Crisis Management in Tourism Complexes with Emphasis on Sustainable Development Approach Case Study: Jihad Daneshghahi Tourism Complex in Kermanshah, Iran

Aeizh Azmi

Department of geography, literature and humanities, Razi university, Kermanshah, Iran, a.azmi@razi.ac.ir

ORIGINAL STUDY

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ABSTRACT

Problem statement: Crisis management in tourist complexes can play a crucial role in increasing tourist attraction and mitigating damages resulting from natural hazards. The Jihad University Tourism Complex in Kermanshah is a tourist destination, and this study aims to present a crisis management model for this complex.

Question: What should be the crisis management model for the Jihad University Tourism Complex in Kermanshah?

Objective: This study aimed to propose a crisis management model for the Jihad University Tourism Complex in Kermanshah.

Methods: A questionnaire was used to collect research data. Approximately 50 individuals were selected as the research population and 33 individuals as the sample, considering the specified community characteristics.

Conclusion: The results revealed that the economic recession indicator, with a value of 70.2%, was the most important of the economic indicators in the opinion of the respondents. Analyzing pairwise comparisons of social indicators showed that social participation recorded the highest significance among social indicators (0.158), ranking first in social indicators' importance. Since environmental hazards are one of the most critical factors contributing to crises in any environment, vulnerability to earthquakes, according to respondents' opinions, obtained the highest importance among the examined physical-environmental indicators in the Kermanshah Tourism Complex.

Keywords: Crisis management, Tourist complexes, Jihad university tourism complex, Kermanshah province

1. Introduction and problem statement

For over fifty years, tourism has evolved into one of the largest sectors of the global economy, accounting for approximately 9% of the world's gross domestic product and providing over 200 million full-time, part-time, and seasonal job opportunities [21]. According to the World Tourism Organization's estimates, the total number of global tourists was around 25 million in 1950, reached approximately 700 million in 2000, and further increased to 84 million in 2006. Among these figures, Europe attracted 51%, Asia and the Pacific 22%, the Americas 20%, Africa 3%, and the Middle East 4% of the tourists. In recent years, the international tourism market has experienced rapid growth, with the World Tourism Organization predicting a threefold increase in international tourist arrivals by 2020, reaching approximately 8.6 billion annually, with an estimated value of 2 trillion dollars [24]. The tourism industry is a major driver and one of the most dynamic activities in the world today. Its development in cities is contingent upon the comprehensive examination and understanding of various aspects of the city, including environmental, social, infrastructural, economic, and institutional dimensions [5].

The rapid growth of the tourism industry in the last half-century has resulted in increasing environmental pressures. Studies indicate that prioritizing economic interests stemming from the unchecked expansion of the tourism industry has compromised the principles of sustainable development in various regions and exposed the environment to escalating risks [25].

Accordingly, all tourist destinations are striving to capture a greater share of the considerable flow of capital in this sector, which intensifies competition between destinations. In this context, tourism, now recognized as one of the most important economic sectors in the world, stands out not only economically, but also for its role in presenting and promoting the history and culture of different cities [12]. Unlike other natural tourist destinations, urban destinations benefit from human population interaction [26], making the management of tourism destination crises an increasingly important topic.

Therefore, in a situation where the foundation of economic systems is based on creating comparative advantage through specialization and generating economic value through trade and specialized services, crises such as floods, earthquakes, and political crises such as sanctions can disrupt or sever economic networks. This has the potential to threaten the foundation of the economic system. Naturally, among businesses, those with small and diverse transactions involving a wide range of individuals in society are most affected by these crises. The factors of "timing of occurrence" and "geographical and social location of the crisis" significantly impact crisis management. Natural disasters such as earthquakes, floods, hurricanes, and similar events typically result in detrimental effects on human settlements, causing heavy casualties and destroying buildings and infrastructure in affected areas. The social and economic repercussions extend broadly to societies and countries. Earthquakes, volcanoes, floods, and similar natural events have historically brought human life from its inception to destruction. Iran is among the countries vulnerable to natural disasters, especially earthquakes. Therefore, the preparedness of the tourism industry to respond to crises has long been a concern for researchers and practitioners in the field of tourism. Notably, the security factor has been considered the most crucial and foundational principle in formulating global tourism development strategies. Many researchers have warned about the potentially serious impact of natural disasters or human-made factors on the tourism industry. Natural disasters such as earthquakes, floods, as well as human-induced risks like political turmoil, riots, terrorism, uprisings, diseases, crime, and war negatively influence customer behavior, especially when reflected in the mass media [1].

In recent years, the province of Kermanshah has been under the influence of various natural hazards. The earthquake in Sarpol-e Zahab in this province has particularly affected the region. Besides, tourism expansion and the subsequent development of tourism complexes have been evident in the province of Kermanshah. Accordingly, crisis management in Kermanshah province, especially in tourism complexes, is of significant importance. Based on this, the main question of this research is: What should be the crisis management pattern in the tourism complexes of Jihad Daneshgahi Kermanshah?

2. Literature review

Ahmadi et al. (2023), in a study titled "Assessing Livelihood Vulnerability of Farmers to Floods (Case Study: Lorestan Province)," argued that farmers in flood-affected villages of Pol-e Dokhtar County are more economically vulnerable compared to Chegni and Khorramabad counties. Pol-e Dokhtar County showed higher levels in livelihood strategic indicators, social networks, knowledge information, and health compared to the other two counties, indicating higher vulnerability in these aspects. Based on the results, the study proposed solutions to reduce vulnerability and enhance adaptability of rural households to flood occurrences.

Besides, Akhgari and Ghasemian Moghadam (2023) published "Prioritizing Factors Affecting Economic Resilience of Rural Households to Drought (Case Study: Dastgerdan District of Tabas County)". They argued that, according to rural residents, the most influential factors in their resilience to drought and enhancing their adaptability to drought conditions are strengthening local rural participation. Furthermore, other factors are of high importance such as focusing on indigenous knowledge, developing crop insurance, and promoting the development of resilient seeds and species. According to the research results, they have the smallest distance to the positive ideal and the furthest distance to the negative ideal.

