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Investigation of Components of Crisis Management Strategy Implementation Model in Bahabad County, Iran

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Original Article

Abstract

INTRODUCTION: Crisis is one of the issues of human societies; the management of each of its stages requires a crisis management strategy; therefore, the purpose of the present research is to explain a model for the implementation of earthquake crisis management strategy in Bahabad County, Iran.

METHODS: In this study qualitative- quantitative research, Grounded Theory method was used in qualitative part. The statistical population in the qualitative phase included 12 specialists and experts who were familiar with crisis management. In the quantitative phase, a total of 53 ones were studied by using a researcher-made questionnaire who were responsible in the institutions subject to Articles 2 and 10 of the crisis management law of the country approved by the Islamic Consultative Assembly of Iran. About 47 ones were selected based on Morgan's table. The inferential statistics such correlation coefficient, regression coefficient, and multivariate variance analysis was used to find the relationship between the variables.

FINDINGS: In the qualitative part, 21 categories were separated after the theoretical saturation resulting from interviews with specialists and experts and then in the quantitative phase, these categories were divided into questions. The analysis of the neural network indicated that the significance of the components of strategy implementation in predicting the mentioned model in Bahabad County, Iran, so that "leadership" had the most impact and "data production, update, and processing" had the least effect on the model prediction.

CONCLUSION: Based on the presented model, the strategy implementation components are operationalized in each of the pre-crisis, during-crisis and post-crisis stages correspondingly through the three processes, including "tool-making", "flow-making," and "institution-making." According to the results, by upgrading these processes, the feasibility of the proposed model will increase as well.

Keywords: Crisis management; Strategy implementation; Tool-making; Flow-making; Institution-making.

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Introduction

Earthquake is one of the most important environmental hazards in many cities in Iran (1); therefore, it is of great significance to pay attention to the possibility of its occurrence and take necessary measures for crisis management (2). It is noteworthy that crisis management is a special type of management that is, through regular observation of crises, in search of access to a tool that can prevent the occurrence of crises, or reduce the effects of crises, present necessary preparations to carry out operations related to relief, control, restoration, and reconstruction (3). The examination of recent events in the world indicates that paying attention to the strategy implementation model can increase the operationalization of strategies and preparation for crises (4) since the strategy implementation model

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is a main process in the realization of strategies and assists managers in complying with their management roles in different crisis situations (5). In other words, the concept of crisis and the implementation of methods to cope with can only be understood through the strategy implementation model (6). Therefore, it is important to achieve the crisis management strategy implementation model. For the formulation of this model, strategy variables and strategy implementation variables in earthquake crisis management in a high-risk area (Bahabad County, Iran) are examined in terms of seismicity.

Mohammadifar et al. (2019) presented a paradigm model extracted from axial coding, based on which development of structural changes and revision of tasks allocation in the body of crisis management or the reduction of unnecessary administrative and organizational procedures can lead to proper crisis management (8).

Amini Alashti and Arabi (2016) presented the appropriate model for implementing the strategy of Water and Sewerage Company of Tehran Province, Iran by identifying factors of strategy implementation and the relationships governing these factors, aligning structural, behavioral and functional factors, as well as fitting environmental factors along with the formulation of operational plan (9). Azizpour et al. (2013) presented some solutions for urban crisis management to reduce vulnerability while prioritizing effective factors in crisis management (10). Samuel et al. (2022) declare that due to the low performance of Botswana's strategy, the national plan and policy has expired and should be renewed by evaluating the national strategy of Gaborone County and comparing it with the objectives and criteria of the risk management performance indicator (11). Karam (2018) concluded that hotels should face the crisis as an integrated part of the strategic plan (12). Taneja et al. (2014) concluded that every organization should develop comprehensive methods and operational plans for crisis prevention and management. Therefore, in critical situations caused by economic, political, structural, and environmental events, it is necessary for the leaders of organizations to employ the strategic crisis management model and ensure that all employees understand this model and can conduct the operational plans for responding to the crisis and methods that are an integral part of the strategic crisis management plan (13).

