of roads, river bridges, and high-voltage power lines identified in high-risk areas.
6. Annual training and maneuver program for citizens: Holding neighborhood-based maneuvers in densely populated areas and priority of dilapidated textures, such as Islamabad, Hesarak, and Aqtapeh, in cooperation with the Red Crescent and schools to familiarize people with safe evacuation routes.
7. Review of passive defense regulations for gas

stations: Gradually relocating high-risk gas stations in the city center or creating standard protective coverage according to passive defense principles.

8. Strengthen the local economy for crisis management: Creating a special fund, "Karaj Urban Crisis Insurance", to financially support small businesses and reduce post-disaster economic damage.
9. Design a local crisis simulation model: Developing a GIS-based model to simulate the occurrence of a strong earthquake with a magnitude of 7 in Karaj and estimate possible losses to plan emergency evacuation.
10. Develop local participatory policies: Establishing volunteer crisis management councils in dilapidated neighborhoods for rapid reporting and cooperating with the crisis headquarters.
11. Standardize the post-disaster reconstruction process: Preparing a schedule for reconstructing strategic bridges and water and electricity networks within a maximum of six months after the crisis.

Implementing the proposed recommendations will lead to a safer, more sustainable, and more resilient city that can cope with various crises. This will not only ensure the security and well-being of citizens but also lay the groundwork for sustainable development and the strengthening of urban governance in the long term.

Authors' contributions

The authors' contributions to this article have been equal.

Acknowledgments

We extend our sincere gratitude to all individuals who generously assisted the researchers in this research. This research has no financial or moral sponsor.

Conflict of Interest

The authors have declared no conflict of interest.

References

Abdulmajed M., Allameh S.M., & Siadat S.A. (2024). Designing a Model for Effective Crisis Management in the Organization through Organizational Learning (Case Study: Selected Organizations in Isfahan Chamber of Crisis Management). *Crisis Management*, 13(1): 70-89. https://dor.isc.ac/dor/20.1001.1.23453915.1403.13.1.5.6 [In Persian].

Ahmadi A., & Manoochehri S. (2018). Assessing the Status and Analysis of Factors Affecting the Desirability of Crisis Management of Environmental Hazards in Ghaenat City. *Scientific-Research Journal of Spatial Planning*, 10(2): 56-23. https://doi.org/10.22108/sppl.2020.117853.1398. [In Persian].

Almulhim, A.I. (2025). Building urban resilience through smart city planning: a systematic literature review. *Smart Cities* (2624-6511), 8(1), 22. https://doi.10.3390/smartcities8010022

Amanpour S., Mohhammadi M., & Parvizian A. (2018). Assessment of Passive Defense Requirements in the Vicinity of Industries, Case Study: Ahwaz Metropolis. *Journal of Geography and Territorial Spatial Arrangement*, 8(26): 217-244. SID. https://sid.ir/paper/236763/fa. [In Persian].

Appanna, N., Jirnal, & Dada Ashok Managanvi. (2022). Hazard mitigation and sustainable community development. https://doi.org/10.5281/zenodo.7524712.

Awan H.H., Kabdrakhmanova M., Varol H.A., & Karaca F. (2024). A GIS-Based emergency response and management support framework for Earthquake crisis: A case study of Antakya and Kahramanmaras earthquake in Turkey. *International Journal of Disaster Risk Reduction*, 111. https://doi.org/10.1016/j.ijdrr.2024.104706.

Bashiri E. (2019). Integrated Model of Passive Defense and Crisis Management. *International journal of engineering sciences & research technology*, 8(8): 18–22. https://doi.org/10.5281/zenodo.3360446. [In Persian].

Chaudhary, M., & Sardana, R. (2023). Disaster management. Chyren Publication. https://doi.org/10.5281/zenodo.8201737.

Chui, CH., Feng Joyce, Y., & Jordan, L. (2014). From good practice to policy formation: the impact of the third sector on disaster management in Taiwan. *International Journal of Disaster Risk Reduction*, 10, 28–37. https://doi.org/10.1016/j.ijdrr.2014.07.001.

Eelagh, M.D., & Abbaspour, R.A. (2024). A location-allocation optimization model for post-earthquake emergency shelters using network-based multi-criteria decision-making. Decision Analytics Journal. https://doi.org/10.1016/j.dajour.2024.100430.