Baghbani et al. (2019), in a study titled "Explaining the Social Crisis Management Model with a Security Approach (Case Study: Sistan and Baluchestan Province)," aimed to present a social crisis management-security model in Sistan and Baluchestan Province. Using a qualitative method and data-based theory, they conducted in-depth interviews with 35 crisis management officials in the province. The study collected data was then organized into five main concepts: identity, penetration, legitimacy, participation, and distribution, along with three categories: security-political, managerial, and social-cultural, forming the crisis management model in a security-social context. The final analysis emphasizes the need for adopting social-security crisis management strategies in the province through changing the central perspective, establishing social justice and equitable distribution of the benefits of regional development, and strengthening processes of national convergence and security-social coherence. This approach can be used as a model for policymaking and decision-making in similar situations for crisis management.

Besides, Nejoumi et al. (2020) studied "Presentation of a Strategic Model for Technological Crisis Management: A Case Study of Pars Gas Complex, Asaluyeh, Bushehr Province," a strategic model for managing crises arising from technological hazards in the Pars Gas Complex was presented. To achieve this, a comprehensive review of all previous research and studies was conducted. Following interviews, a questionnaire was administered to the entire population. Subsequently, eight main factors influencing crisis management were identified, including leadership and management, human factors, organizational culture, organizational agility, organizational systems, regional infrastructure, continuous

production, and ongoing supervision. It was determined that human factors significantly impact the predictive structure of crisis management.

Ghorbani et al. (2020) worked on "Presenting a Strategic Spatial Tourism Heritage Management Model: Case Study of Tehran Metropolis." The study utilized one sample T-test, Friedman test, and confirmatory factor analysis to examine tourists' perceptions of heritage tourism development. The results indicated significant differences in the management indicators of strategic spatial tourism heritage from the perspective of tourists. Empowerment was identified as the factor with the most significant impact on strategic heritage tourism management, followed by public policy and market. The lowest mean was related to the product and social acceptance. From a tourist perspective, it is evident that among the three scrutinized regions, Region 20 offers more favorable conditions, while Regions 6 and 12 exhibit comparatively less conducive environments for sustainable development indicators in heritage tourism. Notably, there is a significant difference in viewpoints between residents and tourists. Residents perceive Region 20 as having less favorable conditions in comparison to Regions 6 and 12, a viewpoint contradictory to that of tourists.

Besides, Chen and Mansfield (2021) published "Creativity and Innovation in Tourism Crisis Management: A QC&IM Approach". This study highlighted three knowledge domains effective in tourism: (1) creativity in tourism, (2) innovation in tourism, and (3) tourism crisis management. The study proposed a theoretical framework for evaluation criteria based on creativity and innovation as the basis for developing QC&IM. The model aims to provide alternative, new, and "out-of-the-box" solutions for destinations worldwide seeking innovative crisis management approaches.

Barbacoa et al. (2021) published a paper entitled "Thematic Analysis of Crisis Management in Tourism". The research shed light on the lack of knowledge and awareness regarding crisis management in the tourism industry.

Kim and Pomerleau (2021) conducted a study investigating effective strategies for tourism management in crisis conditions. Employing a foundational theory approach, they identified three strategies: adaptation, redesign, and participation.

Motevali Taher and Paydar (2021) examined the supply chain design to cope with the global crisis of the COVID-19 virus tourism management. They proposed a multi-objective model aimed at minimizing overall costs and reducing tourist patient numbers. Based on the model results and a case study, it was recommended to open two medical centers with capacities of 300 and 700, should entry points remain open.

Nazir (2023) examined tourism indicators and natural hazards in Siba. Findings indicated that tourist destinations are heavily influenced by natural hazards. Furthermore, experiences demonstrate that natural events have extensive impacts on tourism. Managing these structures and mitigating adverse effects can lead to optimal tourism management.

Liu et al. (2023) in their article on the "Evolution of tourism risk communication: A systematic review and meta-analysis of risk transfer to tourists" argue that factors such as gender, nationality, tourist experiences, local tourism boards, local governments, organizational resource allocation, and assessment influence how risks are dealt with in sensitive tourism areas.

Kui (2023) in an article titled "Hazards of Natural Disasters to Chinese Visitors: A Case Study of New Zealand" suggests that studies have shown tourists are vulnerable to natural hazards during their travels. Therefore, effective communication of potential natural hazards to tourists before and during their travels plays a crucial role in ensuring their safety. Tourists, depending on a spectrum of personal, cultural, and experiential factors, exhibit different levels of vulnerability. Hence, risk communications should be customized appropriately for specific target markets. This study examines stakeholder

perceptions on awareness and preparedness for natural hazards among Chinese visitors on the west coast of the South Island (Otaruwa, New Zealand), evaluating the effectiveness of current risk communication processes and content for the Chinese audience.

David (2022) in an article titled "Effects of Natural Hazards and Disasters on Tourism: A Case Study of the Carpathian Watershed" argues that sustainable rural development is the best approach to cope with natural hazards. Additionally, infrastructure development can serve as a solution for crisis management.

3. Theoretical foundations

The term "natural hazards" refers to the occurrence of a phenomenon or natural conditions that pose a threat and become hazardous at a specific time and place. Various concepts define natural hazards as destructive elements in the physical environment for humans, emphasizing the potential occurrence of a harmful phenomenon. Natural hazards are events that can threaten and disrupt both the natural and social environments, causing potential harm and negatively impacting human and environmental interactions [15]. According to the World Meteorological Organization, natural hazards are sudden and severe weather-related events that occur naturally worldwide, though certain regions may be more vulnerable than others. When natural hazards cause human and material losses and disrupt the lives and livelihoods of people and communities, they transform into natural disasters. The damages resulting from natural disasters constitute a significant barrier to sustainable development [39].

Most current crisis management models in tourism are forward-thinking, considering solutions when a crisis occurs or when warning signs are observed. However, they lack predefined plans to prevent crises. Even process-oriented models address the identification of warning signs before a crisis [20]. Considering the inherent characteristics of the tourism industry, such as intangibility and heterogeneity, it is crucial to provide a model adjusted to these features, especially considering the limited strategies and methods available for crisis management in the service-oriented tourism sector [40]. Such an approach can be found in manufacturing industries, where various diverse methods have been presented over several decades to cope with crises. However, in the service sector, specifically the tourism industry, limited methods and strategies have been provided to deal with crises. The role of municipalities, city councils, governmental and private sector representatives, tourism experts, and research institutions within the country, along with representatives of international non-governmental organizations, is fundamental in addressing the challenges posed by natural hazards to the tourism industry [14].