The research plan for seismic geotechnical zoning of Bahabad, Iran, indicates that there have been devastating and deadly earthquakes in this area, and the probability of its occurrence in the future is considerably high (7). Therefore, there is a need to formulate a new strategy implementation model to reduce the consequences of potential earthquakes. Accordingly, the main objective of the research is to develop a crisis management strategy implementation model in this County. By employing the viewpoints of specialists and experts familiar with crisis management, the identification of the indicators and components effective in earthquake crisis management was carried out. Afterwards, after the evaluation of geographic, climatic, demographic, and natural factors causing a crisis in this County and describing the field data obtained from the responses to the questionnaire by the relevant people in the crisis management institutions in Bahabad County and Yazd province, Iran, the obtained results were used for inferential analysis of data and the investigation of relationships between research variables. Then, the effective factors in the implementation of the crisis management strategy (factors explaining the crisis management strategy implementation model) were investigated using the SPSS-26 multivariate analysis of variance, multiple regression analysis, and neural network. Finally, these actions resulted in the development of a "crisis management strategy implementation model."

Methods

The present study was done based on a mixed method qualitative and quantitative phases. In the qualitative phase, the grounded theory was used. In the quantitative phase, the descriptive-correlational method was employed. The statistical population in the qualitative phase included 12 specialists and experts familiar with crisis management. In the quantitative phase, the statistical population was 53 individuals based on Articles 2 and 10 of the crisis management law of the country approved by the Islamic Consultative Assembly of Iran (14), including responsible people and members of crisis management headquarters in Bahabad County and Yazd province, Iran. According to Morgan's table, the sample size was obtained to be 47 people. In the

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present study, the data collected through books, reliable and relevant magazines, specialized publications, theses, research projects and other documents and resources, interviews, and researcher-made questionnaires.

Findings

The geographical area for the research was Bahabad County which is located in the southeast of Yazd province and is adjacent to Kerman and South Khorasan provinces in Iran (Figure 1). This County includes one County, three rural districts, and 83 inhabited villages. The population of this County is 1721 people (16); 54% and 46% live in urban and rural areas, respectively (15).

According to the Iranian Code of Practice for Seismic Resistant Design of Building, Standard No 2800 4th edition, Bahabad County is known as one of the regions with a relatively high risk of earthquake (16). Moreover, the research plan for seismic geotechnical zoning of Bahabad indicates that due to the existence of various faults in the region, especially Kouhbanan and Bahabad faults, there is a possibility of the incidence of an earthquake with a magnitude of 7 on the Richter scale (7).

In the qualitative method using grounded theory method, after theoretical saturation from the opinions of 12 specialists and experts familiar with crisis management, 67 open codes were extracted; after comparing and classifying these codes, 50 concepts were obtained. Finally, these concepts were divided into 26 categories through the classification of concepts. In the central coding stage, according to the relationship between the obtained categories, the central category was determined, and the causal conditions, intervening conditions, background conditions, strategy and consequence were categorized and placed in their position in the paradigm model. The background conditions include high-risk areas, resilience of people, and management. Moreover, the causal conditions include resource evaluation, foresight, training-learning and resilience improvement, rapid evaluation, crisis response, crisis containment, damage evaluation, reconstruction-rehabilitation and structural reforms, as well as strategy evaluation. Additionally, intervening conditions include providing financial and human resources and equipment, data production, update, and processing, planning and policy-making, prioritization, leadership, provision of emergency services, institutions of information gathering and media coverage, institutions of financial, economic, and relief support, as well as institutions of supervising performance. The central phenomenon includes the crisis management strategy implementation model. The strategy involves the implementation of the crisis management strategy depending on the processes of tool-making before the crisis, flow-making during the crisis, and institution-making after the crisis. Finally, the consequence includes a decrease in the negative consequences caused by the crisis, the result of which is expressed in the form of a paradigm model along with the theory by integrating the categories in selective coding. It is noteworthy that the reliability of qualitative research is calculated to be 0.9 based on Holstein's formula, which is desirable. Moreover, its validity is acceptable based on Maxwell's descriptive validity (correctness of research data by the researcher).

In the quantitative method, the categories resulting from the qualitative method in the form of a questionnaire and a 5-point Likert scale of "very low, low, medium, high, very high" were answered by the statistical population, including 47 people responsible for the crisis management law of the country. The results obtained from the questionnaire, according to the significance given by the respondents to each of the categories as components of the crisis management strategy implementation model, are presented in Table (1).

