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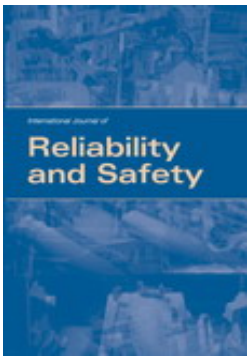

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Enhancing organisational reliability in public organisations: evidence from Iran

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Abstract: This qualitative study examines methods for improving organisational reliability in Iranian public organisations. Sixteen (16) managers and experts from six (6) crisis-prone public agencies participated in the research, and a purposive sampling method was employed. Thematic analysis was used to analyse the collected data. The study's findings suggest that developing the soft dimensions of organisational reliability, such as cultivating human resources capabilities (including cognitive-psychological capabilities, attitudinal-behavioural capabilities), organisational capabilities (including planning capability, organising and coordinating capability, decision-making and delegation capability, preventive and supervisory capability), knowledge capabilities (including cultural capability, interactive-communicative capability, capability to learn, capability to innovate) and human resources management capabilities (including capability to attract, employ and retain human resources, evaluating and empowering capability), is crucial for enabling organisations to maintain their services during critical situations. The insights gained from this study can be helpful in crisis management in Iranian public organisations.

Keywords: organisational reliability; public organisations; qualitative research; crisis management; thematic analysis; soft dimensions.

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1 Introduction

Public organisations are responsible for providing citizens with a wide range of goods and services that are essential for their safety, security and well-being. However, the ability of public organisations to provide reliable services can vary, and they frequently encounter challenges in ensuring the safety and security of citizens. As a result, intrusions and errors that can impact reliability may occur within these organisations. Because of these human and technology-based errors, it is assumed that no organisation can ever function flawlessly, and thus, bureaucracies are not expected to be 'error-free' as well. Therefore, many public officials have come to accept that mistakes by workers and technological breakdowns are an inevitable reality threatening their organisational reliability. However, policymakers, operators and the general public demand that organisations anticipate and prevent errors while providing reliable services. Accordingly, public organisations acknowledge that error prevention and reliability go hand in hand (Sindhu et al., 2017; Kumar et al., 2019), and they must strive to perform their mission reliably while managing errors that can disrupt their service delivery.

Organisational reliability is defined as the organisation's ability to maintain a proper level of organisational performance by limiting the number of organisational errors (Tworek et al., 2020). While this definition is not limited to any kinds of organisation, early studies on organisational reliability often took an engineering approach, focusing on the hard dimensions of reliability and was conducted in 'exotic' organisations (Lekka, 2011). These organisations, which are characterised by interactive complexity and tight coupling (Agwu et al., 2019), are considered complex and somewhat unpredictable systems (Ghaith et al., 2022) that operate in high-stress environments. Paying attention to this kind of reliability for those organisations that operate in critical conditions, has been led to the emergence and institutionalisation of High Reliability Organisation (HRO) which was the primary focus of reliability studies at first. However, with the emergence of a conceptual shift (Moeini Korbekandi et al., 2023), the scope of organisational reliability studies gradually expanded. In the next generation of reliability studies, efforts were made to apply reliability principles to a broader range of organisations (Kim et al., 2022). As a result, an increasing number of researchers expanded the scope of organisational reliability to encompass all types of organisations, paving the way for a soft and cognitive understanding of reliability dimensions. However, the soft dimensions of the organisational reliability have a long way to go yet to be fully explored.

While research on soft dimensions of organisational reliability is limited, it is important to note that a significant portion of the reliability and sustainability of public organisations is not solely dependent on their hard elements (i.e., technology, tools and systems), but on their soft elements such as shared values, skills, organisational culture and the cognitive and communication characteristics of their human resources, or to put it differently, on the organisation's cognitive system (Jensen et al., 2022). An organisation's cognitive system refers to the internalised methods of sensemaking that its members use to interpret organisational phenomena. The concepts of sensemaking, sense-giving, enactment and collective mindfulness, particularly the latter, are essential to the cognitive system of reliable organisations (Weick et al., 1999; Hales and Chakravorty, 2016). In other words, the cognitive system of public organisations should be designed in a way that enables them to adapt to critical conditions and continue to function without significant harm, even as they learn from their mistakes (Al Lawati et al., 2019; Labib and Read, 2015). These organisations must have the ability to prevent failures or respond in a way that prevents failure from leading to disaster, and, in the event of catastrophic failures, they must be able to withstand the consequences.