The tourism industry has rapidly evolved into one of the leading global sectors, but this growth necessitates a cohesive system to support the industry during crises. During crises, the tourism industry, tourists, and local communities are affected. Hence, the focus of government officials, organizations, and major corporations involved in the tourism sector on crisis management is crucial. This attention not only aids in preserving the sustainability of the industry within a destination but also establishes a foundation for fostering collaboration and long-term macro-planning. Notably, this emphasis on crisis management extends beyond large entities, as it plays a vital role in supporting small economic activities within the tourism industry as well [41]. A deficiency in a crisis management plan adjusted to the specific needs of the tourism sector can result in insufficient preparedness levels for tourism destinations.

Due to the vulnerability of the tourism industry to crises, crisis management in tourism has become essential. Various strategies have been proposed in this regard [42]. Proactive

intervention is a response to what may happen in the future, as taking corrective actions in the early stages can cause lower costs and less time.

Various studies in the associated area have examined the effects of climate on the tourism industry, considering geographical space, supply and demand factors, and market influences [43]. It was noted that climatic conditions and their variations are essential criteria for evaluating the suitability of tourism activities and ultimately determining destination choices. Weather plays a crucial role in the development of the tourism sector, and a favorable climate can positively influence the reception and attraction of travelers and tourists. Certainly, weather and its moderation increase the acceptance and appeal of tourists. While tourism has numerous positive effects and is continuously expanding, it is not immune to threats and crises. What is crucial in this context is the need for a cohesive system to support, plan, and manage tourism during crises and before their occurrence. Especially considering that tourism is dependent on various elements, each of which can bring about both beneficial and irreversible shocks [19]. Today, the discussion and concern about risks and threatening factors to the development of tourism systems have gained serious attention. Planners and stakeholders in the tourism sector are now prompted to assess and manage risks in tourism development programs as an analytical and crucial aspect. Identifying risks and managing them is one of the approaches used to enhance the effectiveness of systems [44].

The social impacts of natural hazards reflect the resilience of societies in the face of external shocks based on their social infrastructure [7]. Physical and environmental effects assess the community's response and recovery capacity after disasters, including shelters, residential units, and infrastructures such as pipelines, roads, and their dependencies on other infrastructures. In the physical dimension, attention is given not only to providing shelters for the affected individuals post-crisis but also to principles for designing structures before the occurrence of a crisis and disaster [10].

On the other hand, institutional effects, containing features related to risk reduction, planning, and prior disaster experience, impact communities through their capacity to reduce risk and employ local individuals in risk reduction. Economic considerations, fundamentally, are among the most crucial factors. Recent discussions in engineering and economics highlight that assessing economic structures, by identifying weaknesses in the economic system, facilitates enhancing economic resilience resulting from human and natural disasters [45].

While livelihood strategies and economic and social planning are essential resources for improving household resilience to natural hazards, in many less developed countries around the world their high vulnerability is exacerbated by economic activities, particularly in rural areas. Consequently, a significant number of villages in low-income countries in Africa, Asia, and Latin America are highly vulnerable to hazards [46]. Numerous studies have established a connection between community vulnerability to hazards and access to resources or economic livelihoods [22].

4. Materials and methods

The current research adopts an applied and analytical descriptive approach with a primary goal, quantitative nature, and exploratory and survey methods. The study collects descriptive data (theoretical studies in this context) through documentary research, utilizing library studies and reference sources on the study topic. Additionally, survey methods using a questionnaire tool were employed to gather analytical data (vulnerability indices, information layers, and weighting processes).

Accordingly, a researcher-developed paired comparison questionnaire was designed to weigh the criteria and was then provided to experts. Ultimately, paired comparisons in Expert Choice software were analyzed and synthesized using the Analytic Hierarchy Process (AHP) for analysis in the TOPSIS model. In the Expert Choice software, the vulnerability of the academic tourism complex of Jihad University was prioritized based on expert opinions. Subsequently, the TOPSIS decision-making model was employed to thoroughly examine and rank the vulnerability of the selected academic complex.

The statistical population of this research comprises tourism specialists and crisis management officials in Kermanshah province. Due to time and cost efficiency and the nature of the study, researcher-developed questionnaires were utilized. Because of the cooperation of the experts and their willingness to participate in the study, a sample was selected that is representative of the statistical population.

The Tourist-Educational Complex of the Jihad University is located in the southwest of Kermanshah city, approximately 5 km from the Kermanshah-Islamabad highway. Spanning over 120 ha, the complex occupies a strategic position along the Karbala highway, providing excellent connectivity to the neighboring counties of Islamabad Gharb, Dalahoo, Sarpol-e Zahab, Qasr-e Shirin, and ultimately the Khosrowi border. Situated within the city's boundaries and approximately 311 m away from the approved city limits, the project area naturally encompasses diverse artificial and natural landscapes. These include mountains, agricultural lands, and urban and rural fabric surrounding the study site. From the north, east, and half of the west, the site is surrounded by hills, forming a boundary between the city and the project area. This elevation change creates a distinct transition from urban human-made fabric to the natural terrain. To the southeast of the site, the village of Haj Azizi with its rural fabric adds a unique character to the surroundings, potentially serving as a model for using local materials in constructing accommodation facilities on the site. The southern part of the site exhibits various land uses, including agricultural and industrial workshop lands, contributing to a diverse fabric distinct from other areas.

Therefore, after examining various study environments, reviewing documents and upper plans, studying functions and common uses in tourist villages, and considering the opinions of stakeholders, the following land uses are proposed for the construction phase: Tourist-residential, sports-recreational, agricultural, human and animal, health, service-commercial, cultural-exhibition, and educational-research-technological (complementary and supportive uses for training in solar panels, organic farming techniques, and modern agricultural equipment). Figure 1 illustrates the study area.

Table 1 shows the research indicators.

5. Discussion

In the section on economic components, nine indicators of economic recession, exchange rate fluctuations, taxes and fees, laws and regulations, insurance, savings, income, damage severity, and recovery capability have been investigated [2, 8, 9, 13, 17, 18]. The selection of these indicators aimed to encompass all aspects of the economy.