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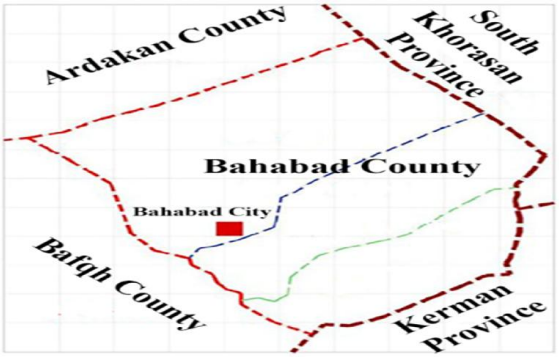

Figure 1. Geographical map of Bahabad County in Yazd province, Iran (16)

Table 1. Significance level of effective components in the formulation of crisis management strategy implementation model for the times of earthquake incidence in Bahabad, Iran

Components	Importance (%)	Very Slightly Important	Slightly Important	Moderately Important	Very Important	Extremely Important	Extremely Important
Strategy	Resource Evaluation	-	14.8	13.7	28.7	42.8	71.5
	Foresight	-	-	2.2	31.1	62.2	93.3
	Training/ Learning	-	-	-	31.1	68.9	100
	Resilience Improvement	-	-	8.9	44.14	46.7	90.84
	Rapid Evaluation	-	-	2.2	31.1	66.7	97.8
	Crisis Response	-	-	4.14	24.14	68.9	93.04
	Crisis Containment	-	-	2.2	42.2	55.6	97.8
	Damage Evaluation	-	-	2.22	55.6	22.2	77.8
	Reconstruction, Rehabilitation	-	-	2.2	46.7	51.1	97.8
	Structural Reforms	4.4	6.7	17.8	15.6	53.3	68.9
	Strategy Evaluation	-	-	13.3	42.2	44.4	86.6
Strategy implementation	Providing Financial & Human Resources & Equipment	2.2	11.1	11.1	31.1	44.4	75.8
	Data Production, Update & Processing	-	2.2	13.3	40	44.4	84.4
	Planning & Policy Making	-	-	2.2	31.1	64.4	95.5
	Prioritization	-	-	8.9	44.4	45.5	89.9
	Leadership	-	-	-	26.1	73.5	100
	Provision of Emergency	-	-	2.2	31.1	67.7	98.8
	Institutions of Information Gathering & Media Coverage	-	-	24.4	35.6	40	75.6
	Institutions of Financial, Economic & Relief Support	-	-	2.2	33.3	64.4	97.7
	Institutions of Supervising Performance	-	-	11.3	32.8	49.9	82.7
Process	Tool-Making	-	-	6.7	44.4	48.9	94.4
	Flow-Making	-	-	2.2	33.3	64.4	97.7
	Institution-Making	4.4	-	15.6	46.7	33.3	80

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The reliability of the questionnaire was evaluated to be acceptable according to the value of Cronbach's alpha (0.803) to answer the research hypotheses, and the validity of the questionnaire was confirmed via face validity by experts and specialists. In the quantitative method, inferential statistics (correlation coefficient, regression coefficient, multivariate analysis of variance, and neural network) were employed to answer the research questions.

Investigation of the Feasibility of the Implementation of the Proposed Strategy Model in Earthquake Crisis Management in Bahabad County, Iran

The investigation of the applicability of this model in the three phases of the earthquake crisis in Bahabad is the result of the responses extracted from the questionnaire based on "tool-making, flow-making, and institution-making processes," which determines meaningful relationships between "tool-making, flow-making and institution-making processes" and their applicability in the crisis management strategy implementation model. The multiple correlation coefficient between "tool-making, flow-making and institution-making processes" and the capability of these processes in the proposed model was equal to 0.847, which was significant with a confidence level of 99%, and its coefficient of determination was 0.692. In other words, 69.2% of the variance of the capability of the proposed model is explained by the tool-making, flow-making and institution-making processes, and the remaining 30.8% depends on other factors. Moreover, the variance analysis confirms the meaningfulness of the regression at the level of confidence of 99%. Considering the variables introduced to the regression model, it can be observed that with one unit change in the standard deviation, the applicability of the proposed model will create 0.847 units of change in the standard deviation of the tool-making, flow-making and institution-making processes. Therefore, it can be declared that by improving the components of tool-making, flow-making and institution-making, the feasibility of implementing the proposed model increased, and the relationship between two variables (i.e., strategy implementation components [independent variable] and strategy components [dependent variable]) was confirmed.