Evidently, despite the varying levels of reliability among public organisations, the presence of numerous demanding stakeholders, policymakers and regulatory bodies has consistently increased the pressure on these organisations to prioritise reliability. Therefore, facing continuous pressures and conflicting goals (Tamuz and Harrison, 2006) and the urgent need of society to maintain service continuity, public organisations can benefit from the principles of soft organisational reliability to provide services more efficiently and effectively. Therefore, to enhance their performance and provide reliable services, public organisations should prioritise investment in the soft dimensions of organisational reliability. Consequently, this research aims to investigate investment opportunities in the soft dimensions of organisational reliability in public organisations. The key question that this study aims to answer is: What steps can public organisations take to enhance their organisational reliability and ensure continuity of service delivery? Therefore, the ultimate goal of this research is to identify the dimensions and components that can assist public organisations in improving their reliability and maintaining service delivery continuity.

2 Theoretical foundations and research background

Weick (1969) was the first scholar to focus on organisational cognition in the first half of the 20th century. He based his conceptualisation of organisational reliability on this idea, viewing organisations as environments composed of human perceptions and interpretations. His work on sensemaking, a fundamental concept in organisational cognition, raised awareness among researchers about the complexity, ambiguity and flexibility of organisational activities, such as decision-making, planning and strategising. Weick (2001) argued that effective sensemaking is the foundation of organisational reliability. In the late 1980s, Weick conducted research on sensemaking during various crises, which led him to develop theories about the requirements for creating stable organisations. He argued that a distorted cognitive system or sensemaking process could cause a situation to spiral out of control and result in a crisis. As a solution, he proposed 'collective mindfulness' as the remedy for this situation and the primary foundation of organisational reliability. By 'collective mindfulness,' he meant the

effective sharing of perceptions and expectations among operational teams to work coherently during crises. He believed that people must create effective mindfulness to pay attention to new stimuli in the situation and make sense of it properly (Starbuck and Karl, 2015). Building on these ideas and focusing on collective mindfulness, Weick et al. (1999) and Weick and Sutcliffe (2007, 2001) identified five characteristics of HROs: preoccupation with failure, reluctance to simplify, sensitivity to operations, commitment to resilience and deference to expertise.

Hales and Chakravorty (2016) added a sixth dimension to Weick's five characteristics of HROs, titled 'fast, accurate and strong information systems.' In addition to Weick's model, several researchers have developed models in the field of organisational reliability. For instance, Logan-Athmer's HRO framework (2022) included non-hierarchical leadership, transparent and continuous communication, deference to expertise, ability to innovate, motivation through recognition, self-reflection and commitment to visibility as characteristics of such organisations. Bieńkowska et al. (2020) proposed a reliability model based on three fields: human resources, information technology and management. Each reliability model comprises a type of capability that forms the basis of reliability in these three fields. Cooper et al.'s (2016) organisational reliability model comprises identifying a culture change champion, assessing organisational preparedness, determining a behavioural framework and model and classifying incident data using a serious safety event system as its core components. In the Casler's model (2014), an HRO has several dimensions, such as openness to the external environment, simplicity of objectives, societal performance demands, degree of risk, process complexity, organisational redundancy, operational control, professional diversity, organisational learning and organisational mindfulness. O'Neil's (2011) three-layer model focuses on the evolution of reliability as part of a larger reliable system, following evolutionary maturity in three dimensions. According to Ciravegna and Brenes (2016), the principles of HROs include investing in routine audits, continuously improving operations, involving the workforce in the strategy implementation process, establishing systems to manage unexpected events, emphasising organisational learning and developing routines and mechanisms that allow for flexibility and adaptability to changing conditions. Agwu et al. (2019) proposed a five-level organisational reliability maturity model, while Chassin and Loeb's (2013) reliability maturity model has three domains and fourteen components. Lekka (2011) developed a model that outlines the characteristics of HROs.

In addition to the theoretical models discussed above, there is also an empirical and rationalist literature that examines the causes and effects of organisational reliability. For instance, Müller et al. (2021) identified factors that affect knowledge transfer in HROs. Other studies in this category have focused on various factors that affect organisational reliability. These factors include social identity processes and identity leadership (Haslam et al., 2022), reliability culture (Cantu et al., 2020), planning (Tillement and Hayes, 2019), work instructions and checklists and awareness of limitations and abilities (Harrison et al., 2019), organising (Christianson et al., 2011; Busby and Iszatt-White, 2014), emotional ambivalence and social motivation (Vogus et al., 2014), communication and information sharing and designing systems with the aim of preventing, absorbing and reducing errors (Sanchez and Barach, 2012). Other factors that have been identified in the literature include internal factors such as organisational culture, knowledge management, work group structure, number of hierarchy levels and human resources policies and practices, as well as external factors such as the length of