The Analytic Hierarchy Process (AHP) was employed to assess the validity and reliability of the measurement tool through exploratory factor analysis. To examine the model, statistics related to the KMO index and Bartlett's test statistic (an approximation of the Kaiser-Meyer-Olkin index) were initially measured. With a KMO index value of 0.879 (approximately close to one), the sample size was deemed sufficient for analysis, indicating
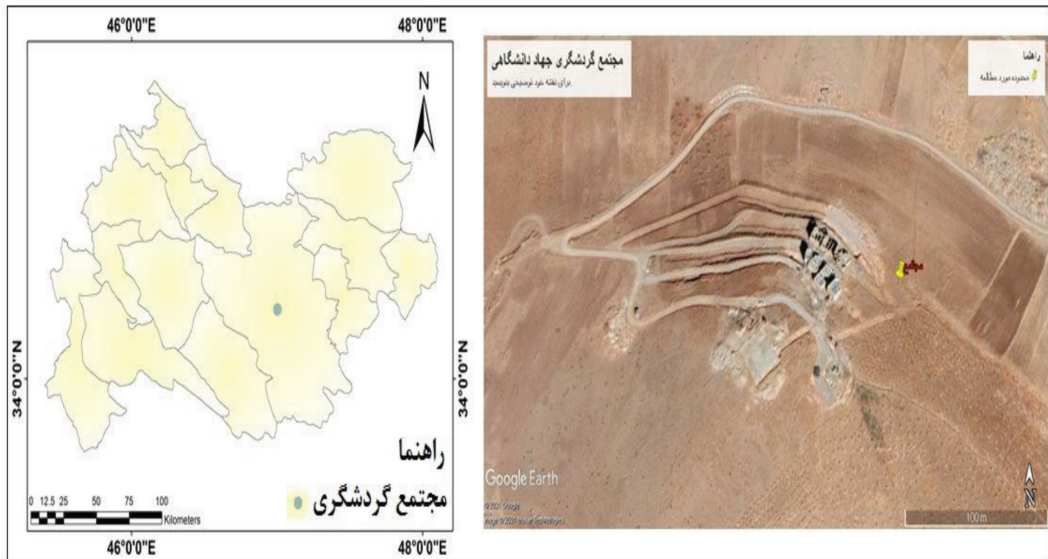
Fig. 1. Study area.

Table 1. Research indicators.

Component	Variable
Economic	Economic recession, exchange rate fluctuations, taxes and levies, laws and regulations, insurance, savings, income, severity of losses, and recovery capability.
Social	Social participation, feelings of tranquility and peace of mind, appropriate interaction and hospitality of citizens, crime, disorder, social support, cultural promotion, crisis management skills, public concern, social justice, social harmony, and social skills.
Physical-environmental	Earthquake, flood, accessibility levels, building density, infrastructure, firefighting station equipment, open spaces, adherence to safety standards, incompatible land uses, timely emergency response, information centers, fire incidents, accommodation and welfare facilities, pollutants, and environmental health.
Institutional	Establishment of optimal management, pre-crisis, during-crisis, and post-crisis management, government intervention, internal and external organizational coordination, relationships, performance, and infrastructure.

adequate sampling adequacy. Additionally, the significance level of Bartlett's test, being less than 5%, indicates that the matrix is not an identity matrix, and factor analysis is suitable for identifying the appropriate structure. Based on the Cronbach's alpha coefficient of 0.856, which is greater than 0.667, the questionnaire exhibits reliability.

First, the importance coefficients of the indicators and sub-indicators for the predetermined target were determined. Furthermore, the importance coefficients of the options were calculated in relation to each sub-indicator and indicator. At this stage, the final score of each option will be determined by combining these importance coefficients using the principle of hierarchical combination, leading to a priority vector considering all judgments at all hierarchical levels. Therefore, given the application of the AHP method, this section presents the corresponding results analyzed by the respondents. Initially, the used components were compared, and ultimately, the indicators of each component were evaluated (Fig. 2).
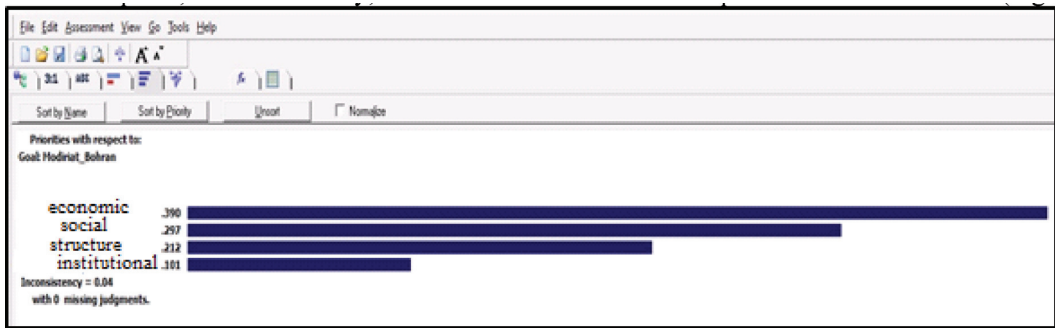
Fig. 2. Pairwise comparison of effective components in reducing the vulnerability level of the tourist complex of Jihad University.
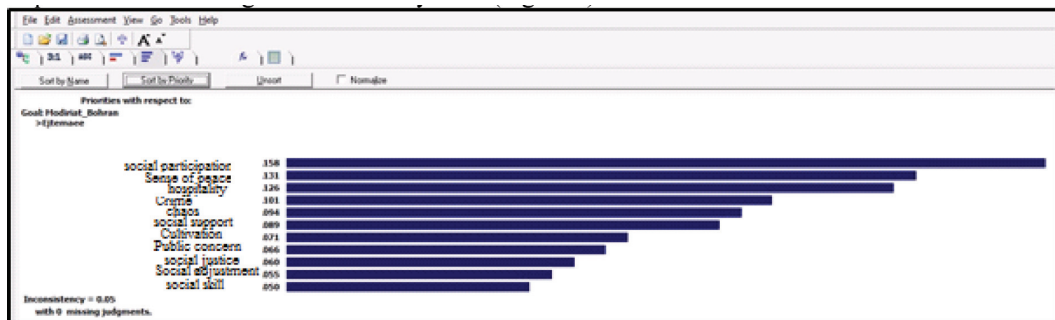

Fig. 3. Pairwise comparison of effective economic indicators in reducing the vulnerability level of the tourist complex of Jihad university.

Figure 3 revealed that according to respondents, the most important component in reducing the vulnerability level of the Tourist Complex of Jihad University is the economic component. In other words, the economic component plays a more influential role compared to other components in this context. When economic indicators improve and economic conditions are favorable, it will be easier to take measures to reduce vulnerability in the Jihad University tourist complex. This component is ranked first among influential components with a weight of 0.390. The second most influential component was the social component, playing a significant role in reducing vulnerability in tourist complexes, especially in the case of the Tourist Complex of Jihad University.