Prediction of the Components of the Proposed Model for the Implementation of Crisis Management Strategy in Bahabad County, Iran, Using Neural Networks

The results of the neural network analysis in Figure (2) indicate its efficiency and acceptable accuracy in predicting the components of the proposed model. In the present study, the prediction of the components of the crisis management strategy implementation model in Bahabad County was performed using neural networks. First, approximately 69.2% (for neural network learning) and 30.8% (for processing) of all the data employed in the neural network model were entered into the network. The input field includes the independent variables of the research, and the leadership component is considered the basic input of network communication due to the largest standard distance from other variables among the nine independent variables of the research.

According to the prediction resulting from the neural network analysis for the components of crisis management strategy implementation in Bahabad County, the following results are presented:

1) The accuracy evaluation measures of the neural network model indicate an average correlation of 0.961, a coefficient of determination of 0.925, and an average square error for the learning stage to be 0.0138 and for the analysis stage to be 0.0361, which demonstrates the precision and validity of the neural network in the prediction of the proposed components in the strategy implementation model in Bahabad County, Iran.

2) According to Table (2), the "leadership" component, with a normalized importance of 98.3%, has the greatest impact and the "data production, update, and processing" component, with a normalized importance of 8.3%, has the least impact in the prediction by neural networks.

3) According to Figure (3), the real values of the components of the crisis management strategy implementation model are indicated with the predicted values in the neural network, which demonstrates the acceptable precision of the neural network in the prediction of the components.

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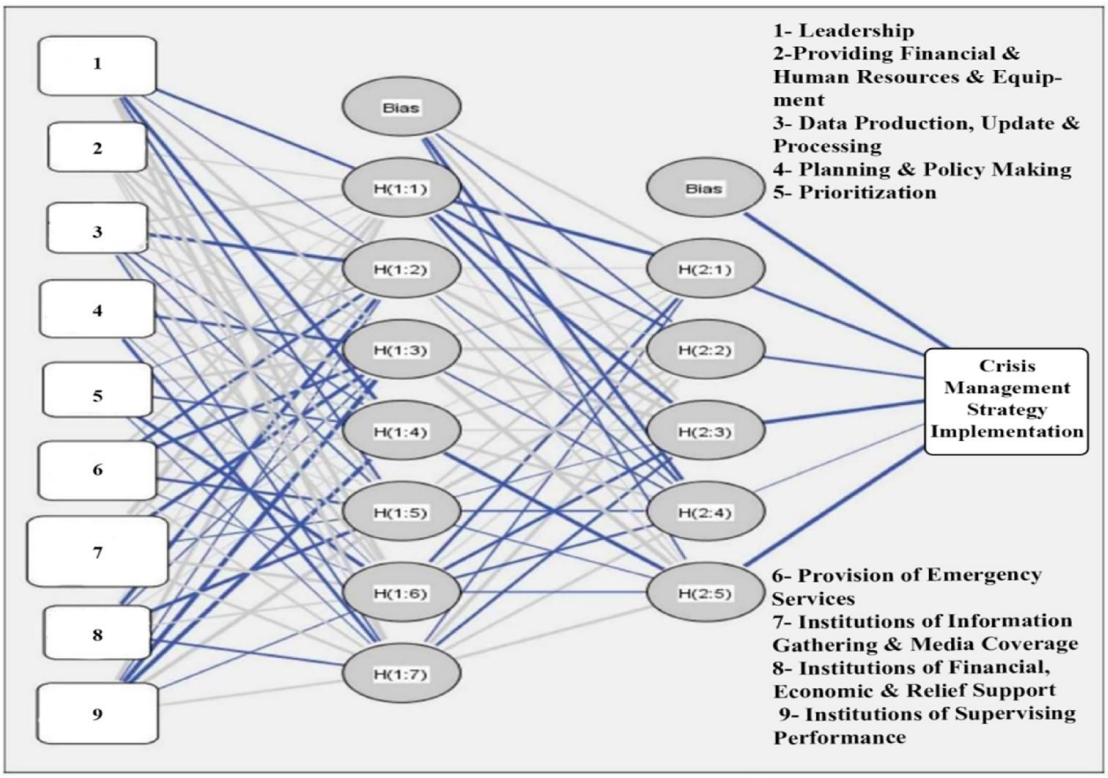