the supply chain, ability of the companies involved, time and financial pressures (Parkes et al., 2012). Individual training and team communication (Miller et al., 2009), teamwork training and process design, acceptance of responsibility for quality and safety (Riley, 2009), paying attention to the human factor and developing systems to minimise accidents (Cox, 2008) are also important factors. Frankel et al. (2006) and Baker et al. (2006) emphasised the importance of just culture, leadership involvement in safety, teamwork and training, communication, incident reporting, learning at the individual and organisational level and the use of skilled temporary workers, positive employee relations and emphasis on training (Vogus and Welbourne, 2003), organisational factors such as decision-making, leadership and communication and human factors (Howe et al., 2023), personal and organisational factors, improving ability for better resource allocation (in the case of training or train the individual) or implement risk control measures (stricter scheduling rules) (Neves et al., 2024), organisational mindfulness, top management involvement and organisational structure (Hassandoust and Johnston, 2023). Finally, redundancy and diversity (Husted, 1993), resources and organisational structures and flexibility (Jahn, 2017) have also been identified as important factors for enhancing organisational reliability.

The studies discussed above indicate that researchers have primarily focused on the hard dimensions of organisational reliability, while giving less attention to the soft dimensions. Additionally, the characteristics identified in these studies do not provide a clear and comprehensive framework that can be applied to all public organisations. Therefore, this qualitative study aims to address this gap by providing insights into the soft dimensions of organisational reliability in public organisations. To do this, the study will use the thematic analysis to code the lived experience of the participants and to develop a comprehensive understanding of these dimensions.

3 Methodology and research design

Based on the exploratory nature of the research purpose, this study uses a qualitative research design to answer its research questions. To obtain data, semi-structured interviews were conducted.

3.1 Participants

The study included managers and experts from six crisis-sensitive public organisations in the Islamic Republic of Iran: The Civil Aviation Organisation, Social Security Organisation, Food and Drug Administration, Gas Company, Water and Wastewater Company and Railway Company. The participants were selected based on their work experience of more than 10 years, working in crisis management or safety management and having management education. Sixteen (16) participants were purposefully selected for this research. Data was collected through semi-structured interviews with experts and managers until theoretical saturation was reached. The interviews, which lasted 60 to 90 minutes, were recorded with the participants' permission. The data collection process involved conducting 16 interviews, and theoretical saturation was achieved after the 12th interview.

Table 1 Participants

Indicator	*Grouping*	*Number of people*
Gender	Man	15
	Female	1
Work experience	Less than 10 years	2
	Between 10 and 20 years	2
	More than 20 years	12
Education	Masters	10
	PHD	6
Type of position	Planning manager	4
	Crisis manager	5
	Safety manager	4
	Research and consulting	3

3.2 Data collection

A protocol was developed for conducting the interviews, which included the following questions: What factors contribute to the reliability of the organisation, and what factors pose a threat to it? What solutions exist to improve the organisation's reliability? What are the causes of errors and mistakes in the organisation? What measures can be taken to reduce errors and mistakes? What are the causes of crises in the organisation and how are they managed? What lessons have been learned from crises? What measures can be taken to increase the organisation's resilience against crises?

3.3 Data analysis

The thematic analysis method proposed by Braun and Clarke (2006) was used to analyse the data. The steps of the theme analysis method are shown in Table 2.

Table 2 The step-by-step process of thematic analysis

Phase	*Step*	*Action*
Analysis and description of the text	1- Getting to know the text	- Writing data - Initial study and re-study of the data - Writing initial ideas
	2- Creating primary codes and coding	- Proposing the coding framework and preparing the theme template - Separating the text into smaller parts - Coding interesting features of the data
	3- Searching and understanding themes	- Adapting the codes to the theme format - Extracting themes from the coded parts of the text - Refining and revising themes

Table 2 The step-by-step process of thematic analysis (continued)

Phase	*Step*	*Action*
Description and interpretation of the text	4- Draw the theme network	- Check and control the compatibility of themes with extracted codes - Sort themes - Selection of basic, organised and inclusive themes - Drawing theme maps - Modifying theme networks
	5- Theme network analysis	- Defining and naming themes - Description and explanation of the theme network
Text composition and integration	6- Preparing the report	- Summary of the network of themes and brief expression - Extracting interesting data samples - Relating results to research questions and theoretical foundations - Writing a scientific and specialised report of the analysis

Initially, the data from the interviews was transcribed, read and re-read to obtain a note of the initial ideas. Using ATLAS.ti software version 8, interesting and related parts of the data were systematically coded. The themes were then derived by classifying the primary codes. Next, the themes were examined using a hermeneutic cycle to interpret the whole and part of the analysis, which resulted in the creation of a macro-map and the definitions and naming of the themes.