The Physical-Environmental components also hold importance with a weight of 0.212, ranking third. Indicators of this component, mainly related to environmental structure, risks, and infrastructures, can play a crucial role in the development of the Tourist Complex of Jihad University on one hand and pose constraints such as environmental risks on the other. Given the geographical location of the Tourist Complex of Jihad University, experts consider this component less important in comparison to other components.

Lastly, the Institutional components are placed with the least value among the examined components, assigning the lowest importance according to both experts and respondents, with a weight of 0.101.

This section examined the economic indicators in the Tourist Complex of Jihad University. As mentioned earlier, nine economic indicators are assessed in the economic component, and the pairwise comparisons of these indicators are illustrated in Fig. 4. Accordingly, it is noted that the economic recession indicator has been assigned the highest

Fig. 4. Pairwise comparison of social indices affecting the reduction of vulnerability in the tourist complex of Jihad university.

importance among economic indicators with the highest value of 0.210 according to respondents. This indicates its significant impact on the vulnerability level of the Tourist Complex of Jihad University. Considering that economic recession can adversely affect other sectors in any society, its occurrence can also impact tourism and tourist complexes. Therefore, economic growth and development can play a crucial role in the growth and development of the Tourist Complex of Jihad University, while economic recession plays a significant role in causing harm to this complex. Accordingly, from the perspective of respondents and in comparison with other indicators, the economic recession indicator had the highest impact among indicators in terms of the vulnerability level of the Tourist Complex of Jihad University.

Exchange rate fluctuations are another crucial indicator in the growth, development, and vulnerability level of the Tourist Complex of Jihad University. The currency has experienced significant fluctuations in Iran in recent years, and most of these fluctuations are related to the increase in the exchange rate, which may affect the increase in costs and reduce the purchasing power of consumers and users of the Jihad University tourist complex. Consequently, this increase in costs and reduction in consumer and user purchasing power can significantly affect the Tourist Complex of Jihad University economically. Based on the opinions of respondents, the exchange rate fluctuations indicator is ranked second in importance among the examined indicators. This indicator, with an importance level of 0.183, is placed in the second rank of importance after economic recession (Fig. 3).

Another significant economic indicator is the intensity of economic damages. The higher the intensity of the tourist complex, the more vulnerable the complex will be. According to respondents, this indicator, with an importance of 0.150, is ranked third in importance among the economic indicators. Taxes and fees in the Tourist Complex of Jihad University are perceived as the next important indicator by respondents. With an importance level of 0.136, an increase in taxes and fees will inevitably make the tourist complex more vulnerable, placing this indicator in the fourth rank of importance.

Finally, the insurance indicator has been assigned the least importance among the economic indicators. Considering that the insurance industry in Iran is still in its infancy and has not yet reached its true position, respondents attribute the least importance to this indicator among the economic indicators.

One of the crucial and influential components in crisis management in tourist complexes is social issues. In other words, the social situation of complexes can be effective in crisis management, both during and after the crisis. Therefore, according to previous studies, 11 social indicators, including social participation, sense of tranquility and peace of mind, appropriate citizen behavior and hospitality, crime, unrest, social support, cultural

development, crisis coping skills, public concern, social justice, and social adaptation and skills, have been considered to assess the vulnerability level of the Tourist Complex of Jihad University [2, 8, 9, 13, 17, 18].

Furthermore, a Pairwise comparison of social indicators revealed that social participation, according to respondents, has been assigned the highest importance among the social indicators. This indicator, with an importance level of 0.158, is ranked first in importance among the social indicators. Considering the current high importance of social participation in all affairs, its presence is expected to reduce the vulnerability level of the Tourist Complex of Jihad University. Conversely, lower levels of social participation are associated with increased vulnerability in the tourist complex.

The sense of tranquility and peace of mind in the Tourist Complex of Jihad University is one of the most crucial social indicators. This indicator, with an importance level of 0.131, is ranked second among the social indicators, highlighting its significant importance. As tourists seek peace, relaxation, and enjoyment of leisure time in recreational areas, an increased sense of tranquility and peace of mind in the Tourist Complex of Jihad University will reduce the vulnerability of the complex. Conversely, if the level of tranquility and peace of mind is lower, individuals will have less interest in using this complex, resulting in a decrease in users. A decrease in the number of users of the Tourist Complex of Jihad University leads to reduced profits and, consequently, harm to the complex.

On the other hand, tourists prefer to experience appropriate behavior from the host community. Wherever this interaction is more favorable, the number of users and visitors to the complex will increase. Therefore, this indicator holds considerable importance among the social indicators and is ranked third in importance among the 11 examined indicators in the Tourist Complex of Jihad University.

The levels of crime and unrest are two other indicators examined for their impact on reducing the vulnerability of the Tourist Complex of Jihad University. As mentioned, tourists prefer an environment they use to be calm and secure, ensuring they derive the most pleasure from it. Thus, high levels of crime and unrest can cause reduced use of these places, leading to an increase in the vulnerability of the Tourist Complex of Jihad University. Considering these factors, these two indicators are ranked fourth and fifth in importance for reducing the vulnerability level (Fig. 4).

Cultural development and social concerns are two additional indices that hold significance in reducing the vulnerability of the Jihad University tourist Complex. These indices, with importance scores of 0.71 and 0.66 respectively, are ranked seventh and eighth among social indices.

Finally, the social skills index is included, allocating the least importance among the eleven examined indices in the Jihad University tourist Complex. This index, with an importance score of 0.50, ranks last in importance.

The environment and structure of each region can significantly impact crisis management in tourist communities. Factors such as proximity to flood and earthquake-prone areas, accessibility, and emergency response are crucial indicators in crisis management. This study considers 15 environmental-structural indices, including earthquake, flood, accessibility, building density, infrastructure, medical facilities, fire station equipment, open space, adherence to safety standards, incompatible land use, timely emergency response, fire incidents, accommodation and welfare centers, pollution, and environmental health for assessing the vulnerability of the Jihad University tourist Complex [2, 8, 9, 13, 17, 18].

As mentioned earlier, environmental-structural indices are related to environmental structure, environmental risks, and infrastructure. Considering that environmental risks are among the most significant factors leading to crises in any environment, earthquake,

among the examined environmental-structural indices in the Jihad University tourist Complex, has been assigned the highest importance according to respondents.