Figure 2. Graphical relationship of data input and output and their connection in the neural network

Table 2. Importance of independent variables

Independent Variable	Importance	Normalized significance (%)
Providing Financial & Human Resources & Equipment	0.163	53.4
Data Production, Update & Processing	0/021	8.3
Planning & Policy Making	0.096	39.5
Prioritization	0.184	56.7
Leadership	0.312	98.3
Provision of Emergency Services	0.142	47.8
Institutions of Information Gathering & Media Coverage	0.086	32.7
Institutions of Financial, Economic & Relief Support	0.091	35.2
Institutions of Supervising Performance	0.234	79.9

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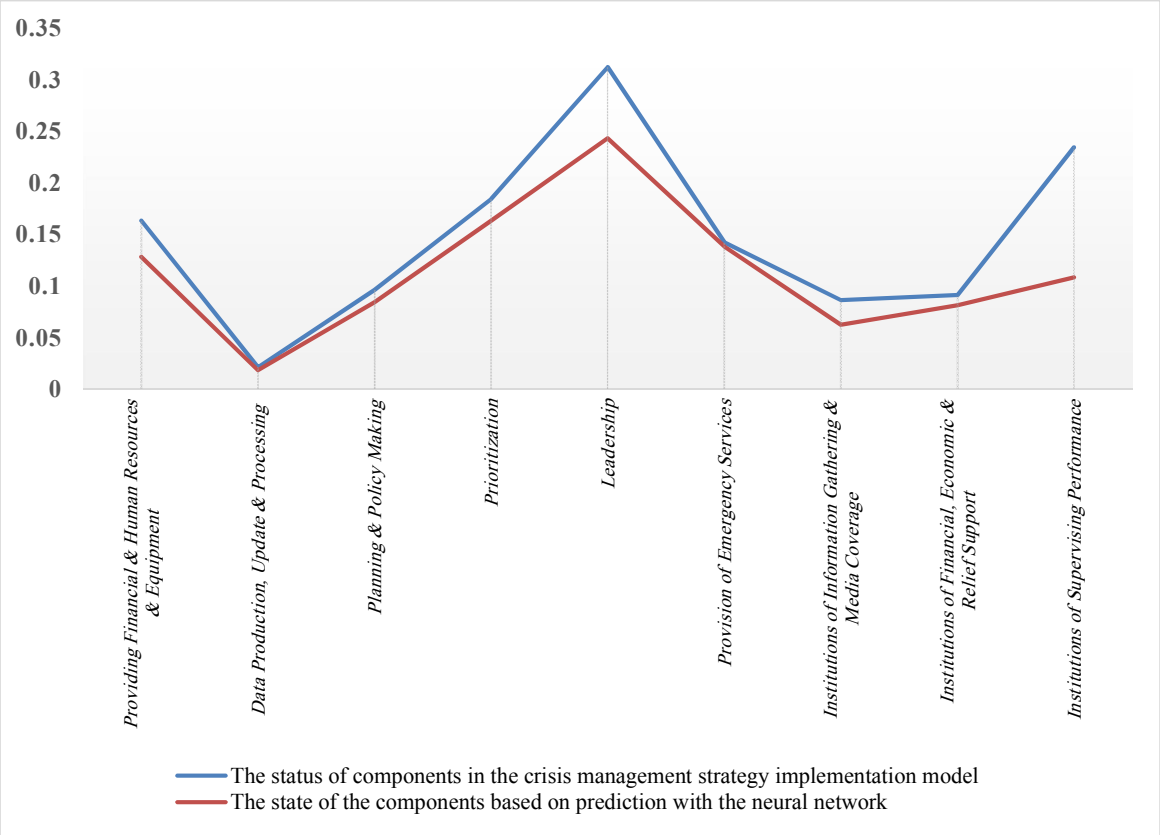

Figure 3. Comparison the values of the crisis management strategy implementation model components in the present conditions with the predicted values in the neural network

Discussion and Conclusion

The results obtained from the qualitative method led to the selection of 21 categories, while the quantitative method involved measuring the proposed components of the "crisis management strategy implementation" model through a questionnaire. The proposed model is considered a process-conceptual model because, in addition to demonstrating the stages of successful strategy implementation, it indicates the factors influencing strategy implementation. Furthermore, despite the common components with strategy implementation models and crisis management models, additional components derived from the approaches presented in this research can be observed as well.