3.4 Quality control

To ensure the quality and accuracy of the research, the criteria proposed by Lincoln and Guba (1985) were used.

Transferability: To enhance the accuracy and richness of the themes, the research employed the maximum variation as a strategy of purposive sampling, as well as the method of constant comparison and member check.

Dependability: The researchers in this study have taken great care to record and report the research process accurately, allowing readers to follow the researchers' steps correctly.

Credibility: To enhance the credibility of the findings in this study, the researchers engaged in continuous participation in the research process, reviewed the findings and included direct quotes from participants in sub-themes.

Conformability: To ensure the conformability of the study, the first researcher conducted primary data analysis, and the other researchers reviewed the codes and themes to reach a consensus. Additionally, the researchers documented the phases of the study, allowing other researchers to review the research process.

To determine the reliability of the research, the agreement method between two coders was used. In addition to the researcher who did the initial coding, another researcher separately coded the findings. The closeness of these two codings indicates

agreement and reliability. In order to calculate the agreement, Kappa coefficient was used in SPSS software, and its value was 0.74, which indicates acceptable reliability. Also, in order to ensure the validity of the research, in addition to applying the researcher's sensitivity strategy in the research process, the findings were provided to three academic and organisational experts and were approved by them.

4 Research findings

The findings of the study suggest that the soft dimensions of reliability in Iranian public organisations can be conceptualised around four dimensions: Human resource capabilities (including 'cognitive-psychological' and 'attitudinal-behavioural' capabilities); Organisational capabilities (including 'planning', 'organising-coordinating', 'decision-making and delegation' and 'preventive supervisory' capabilities); Knowledge-based capabilities (including 'cultural', 'interactive-communicative', 'learning' and 'innovation' capabilities); Human resource management capabilities (including 'attracting, employing and maintaining human resources', and 'evaluating and empowering' capabilities). The sub-capabilities of each dimension, along with their operational examples, are presented below.

Table 3 Research findings

Main themes	*Sub-themes*	*Primary codes*
Human Resource Capabilities	Cognitive-Psychological Capabilities	- The employees are sharp and have an active mind - Employees have positive thinking and optimism - Employees have work ethics - Employees can work in ambiguous conditions - Employees have hope instead of excessive pessimism - Employees have resilience and perseverance instead of giving up - Employees have a sense of self-reliance instead of relying on others - Employees have self-confidence - Having employees have critical thinking in the work environment - Employees can make decisions and solve problems
	Attitudinal-Behavioural Capabilities	- Commitment of employees to report errors - Adherence of employees to regulations and standards - Employees' concern for coherence instead of the inconsistency of behaviour and experience - Aligning the attitude of managers and employees toward issues - Employees have a sense of responsibility instead of avoiding responsibility - Employees have a comprehensive view of the organisation - Employees have negotiation skills - Employees can play a role - The employees can manage teams and work as a team

Table 3 Research findings (continued)

Main themes	*Sub-themes*	*Primary codes*
Organisational Capabilities	Planning Capability	- Existence of coherent, formal, and purposeful planning in the organisation to deal with the crisis - Existence of comprehensive emergency management planning in the organisation to deal with the crisis - The organisation has a business continuity plan to deal with the crisis - Existence of different scenarios in the organisation to deal with the crisis - Existence of instructions, directives and procedures in the organisation to deal with the crisis
	Organising and Coordinating Capability	- Existence of clear and specific duties in the organisation - Existence of integrated management of organisational units in line with the set goals - Existence of the system of delegating authority and delegating authority to employees in the organisation - Existence of powers appropriate to accountability at different levels of the organisation - The existence of organisational rules and procedures to coordinate the organisation's processes - Existence of organisational routines and procedures for connecting and coordinating teams - Existence of proper coordination between different levels and units of the organisation and within and between the organisation's teams
	Decision-making and Delegation Capability	- Existence of system-oriented decision-making procedures instead of individual-oriented ones in the organisation - The stability of specialised managers and the non-change of managers after the crisis in the organisation - Native decision-making managers of the organisation in the field of crisis - Ensuring the independence of influential institutions in the field of crisis in the organisation - Existence of a procedure to ensure the nobles of the decision-making authorities to the work field of the organisation - Preventing the intervention of the superior authority in a specialised issue in crisis conditions in the organisation

Table 3 Research findings (continued)