Given that Iran is one of the earthquake-prone nations globally, this risk is one of the principal and most critical threats that can impact tourist communities. Vulnerability to earthquakes in the Jihad University tourist Complex in Kermanshah has been attributed the highest importance among environmental-structural indices. This index, with an importance score of 1.19, ranks first in the importance of environmental-structural indices.

Another natural threat that causes substantial damage in Iran annually is the occurrence of floods. This hazard has been a significant contributor to causing extensive damage in recent years. The most crucial point regarding environmental-structural indices is the high importance of natural hazards according to respondents. In other words, the two indices with the highest importance among the fifteen environmental-structural indices are those related to environmental risks.

The accessibility of the Jihad University tourist Complex is the third most important index in reducing vulnerability, according to respondents. This index, focusing on how accessibility is addressed, can play a vital role in reducing vulnerability in the Jihad University tourist Complex. The ease and speed of access, both before the crisis for users and during and after the crisis, have a significant impact and contribute to reducing vulnerability.

Another crucial index in the physical-environmental component is the Building Density Index. This index holds an importance level of 0.097, ranking fourth in importance among the physical-environmental indices. The higher the building density and the more challenging the access, the greater the human and financial losses to the tourism Complex during and after a crisis. Conversely, lower building density will result in reduced vulnerability in the tourism complex (Fig. 5).

Infrastructure and firefighting station equipment were ranked fifth and sixth in importance among the physical-environmental indices. Infrastructure includes energy, roads, water, electricity, gas, telecommunications, and other components that can significantly play a role in reducing vulnerability in the tourism complex. The higher the quantity of these infrastructures, the lower the damages, and vice versa. On the other hand, well-equipped firefighting stations can play a key role during and after a crisis. If these facilities are up-to-date and sufficient, the level of damage will decrease. This index holds an importance level of 0.072, ranking sixth in importance among the physical-environmental indices.

The presence of open spaces in any complex can play a crucial role during and after a crisis. Given that crises, especially environmental crises, occur suddenly and
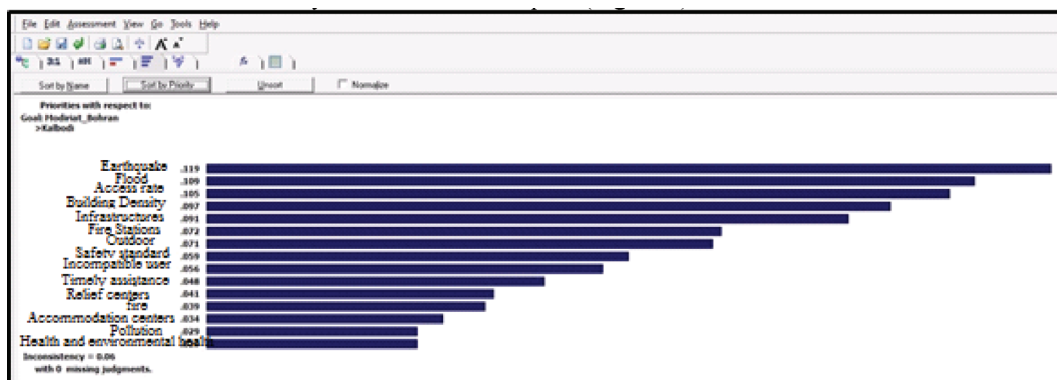

Fig. 5. A pairwise comparison of effective physical-environmental indices in reducing vulnerability in the tourism complex of Jihad university.

simultaneously affect the environment, the open spaces in such communities can particularly contribute to reducing vulnerability, especially in terms of human casualties. Therefore, it holds significant importance in vulnerability reduction.

Among the examined indices in the physical-environmental component, the Environmental Health and Safety index has allocated the least importance. According to the pairwise comparison of indices, this index, with a weight of 0.029, ranks last in importance among the physical-environmental indices.

In crisis management, institutions and organizations can have a significant impact in each region, contributing to the acceleration and effectiveness of crisis management when a crisis occurs. Hence, seven institutional indices, including optimal management deployment, pre-crisis management, during and post-crisis management, government intervention, intra and inter-organizational coordination, relationships, performance, and infrastructure, have been considered for evaluating the tourism complex at Jihad University [2, 8, 9, 13, 17, 18]. Among the seven institutional indices examined in the tourism complex at Jihad University, the Optimal Management Deployment index has been assigned the highest importance according to the respondents. This index, with an importance level of 0.245, holds the first rank among the institutional indices. Given that optimal management during a crisis can play a significant role in vulnerability reduction, this index is of utmost importance. Therefore, optimal management deployment is essential in the tourism complex to effectively reduce damages during crises.

Pre-crisis, during, and post-crisis management is also crucial in this component and holds the second rank in importance. The most critical factor during and after a crisis is the management approach, implying the need to control and respond effectively to damages and risks during and after a crisis.

Government intervention is another essential index in the institutional component. It is known that significant damages occur to the complex and residents of the tourism complex during and after a crisis. Furthermore, the government can, to some extent, alleviate these damages through its intervention.

One of the influential indicators during and after a crisis that has been examined is internal and external organizational coordination. Given the considerable turmoil observed among various organizations and entities, even within organizations, during recent crises such as floods and earthquakes in the country, it is essential to establish comprehensive coordination to achieve optimal performance in reducing vulnerability. Other indicators, such as relationships, performance, and infrastructure, have also been investigated in the tourism complex of Jihadi University. These indices have been prioritized in the final considerations based on individuals' responses. Figure 6 illustrates the pairwise comparison of the effective institutional indicators in reducing the vulnerability of the Jihadi University tourism complex.