In the presented model, similar to many "crisis management models," such as the "Burnett model of crisis management," different layers are observed. Moreover, this model is cyclical, similar to the "Thierry and Mitroff model of crisis management." Moreover, like most strategy implementation models, such as "Andrew MacLennan's model," it induces a step-by-step process with a logical set of tasks.

It should be noted that previous research has always provided an approach to identify the factors influencing strategy implementation, such as the identification of structural reform strategy in the studies entitled "designing an indigenous model of crisis management for widespread natural disasters" and "evaluation of national disaster management strategy and planning for flood management and impact reduction in Gaborone, Botswana." Other research, including the studies entitled "identification of strategy implementation factors," the findings of Karam regarding the "importance of strategic planning," and another study on the "investigation of the prioritization of factors influencing urban crisis management", has also played a role in identifying factors influencing strategy implementation.

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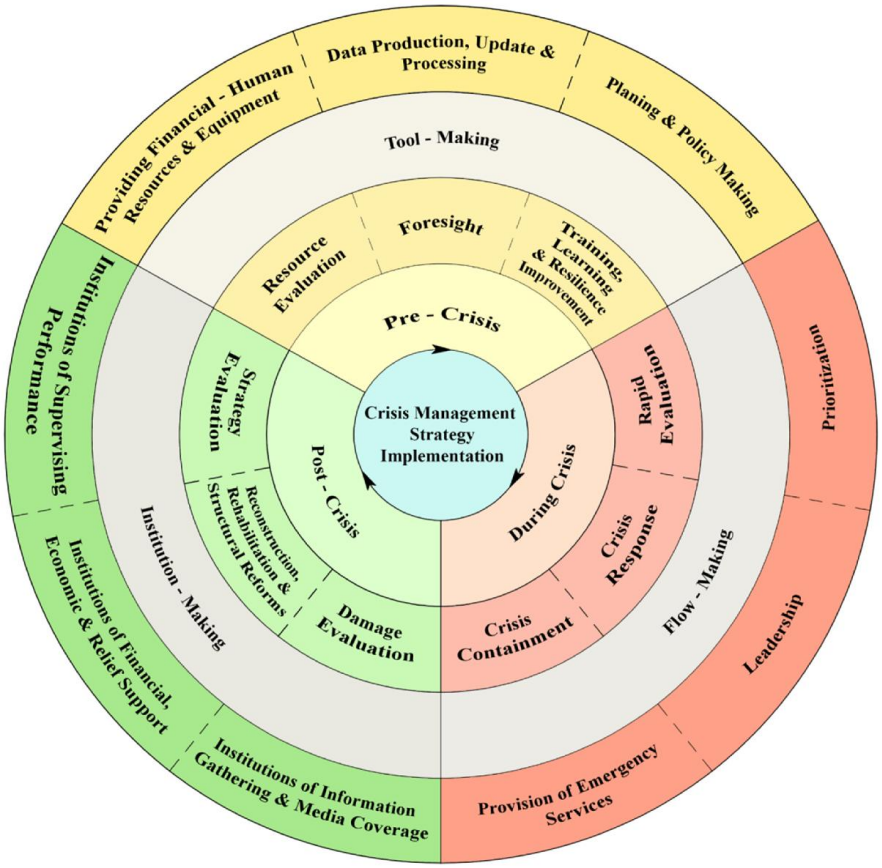

Figure 4. Amjad & Ebrahiminejad & Poursaeid's Crisis Management Strategy Implementation model

According to Figure (4), the presented model consists of a core and four layers as follows:

The core of this model encompasses the "crisis management strategy implementation," which serves as a pivotal point in the model, similar to the "Burnett model of crisis management." It acts as the initiator and link for strategy implementation across all stages of crisis management, signifying the interdependencies and connections between these stages.