Farhang S. (2025). Designing a Crisis Management Improvement Model with Emphasis on the Role of Social Media. *Emergency Management*, 14(1): 37-52. https://dor.isc.ac/dor/20.1001.1.23453915.1404.14.1.2.0. [In Persian].

Fitriani. (2021). Crisis leadership in the incident command system. Department of State Administration - Musamus University. https://doi.org/10.35724/mjpa.v3i2.3446.

Gueben-Venière, S., & November, V. (2020). Crisis management as an evolutive and adaptable infrastructure. HAL CCSD. https://enpc.hal.science/hal-02518041.

Hetu, S.N., Gupta, S., Vu, V.A., & Tan, G. (2018). A simulation framework for crisis management: Design and use. *Simulation Modelling Practice and Theory*, 16(85), 15–32. https://doi.org/10.1016/j.simpat.2018.03.001.

Jiang, P., Rowsell, J., & Schmidt, S. (2025). Crisis-ready telecom: Global approaches to emergency management in telecommunications. *Telecommunications Policy*, 49(4). https://doi.org/10.1016/j.telpol.2025.102914.

Karimi Shirazi H., Madiri M., & Nosrati S. (2014). Crisis Management Planning in the Field of Urban Management with a Passive Defense Approach Using SWOT and MCDM Method (Case Study: Rasht Metropolis). *Biannual scientific research journal of crisis management*, 7: 5-14. https://civilica.com/doc/1429750. [In Persian].

Karamy (2004). Natural Hazards and Environmental Disasters. Journal of Education. https://ensani.ir/fa/article/146901. [In Persian].

Kamran H., Hosseini H., & Parizadi T. (2011). Analysis of Shahryar City Structures and Passive Defense Strategies. *Journal of Geography*, 9(30): 5-37. https://www.magiran.com/p922704. [In Persian].

Kiani Dehkiani S. (2015). The Study and Zoning of Villages under Natural and Human Risk in Dehdz District of Izeh City. Master's thesis, Department of Geography, Faculty of Literature, Urmia University. https://elmnet.ir/doc/10942441-42822. [In Persian].

Kummer, R.E., & Kummer, R.B. (2010). Shelter design data. U.S.A. Department of Defence, Office of Defence.

Lane Marcus, B. (2003). Reviewing the regional forest agreement experience: the wicked problem of common property forests. Presented at Regional Forest Agreements and the Public Interest: A National Symposium. Australian National University, Canberra, Australia.

Manafi S., & Saraei M.H. (2021). Assess Integrated Crisis Management with a Spatial Data Infrastructure Approach. *Urban Economics and Planning*, 2(1): 10-18. DOI: 10.22034/UE.2021.02.01.02. [In Persian].

Manafi S., Saraei M.H., & Mostofi R. (2018). Evaluation of Integrated Management to Reduce the Crisis with an Approach to Spatial Data Infrastructure. *Journal of Fundamental and Applied Sciences*, 10(2S): 554-570. https://www.ajol.info/index.php/jfas/article/view/171435. [In Persian].

Mirzaei M.M., & Akhavan P. (2023). Developing a Model for Knowledge Management in Crisis Conditions (Case Study: Kermanshah Earthquake). *Crisis Management*, 12(1): 16-35. https://dor.isc.ac/dor/20.1001.1.23453915.1402.12.1.2.6. [In Persian].

Mohhammadian M., Hosieni S.A., & Hajiaghaei Kamrani M. (2018). Analysis of the Role of Passive Defense in Tabriz with Crisis Management Approach. *Research and Urban Planning*, 9(35): 69-82. https://dorl.net/dor/20.1001.1.22285229.1397.9.35.6.9. [In Persian].

Movahhedinia J. (2009). Principles of Passive Defense (3rd Ed.). Passive Defense Engineering Research Institute, Malek Ashtar University of Technology. [In Persian].

Mohammadi Deh Cheshme, M., Firoozi, M.A., & Nazarpour Dezaki, R. (2016). The assessment of Proximity in sensing land use, from the perspective of urban passive defense Study proximity to major hospitals in Ahwaz. *Human geography research*, 49(2), 259-272. https://doi.org/10.22059/jhgr.2017.55366

Mohammadian Beiragh M., Shahmari Ardejani R., Hassani Mehr S.S., & Pourshikhian A. (2025). The Impact of Integrated Urban Management on Enhancing the Livability of Tabriz: Identifying Solutions and Evaluating Its Effects. *Urban Economics and Planning*. https://doi.org/10.22034/uep.2025.510887.1609. [In Persian].