As noted earlier, each decision-making problem is confronted with multiple indicators, so understanding the relative importance of indicators is essential (Table 2). Therefore, a weight is assigned to each indicator in a way that the sum of the weights of the indicators equals one. Various methods, including entropy, linmap, least squares method, and eigenvector methods can be used. In this study, considering the nature of the TOPSIS method, the entropy approach was utilized, whereby calculating the entropy related to each indicator and then the deviation from its standard, the weight of each indicator is determined. This can be calculated through the following formulas (Table 3).

$$E_j = -k \sum_{i=1}^{m} P_{ij} \times Ln\, P_{ij} \quad i = 1, 2, \ldots, m$$
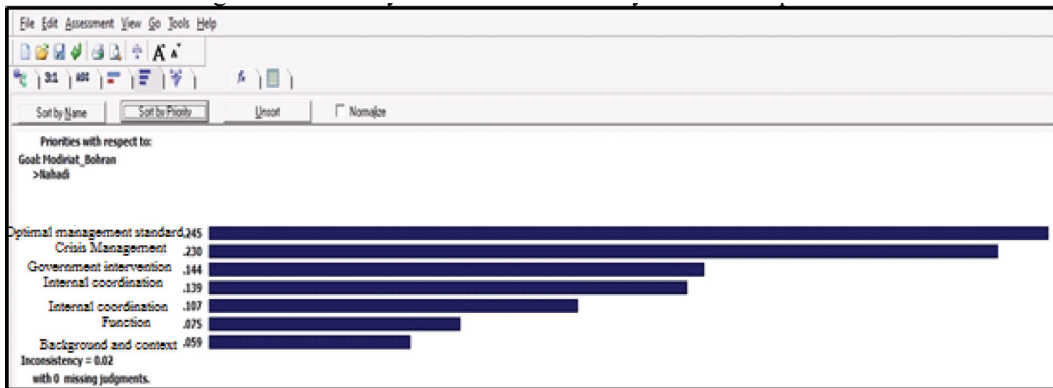
Fig. 6. Pairwise comparison of effective institutional indicators in reducing vulnerability in the tourism complex of Jihadi university.

Table 2. Normalized weight matrix for each investigated indicator in the vulnerability reduction in Jihad university tourism complex.

Unscaled normalized N	Economic component	Social component	Physical-environmental component	Institutional component
Taxes and duties received	0.28	0.25	0.015	0.015
Building density	0.23	0.19	0.22	0.22
Flood	0.23	0.25	0.22	0.29
Infrastructure	0.17	0.19	0.22	0.15
Fire station equipment	0.17	0.19	0.15	0.15
Internal and external coordination	0.28	0.25	0.22	0.22
Crime	0.25	0.19	0.22	0.22
Earthquake	0.23	0.31	0.30	0.22
Appropriate treatment and hospitality of citizens	0.28	0.31	0.22	0.22
Access rate	0.23	0.19	0.22	0.29
open spaces	0.23	0.19	0.15	0.18
Exchange rate fluctuations	0.28	0.19	0.30	0.29
Downturn	0.28	0.25	0.30	0.29
Establishment of optimal management	0.28	0.19	0.30	0.29
Severity of damage	0.23	0.19	0.22	0.22
social participation	0.17	0.25	0.22	0.22
Management pre-, during, and post-the crisis	0.17	0.25	0.22	0.22
Feeling calm and relaxed	0.17	0.25	0.22	0.22
Government intervention	0.17	0.19	0.15	0.22

Where K is a constant number that keeps the entropy between 0 and 1. Pij is the normalized weight.

$$D_j = 1 - E_j$$

$$w_j = d_j / \sum d_j$$

Then, the determination of the positive and negative ideal was addressed (the maximum and minimum values in each indicator). To form the positive ideal option (A+), the best

Table 3. Entropy calculation of th components' importance.

Indices	Indice entropy Ej	Deviation degree dj	Normalized weight Wj	Rank
Institutional component	0.940	0.060	0.222	4
Physical-environmental component	0.936	0.064	0.236	3
Social component	0.932	0.068	0.0251	2
Economic component	0.922	0.078	0.0291	1

Table 4. Positive and negative ideals of each component.

Positive and negative ideal	Economic component	Social component	Physical-environmental component	Instittional component
V +	0.0398	0.0790	0.0665	0.0853
V −	0.0663	0.0474	0.0333	0.427

value should be chosen in each column of the V matrix. Conversely, for the formation of the negative ideal solution, the minimum value in the columns of the indicators was selected (Table 4).

Subsequently, the relative proximity of each option to the ideal solution was calculated. The Euclidean distance of each option from the positive and negative ideals was computed using the following formula. The final step was to calculate the ideal solution. In this step, the relative proximity of each option to the ideal solution was determined. Then, the distance of each option to the positive and negative ideals was calculated, as shown in the matrix below. The distance of option I to the positive ideal was represented by the symbol d_i^+ and to the negative ideal by the symbol d_i^-. The calculation method for each of the indicators from the positive and negative ideal limits is provided below.

$$d_i^+ = \sqrt{\sum_{j=1}^{n}(V_{ij} - V_j^+)^2}$$

$$d_i^- = \sqrt{\sum_{j=1}^{n}(V_{ij} - V_j^-)^2}$$

The Index of Closeness to the Ideal Option (CL_i) was calculated through the following formula. The value of the similarity index ranges between zero and one. The closer this value is to one, the closer the solution is to the ideal answer, indicating a better solution (Tables 5 and 6).

$$CL_i = \frac{d_i^-}{d_i^- + d_i^+}$$

Based on Table 6, the earthquake and flood risks were ranked first and second among all indicators. The economic indicator of economic recession is considered next in importance. Among all the studied indicators in this section, open spaces ranked last.

Table 5. Distance between options and ideals and their relative proximity to the final solution.

Distance	d +	d −
Taxes and duties received	0.0623	0.0158
Building density	0.0437	0.0301
Flood	0.0265	0.0502
Infrastructure	0.0556	0.0313
Fire station equipment	0.0627	0.0265
Internal and external coordination	0.410	0.0131
Crime	0.437	0.0301
Earthquake	0.0251	0.0523
Appropriate treatment and hospitality of citizens	0.379	0.416
Access rate	0.0381	0.0477
open spaces	0.0640	0.0133
Exchange rate fluctuations	0413/0	0541/0
Downturn	0309/0	0564/0
Establishment of optimal management	0413/0	0541/0
Severity of damage	0437/0	0301/0
social participation	0313/0	0410/0
Management before, during, and after the crisis	0313/0	0410/0
Feeling calm and relaxed	0313/0	0410/0
Government intervention	0516/0	0340/0

Table 6. Final prioritization of indicators based on their relative distance to the ideal.