The first layer is categorized into three phases: "pre-crisis, during crisis, and post-crisis," based on the temporal cycle of crisis management. This phase categorization aligns with various crisis management models, such as the "three-stage crisis management model."

The second layer comprises influential crisis management strategies within each of the pre-crisis, during-crisis, and post-crisis stages. The pre-crisis phase strategy includes resource evaluation, foresight, training-learning, and resilience improvement. The during-crisis stage strategy encompasses rapid evaluation, crisis response, and crisis containment. Moreover, the post-crisis stage strategy consists of damage evaluation, reconstruction, rehabilitation, structural reforms, and strategy evaluation. A comparative examination of this model with other crisis management models indicates that, although the shape and type of layering differ from a four-layer crisis management intervention model, they share similarities in having a layer as a strategy.

The third layer is related to the processes through which the strategy is implemented. Similarly, this layer can be observed as the model of the operational urban planning of the Ministry of Roads and Urban Development, which includes the tool-making, flow-making, and institution-making processes. The existence of the process layer in the proposed model is based on a systemic viewpoint (input, process, output), similar to the "Galbraith and Nathanson strategy implementation model" and the "Stonich strategy implementation model." In this regard, the

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strategy (input) is transformed into performance (output) through these processes in each of the pre-crisis, during-crisis, and post-crisis stages.

The tool-making process represents the pre-crisis phase and refers to the selection and allocation of tangible and intangible resources for preparedness for crisis, crisis management, and restoration of ideal conditions. This process encompasses the selection and allocation of financial and human resources and necessary equipment for managing all phases of a crisis. By creating databases, it establishes the foundations for planning and policy-making to predict, prevent, and limit crises and their damages, as well as for rehabilitation.

The flow-making process represents the during-crisis phase and involves the creation of a dynamic and continuous flow towards strategy implementation. It aims to overcome critical conditions and reach desirable situations through a participatory approach. This process initiates crisis response and containment, as well as the provision of emergency services. It requires leadership and involves rapid evaluation to understand the extent and severity of the crisis, environmental and human damages, destruction, casualties, and the prioritization of needs.

The institution-making process represents the post-crisis phase and focuses on establishing or strengthening social institutions with a defined philosophy of existence (clear structure, purpose, and mission). It involves collective efforts and adherence to human values to implement efficient activities and measures. This process includes the formation, improvement, and development of civil institutions and their active organization, enabling actions such as reliable data collection and dissemination, rehabilitation, reconstruction, normalization, and impartial monitoring.

The fourth layer is the final layer in the proposed model, and similar to the other layers, it corresponds to the phases of pre-crisis, during a crisis, and post-crisis, along with the tool-making, flow-making, and institution-making processes. It represents the components through which the strategy is operationalized and implemented.

The implementation of the strategy in the pre-crisis phase includes securing financial, human, and equipment resources, "data production, update, and processing," planning, and policy-making. Although these components are operational elements of strategy implementation in the pre-crisis phase, they are the main tools of crisis management in its three stages.

The implementation of the strategy in the during-crisis phase includes prioritization, leadership, and the provision of emergency services. When a crisis occurs, the most critical phase of crisis management is encountered with prioritization, leadership, and the provision of emergency services to respond to and contain the crisis.

The implementation of the strategy in the post-crisis phase consists of institutions of information gathering and media coverage, institutions of financial, economic, and relief support, as well as institutions of supervising performance.

In the development of this model, in order to combine independent and effective variables (crisis management strategy implementation) and dependent and effective variables (crisis management strategy), the determining factors of the crisis management strategy implementation model were examined using the SPSS software, multivariate analysis of variance, and multiple regression analysis. The results demonstrate the feasibility of implementing this model in the three stages of earthquake crisis management in Bahabad County, Iran. The utilization of multiple regression analysis determines the significant relationship between the tool-making, flow-making, and institution-making processes and their applicability in the proposed model. Furthermore, the results of the neural network analysis indicate an acceptable accuracy in predicting the components.

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Conflict of Interests

The authors declare no conflict of interest.

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