Main themes	*Sub-themes*	*Primary codes*
	Preventive and Supervisory Capability	- The existence of a spirit of actively dealing with errors and crises instead of passively to reduce errors and increase resilience in the organisation - Existence of preventive control system to reduce errors and increase resilience in the organisation - Existence of periodic monitoring and supervision system to reduce errors and increase resilience in the organisation - Existence of a monitoring system and performing routine and non-routine repairs to reduce errors and increase resilience in the organisation - Existence of online monitoring systems in high-risk areas to reduce errors and increase resilience in the organisation - The possibility of attendance and audit by beneficiary companies and external institutions to reduce errors and increase resilience in the organisation - The use of plans for separation from service, changing the workplace and job of a person to reduce errors and increase resilience in the organisation. - Existence of systems such as the schedule of work shifts and reward plans to reduce errors and increase resilience in the organisation - Existence of systems to restructure job procedures to reduce errors and increase resilience in the organisation - Paying attention to all aspects of the job in the job description to reduce errors and increase resilience in the organisation - Share and involve employees in joint jobs to reduce errors and increase resilience in the organisation - Existence of procedures for updating, improving, renovating and retrofitting equipment and designing systems to reduce errors and increase resilience in the organisation - Existence of backup, parallel or alternative systems to reduce errors and increase resilience in the organisation - Creating correct, up-to-date and safe structures and infrastructures to reduce errors and increase resilience in the organisation - Active presence of signalling systems to reduce errors and increase resilience in the organisation

Table 3 Research findings (continued)

Main themes	*Sub-themes*	*Primary codes*
Knowledge-based Capabilities	Cultural Capability	- The existence of a climate to overcome the culture of silence and concealment in the organisation - Absence of blaming approach when errors and crises occur in the organisation - Supporting a positive safety culture, open and without blame for raising and discussing errors in the organisation - Encouraging and making employees willing to talk about work errors and mistakes - The importance of dealing with the sensitivity of the error instead of dealing with errors and mistakes in the organisation - The importance of dealing with crises, errors and mistakes in the organisation in a systematic way instead of a team approach
	Interactive-Communicative Capability	- Existence of effective intra-organisational and official communication channels to deal with errors and crises in the organisation - Effective communication between professional groups to deal with errors and crises in the organisation - The existence of interaction with international organisations to use their knowledge and experience to deal with errors and crises in the organisation. - Existence of extra-organisational communication and interaction with other organisations through working groups to deal with crises in the organisation - Existence of voluntary and mandatory notification systems of incidents and crises to handle the complaints of stakeholders in the organisation
	Capability to Learn	- The existence of a thinking room to use the experiences and suggestions of people, especially retirees in the organisation - Existence of thinking circles and recording of information of elites in the organisation - The existence of a proposal system working group and proposal analysis in the organisation - The existence of a knowledge management base for establishing and monitoring information, turning it into knowledge and levelling it in the organisation - Holding meetings to review, document and analyse crises in the organisation - Existence of meetings to review the experiences of team failures for team learning in the organisation - Existence of a system to learn from mistakes and crises through systematic analysis and discussion - Existence of systems and processes for sharing lessons learned from errors and crises in the organisation

Table 3 Research findings (continued)

Main themes	*Sub-themes*	*Primary codes*
	Capability to Innovate	- Using global and national standards to reduce errors in the organisation - Localising safety models and adapting them to the conditions of the organisation to reduce errors in the organisation - Standardisation of definitions of events, errors and mistakes of employees to reduce errors in the organisation - Continuous or periodic correction of processes to reduce errors and crises in the organisation - New technologies to reduce the role of manpower in errors and crises in the organisation - Using new technologies to strengthen monitoring systems to reduce errors and crises in the organisation
Human Resource Management Capabilities	Capability to Attract, Employ and Retain Human Resources	- Appointing specialised crisis managers from among the people inside the organisation - Appointment of field commanders and their successors in crisis management in the organisation - Selection and precise determination of crisis response teams according to the crisis that occurred in the organisation - The existence of a coordinating body for responsible departments in times of crisis in the organisation - Appointment of knowledge management representatives in the organisation - Lack of relationship appointments and bus managers in the organisation
	Evaluating and Empowering Capability	- Existence and use of performance indicators to reduce errors and crises in the organisation - Identifying, evaluating and monitoring personnel and identifying their weaknesses and points that can be improved to reduce errors and crises in the organisation - Holding internship courses – workshop training in the field of developing individual skills to improve resilience in the organisation - Conducting employee retraining courses to reduce errors in the organisation - Existence of teamwork training courses to face a crisis in the organisation - Conducting manoeuvers and competitions to prepare operational personnel to face a crisis in the organisation - The existence of training systems based on allowing employees to make controlled mistakes in the organisation

Table 3 Research findings (continued)