Importance order	Indices	Final score
1	Earthquake	0.676
2	Flood	0.655
3	Downturn	0.646
4	Establishment of optimal management	0.567
4	Exchange rate fluctuations	0.567
5	social participation	0.567
5	Management before, during, and after the crisis	0.567
5	Feeling calm and relaxed	0.567
6	Access rate	0.566
7	Appropriate treatment and hospitality of citizens	0.523
8	Internal and external coordination	0.433
9	Crime	0.408
9	Severity of damage	0.408
9	Building Density	0.408
10	Government intervention	0.402
11	Infrastructure	0.360
12	Fire station equipment	0.297
13	Taxes and duties received	0.202
14	open spaces	0.172

6. Conclusion

6.1. Economic

Based on previous studies in tourism industry crises, 9 economic indicators, including economic recession, exchange rate fluctuations, received taxes and duties, laws and regulations, insurance, savings, income, damage severity, and recovery capability, were utilized to reduce vulnerability in the Jihadi University tourism complex in Kermanshah.

To assess the importance of each economic indicator in the Jihadi University tourism complex in Kermanshah, the Analytical Hierarchy Process (AHP) method was employed. According to the results, it is noted that the economic recession indicator has allocated the highest importance among economic indicators. This indicator has obtained the highest value, with 0.21, according to respondents. Considering that economic recession can adversely affect other sectors in any society, in this case, if an economic recession occurs, tourism and tourism complexes will also be affected. Therefore, economic growth and development can play a significant role in the growth and development of the tourism complex in Kermanshah. Conversely, economic recession plays a crucial role in harming this complex. Accordingly, in comparison with other indicators, the economic recession indicator has assigned the highest impact in terms of vulnerability in the tourism complex in Kermanshah according to the respondents' perspectives.

Foreign exchange rate fluctuations are another important indicator of the growth, development, and vulnerability level of the Kermanshah tourism complex. Iran's currency has experienced significant fluctuations in recent years, mostly related to the increase in the exchange rate, which can impact increased costs, reduced consumer purchasing power, and decreased utilization of the Kermanshah tourism complex. Therefore, economically, the Kermanshah tourism complex may face significant challenges in such scenarios. Accordingly, based on the respondents' opinions, the foreign exchange rate fluctuations index is ranked second in importance among the examined indicators, with an importance level of 0.183 after the economic recession.

In summary, the insurance index has been accorded the least significance among the various economic indicators. This is particularly noteworthy given the emerging stage of the insurance industry in Iran, which has yet to fully establish its position. Respondents have consistently ranked it as the least important economic indicator in their assessments.

The findings of this study affirm the validation of the first hypothesis. Despite the exploration and valuation of additional components in this research, the primary indicators highlighted in the initial hypothesis retain their paramount importance according to the obtained results.

6.2. Social

In the social section, 11 indicators were extracted and evaluated based on previous studies, including social trust, social participation, social support, turmoil, crime, cultural promotion, crisis coping skills, public concern, social adaptation, appropriate behavior, and citizen hospitality.

From the pairwise comparison of social indicators, it is observed that social participation showed the highest importance according to respondents. This indicator, with an importance level of 0.158, is ranked first among the social indicators. Considering that social participation is currently of high importance in all matters, and in the presence of high social participation, the vulnerability of the Kermanshah tourism complex will decrease, and vice versa.

The sense of tranquility and peace of mind in the Kermanshah tourism complex is one of the most important social indicators. This indicator, with an importance level of 0.131, was placed second among the social indicators, highlighting its high significance. Since tourists in tourism environments seek relaxation and enjoyment during leisure time, the higher the sense of tranquility in the tourism complex, the lower the vulnerability of the complex. Conversely, if the level of tranquility in the complex is lower, people will be less inclined to use the facility, leading to a decrease in the number of users and consequently harming the complex.

On the other hand, tourists prefer to experience appropriate interactions from the host community, and wherever these interactions were more suitable, the number of users and visitors to this Complex increased. Therefore, this indicator holds significant importance among social indicators and ranks third in importance among the 11 indicators.

The levels of crime and disorder were two other indicators investigated in reducing the vulnerability of the Kermanshah tourism complex. As mentioned earlier, tourists prefer the environment they utilize to be calm and secure, deriving the utmost pleasure from the surroundings. Thus, when crime and disorder are high in the complex and surrounding areas, the general interest in using these places decreases and the vulnerability of the tourist complex increases. Considering these factors, these two indicators rank fourth and fifth in terms of their importance in reducing vulnerability.

Finally, the social skills indicator was placed with the least importance among the studied indicators. This indicator holds an importance level of 0.050 and was positioned at the last rank of importance.

In this study, 15 physical-environmental indicators have been considered to evaluate the vulnerability of the Kermanshah tourism complex, including accessibility, open spaces, building density, infrastructure, incompatible uses, firefighting station equipment, accommodation, and welfare centers, information center, environmental health, adherence to safety standards, timely relief, floods, earthquakes, fires, and pollution.

Since environmental risks are one of the most crucial factors leading to crises in any environment, earthquake response stands out as the most important among the examined physical-environmental indicators in the Kermanshah tourism complex, according to respondents. The vulnerability of the Kermanshah University Jihad tourism complex to earthquakes has been assigned the highest importance, with a significance level of 0.119, ranking first among the physical-environmental indicators.

6.3. Physical-environmental

The most important point regarding physical-environmental indicators is the high importance of natural hazards from the perspective of respondents. In other words, the two indicators that have the highest importance among the fifteen physical-environmental indicators are those related to environmental hazards.

The level of access to the Kermanshah tourism complex is the third most important indicator according to respondents, in the context of reducing the vulnerability of the tourism complex. Another critical indicator in this component is the building density indicator, with an importance level of 0.097. This indie was ranked fourth in importance among the physical-environmental indicators.

Among the examined indicators in the physical-environmental component, the environmental health indicator has assigned the least importance to itself. Based on the pairwise comparison results, this indicator is positioned at the last rank of importance among the physical-environmental indicators with a weight of 0.029.

As mentioned above, natural hazards and access to roads, along with the equipped firefighting stations, were important indicators in reducing the vulnerability of the Kermanshah Jihad University tourism complex.

6.4. Institutional

Regarding the institutional component, seven indicators have been examined based on previous studies, including performance, infrastructure, relationships, optimal

management deployment, pre-, during-, and post-crisis management, intra- and inter-organizational coordination, and government intervention.

Among the seven institutional indicators examined in the Kermanshah University Jihad tourism complex, the optimal management deployment indicator has been assigned the highest importance according to respondents. This indicator, with an importance level of 0.245, ranks first among the institutional indicators.

Pre-, during-, and post-crisis management was also an important indicator in this component, ranking second in importance. Relationship, performance, and infrastructure indicators were among the other examined indicators in the institutional component and, according to respondents, were placed at the end of the priority list.

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