Nasiri Hende Khaleh E., Rostami S., & Shirini M. (2023). Location Selection of the Central City Crisis Management Support Base in Karaj Using Geographic Information System (GIS). *Human Geography Research*, 55(3). [In Persian].

Nazarian A., & Rahimi M. (2011). Analysis of the Management Model of Tehran City. *Human Geography Research Journal*, 81(Autumn 2013): 111-126. https://civilica.com/doc/1807951. [In Persian].

Nurdiyana, S.S., & Putri, R. (2025). Integration of civic education in climate crisis and natural disaster management in South Tangerang City. *Academy of Education Journal*, 16(1), 52–61. https://doi.org/10.47200/aoej.v16i1.2719

Parizadi T., Hosseini H., & Shahriari M. (2010). Investigation and Analysis of Passive Defense Preparations in Saggez City, In an Analytical Approach. *Journal of Urban Management*, 8(26): 191-202. SID. https://sid.ir/paper/92181/fa. [In Persian].

Rashid Kolver H. (2021). Evaluation Requirements of Passive Defense along Critical Management Planning in Urban Management Course (Case Study: Ardebil City). *Research and urban planning*, 11(43): 209-222. SID. https://sid.ir/paper/1001605/en. [In Persian].

Rezek, P., & Zvanut, B. (2024). Towards optimal decision making in mass casualty incidents management through ICT: A systematic review. *International Journal of Disaster Risk Reduction*, 102: 104281. https://doi.org/10.1016/j.ijdrr.2024.104281.

Saeednia A. (2001). Urban Management. The Green book of municipalities, 11(Tehran). Publications of the Organization of Municipalities. [In Persian].

Shabankare A.O., Khandan M., & Zabihi H. (2025). Evaluating the Physical, Institutional, Social, and Economic Impacts of Pre-Disaster Management Measures on Enhancing Urban Resilience Against Earthquakes (Case Study: Ahram City, Bushehr Province). *Urban Economics and Planning*, 5(3):248-261. https://doi.org/10.22034/uep.2024.484693.1547. [In Persian].

Szczurek, T., & Bryczek-Wróbel, P. (2018). Crisis management model for large urban agglomerations. CNBOP-PIB Centrum Naukowo-Badawcze Ochrony Przeciwpozarowej. https://doi.org/10.12845/bitp.49.1.2018.10.

Talebpour A., & Kohle Dasht A. (2024). The Study of the Developmental Impact of Urban Planning on Urban Crisis Management, Case Study: Tehran City. *Bi-quarterly journal of socio-economic development studies, Al-Zahra University Department of Social Sciences*, 1(1): 229-200. https://doi.org/10.22051/ijosed.2023.39890.1008. [In Persian].

Talebpour A., & Mujahiddini M. (2019). The Role of Integrated Urban Management in Improving Crisis Management and Improving the Quality of Public Services to Citizens (Case Study: Tehran Province). *Journal of studies of socio-cultural development*, 7(4): 67-92. SID. https://sid.ir/paper/246475/en. [In Persian].

Tokakisa, Vassileios, Polychronioua, Panagiotis, Boustras, George. (2019). Crisis management in public administration: The three-phase model for safety incidents. *Safety Science*, 28(113), 37-43. https://www.amar.org.ir.1395.

Wiśniewski, M. (2022). Analysis of the integrity of district crisis management plans in Poland. *International Journal of Disaster Risk Reduction*, 102650. DOI: 10.1016/j.ijdrr.2021.102650

Wolf, A. (2021). Collaboration in Crisis Management. UNI ScholarWork. https://scholarworks.uni.edu/grp/2103.

Zaboli Z. (2011). Analysis of Passive Defense Pattern in Rural Areas of Mohammadabad Sistan. Thesis in Zabol University, Faculty of Geography and Rural Planning. https://elmnet.ir/doc/10507819-12661. [In Persian].

Zhou, W. (2011). Emergency Management of Urban Major Hazards Based on Information Synergy. *Journal of Procedia Engineering*, 15 (2): 1-3. https://doi.org/10.1016/j.proeng.2011.08.361

Ziyodullaev, I.B., Ziyodullaeva, R.B., Abdukholikov, A.A., & Shamansurov, S.S. (2021). Development of recommendations on the use of forces and facilities in case of emergency and crisis situations. Novateur Publication, India. https://repo.journalnx.com/index.php/nx/article/view/3257.