Main themes	*Sub-themes*	*Primary codes*
		- Existence of managers' emotional support for employees to improve resilience in the organisation - Teaching individual skills such as regulating emotions to employees to improve resilience in the organisation - The possibility of counselling employees to improve resilience in the organisation - Using methods to give hope to employees to improve resilience in the organisation - The possibility of recovery or separating the person from the system to improve resilience in the organisation - Designing and implementing systematic and cultural interventions to improve the resilience of employees in the organisation

4.1 Main Theme 1: human resource capabilities

Human resource capabilities refer to the competencies and skills related to technical, technological and business management knowledge that employees activate in response to situational conditions within the organisation (Byrd and Turner, 2000). In other words, these capabilities reflect employees' ability to use or develop competencies to effectively perform tasks in the work environment (Yang, 2008). In this study, the human resource capabilities include two main sub-themes: cognitive-psychological capabilities (Helfat and Martin, 2015) and attitudinal-behavioural abilities (DeWitt et al., 2017), which are discussed in the following sections:

1) *Sub-Theme 1: cognitive-psychological capabilities:* Cognitive-psychological capabilities refer to an individual's ability to receive, retain and apply information or perform mental and physical tasks. These capabilities reflect an individual's potential for intellectual or creative growth and success, which can be improved for better work performance. Therefore, public organisations should consider enhancing cognitive-psychological capabilities to improve their reliability. These capabilities include: 'having employees with sharp and active minds', 'positive thinking and optimism', 'strong work ethics', 'hopefulness instead of excessive pessimism', 'resilience and perseverance instead of giving up', 'sense of self-reliance instead of relying on others', 'self-confidence', 'critical thinking', 'ability to work in ambiguous conditions', 'ability to make decisions and solve problems'.

   It is a matter of work ethic when someone accepts responsibility and endangers their own and their colleagues' safety and life with their behaviour. Unfortunately, there is no clear example of what the work ethic of a safety expert should be. (Interviewee 12)

2) *Sub-Theme 2: attitudinal-behavioural capabilities:* Attitudinal-behavioural capabilities refer to those characteristics such as knowledge, skills, teamwork, leadership abilities and technical expertise that enable an individual to take on bigger roles. Cultivating these capabilities should be a key objective in improving

the reliability of public organisations. These capabilities include: 'employee commitment to reporting errors', 'adherence to regulations and standards', 'concern for coherence instead of inconsistency in behaviour and experience', 'alignment of manager and employee attitudes toward issues', 'sense of responsibility instead of avoiding responsibility', 'comprehensive understanding of the organisation', 'negotiation skills', 'ability to manage teams and teamwork'.

'Understanding teamwork is crucial in critical situations'. (Interviewee 3)

4.2 Main Theme 2: organisational capabilities

Organisational capabilities are the criteria used to make design decisions that differentiate the organisation and give it a unique identity. They assist in implementing the organisation's strategy and serve as the interface between the strategic requirements and the organisational needs. In this context, public organisations can consider the following capabilities to improve their reliability.

1) *Sub-Theme 1: planning capability:* Planning is the foremost and crucial activity for achieving desired results that plays a significant role in preventing errors or identifying opportunities. It is a continuous process that reflects changes and aims to achieve organisational goals. In today's complex organisational environment, detailed planning is essential for survival. Therefore, one of the key capabilities for enhancing reliability in public organisations is the ability to plan effectively. These capabilities include 'coherent, formal and purposeful planning', 'comprehensive emergency management planning', 'business continuity planning', 'scenario planning' and 'development of instructions, directives and procedures to deal with organisational crises'.

   When there is no specific emergency plan for an event, the manager responsible for crisis management may have thoughts such as 'what will happen now?', 'what can we do?', and 'what are our assets?' This lack of preparedness can cause undue stress for the manager and hinder a proper reaction to the crisis. (Interviewee 7)

2) *Sub-Theme 2: organising and coordinating capability:* Organising involves determining executive duties, assigning tasks, grouping responsibilities and establishing reporting structures. Coordinating involves establishing communication between the works and resources of the organisation's departments to achieve a specific and common goal. These capabilities include: 'clear and specific delineation of duties within the organisation', 'integrated management of organisational units aligned with set goals', 'effective delegation of authority to employees within the organisation', 'appropriate distribution of power and accountability at different levels of the organisation', 'having organisational rules and procedures to coordinate the organisation's processes', 'establishing organisational routines and procedures for connecting and coordinating teams', 'proper coordination between different levels and units of the organisation, as well as within and between the organisation's teams'.

   Transparency in job duties is essential to ensure organisational reliability. It is important to have a specific job description, hierarchy and organisational chart for each position. (Interviewee 13)

3) *Sub-Theme 3: Decision-making and delegation capability:* Decision-making involves identifying and choosing among alternatives based on the values and preferences of the decision-maker. Delegation of authority is the act of assigning part of a manager's responsibility to individuals in lower ranks. Therefore, developing decision-making and delegation capability is crucial for improving the reliability of public organisations in dealing with crises. This sub-theme includes: 'system-oriented decision-making procedures rather than individual-oriented ones', 'stability of specialised managers and continuity of their roles after a crisis', 'decision-making managers with native knowledge of the crisis area', 'ensuring independence of influential institutions in crisis management', 'establishing procedures to ensure decision-making authorities are familiar with the organisation's work field', and 'prevention of intervention by higher authorities in specialised crisis issues'.

   Decision-making bodies should consider a wide range of business issues and establish rules and regulations that are comprehensive and multidimensional. (Interviewee 9)

4) *Sub-Theme 4: Preventive and supervisory capability:* Preventive measures aim to prevent accidents or minimise their harmful effects by assessing and reducing the risk level to an acceptable level using the necessary measures. Preventive and supervisory capability includes: 'proactive approach to dealing with errors and crises, rather than a reactive one', 'preventive control system', 'periodic monitoring and supervision system', 'system for monitoring and performing routine and non-routine repairs', 'online monitoring systems in high-risk areas', 'systems to restructure job procedures', 'establishing systems such as work shift schedules and reward plans', 'procedures for updating, improving, renovating and retrofitting equipment and designing systems', 'backup, parallel or alternative systems', 'possibility of attendance and audit by beneficiary companies and external institutions', 'planning for separation from service, changing the workplace and job of an employee', 'attention to all aspects of the job in the job description', 'sharing and involving employees in joint jobs', 'creating correct, up-to-date and safe structures and infrastructures', and 'active presence of signalling systems' to reduce errors and increase resilience in the organisation.

   The first step in recognising an error is to accurately evaluate the job and extract the appropriate job description, paying close attention to its details. (Interviewee 3)

4.3 Main Theme 3: knowledge-based capabilities

Knowledge-based capabilities refer to collective learning that combines the resources, knowledge and capabilities of an organisation to achieve harmonious development with the environment (Ning et al., 2006). Paying attention to knowledge-based capabilities is crucial for public organisations to improve their reliability.

1) *Sub-Theme 1: cultural capability:* Organisational culture can create a certain type of organisational climate that can either enhance or impede knowledge ability. The organisational climate should be conducive for absorbing knowledge and linking it to new and creative methods. Cultural capability is the ability to create more knowledge assets (Ning et al., 2006) and should be a key consideration for public organisations looking to improve their reliability. This capability includes: 'creating

a climate that overcomes a culture of silence and concealment', 'avoiding a blaming approach when errors and crises occur', 'supporting a positive, open and non-punitive safety culture for reporting and discussing errors', 'encouraging employees to speak up about work errors and mistakes', 'dealing with errors and mistakes in a manner that reflects their sensitivity' and 'dealing with crises, errors and mistakes systematically'.

Our monitoring system has a weakness in terms of proportionate responses to violations. This proportionality issue has a two-fold impact: in some areas, the consequences are immediate while in others, they are delayed. (Interviewee 1)

2) *Sub-Theme 2: interactive-communicative capability:* Effective communication is essential for knowledge innovation as it not only enhances the capability of individuals but also strengthens other organisational capabilities (Ning et al., 2006). Therefore, public organisations should focus on internal and external interaction and communication to improve their reliability. Interactive-Communicative capability includes: 'effective intra-organisational and official communication channels', 'effective communication between professional groups', 'interaction with international organisations to leverage their knowledge and experience', 'extra-organisational communication and interaction with other organisations through working groups', and 'voluntary and mandatory incident and crisis reporting systems to address stakeholder complaints and handle errors and crises within the organisation'.

We have established our external relationships with relevant organisations for times of crisis, and we have a dedicated working group for developing and maintaining these relationships. (Interviewee 1)

3) *Sub-Theme 3: capability to learn:* Updating and rebuilding capabilities requires organisational learning. Organisational learning is a crucial component of the knowledge economy, and as competition and complexity increase, the ability to learn becomes even more important. While all organisations engage in learning to some degree, only some are successful. The difference between success and failure lies in their learning capability (Ning et al., 2006). Developing this capability should be a key focus for public organisations looking to improve their reliability which includes: 'having a 'thinking room' that leverages the experiences and suggestions of people, especially retirees', 'using thinking circles and recording of information from experts', 'using a working group for proposals and analysis of suggestions', 'using a knowledge management database for organising and monitoring information, and transforming it into knowledge', 'holding meetings to review team failures and facilitate team learning', 'using a system for learning from mistakes and crises through systematic analysis and discussion', 'systems and processes for sharing lessons learned from errors and crises' and 'holding meetings to review, document and analyse crises'.

The discussion we have initiated aims to document the events, which will provide insights to the expert who responds to the next crisis and aid in the subsequent crisis management. (Interviewee 5)

4) *Sub-Theme 4: capability to innovate:* This capability builds upon the knowledge capabilities discussed earlier, and it includes management innovation capability,

structural innovation capability and value innovation capability (Ning et al., 2006). Public organisations should also focus on innovating their systems and processes to keep up with new technologies, ensuring that they do not compromise their reliability during crises. This capability includes: 'adhering to global and national safety standards', 'localising safety models and adapting them to the organisation's conditions', 'standardising the definitions of events, errors and mistakes made by employees', 'continuously or periodically correcting processes', 'utilising new technologies to reduce the role of manpower in errors and crises' and 'leveraging new technologies to strengthen monitoring systems and minimise errors and crises within the organisation'.

When discussing long-term solutions, let's explore how we can leverage new technologies to minimise the role of human error in accidents. (Interviewee 7)

4.4 Main Theme 4: human resource management capabilities

These capabilities encompass human resource management practices (Chang and Huang, 2010) as well as organisational mechanisms and processes that leverage the implicit and explicit knowledge of organisational members to acquire, develop and cultivate human resources in a dynamic and competitive environment (Park et al., 2004). In the area of human resource management capabilities, public organisations can prioritise the following capabilities to enhance their reliability.

1) *Sub-Theme 1: capability to attract, employ and retain human resources:*One of the key components of human resource management is acquiring talent, which involves planning and sourcing the workforce needed to fulfil various job duties through legal recruitment and hiring procedures. Enhancing organisational productivity requires attracting, developing and retaining employees while strengthening their motivation. Therefore, public organisations can improve their crisis management reliability by taking steps to attract, select and retain suitable individuals. This capability include: 'appointing specialised crisis managers from within the organisation', 'appointing field commanders and their successors in crisis management', 'selecting and precisely determining crisis response teams based on the type of crisis', 'establishing a coordinating body for responsible departments during times of crisis', 'appointing knowledge management representatives' and 'avoiding appointments based on relationships or management hierarchy'.

   During crises, we lack an intermediary department that can coordinate with other departments in the ministry. Therefore, we require a coordinating deputy who can define the task descriptions, overarching goals and strategies. (Interviewee 10)

2) *Sub-Theme 2: evaluating and empowering capability:* The concept of empowerment centres on providing individuals with the necessary skills, resources, opportunities and responsibilities to promote career growth and job satisfaction. Empowerment involves controlling and evaluating the work environment and utilising skills and talents in ways that benefit both individuals and the organisation. To enhance their reliability in the face of crises and errors, public organisations can focus on issues such as training, retraining and improving employee resilience. Evaluating and empowering capability includes: 'determining and using performance indicators', 'identifying, evaluating and monitoring personnel to identify areas for

improvement', 'offering employee retraining courses', 'implementing training systems that allow employees to make controlled mistakes to minimise errors and crises', 'providing internship courses and workshops to develop individual skills', 'offering managerial emotional support to employees', 'teaching individual skills, such as emotion regulation, to employees', 'providing counselling services to employees', 'utilising methods to instil hope in employees', 'offering recovery or separation options for individuals within the system', 'designing and implementing systematic and cultural interventions to improve organisational resilience' and 'conducting teamwork training courses, manoeuvers and competitions to prepare operational personnel to handle crises'.

To build resilience, individuals can rely on their own abilities, education and psychological well-being. At times, seeking advice from others may also be beneficial. (Interviewee 4)

5 Conclusions

The aim of this research was to identify ways to enhance the reliability of Iranian public organisations. Given the crises that have taken place, investing in the soft dimensions of organisational reliability is essential for these organisations to sustain service provision and improve their performance. Historically, organisations have prioritised investing in the hard dimensions of reliability, while the soft dimensions have garnered less attention from both practitioners and researchers. This study sought to address this gap by examining the soft dimensions of reliability and presenting a comprehensive framework for public organisation to invest. Unlike previous research that has focused mainly on the hard dimensions, this study provided valuable insights into the soft dimensions. The research findings indicated that public organisations can improve their service provision and performance by investing in four key areas of soft dimensions of organisational reliability, namely human resource capabilities, organisational capabilities, knowledge-based capabilities and human resource management capabilities.

To enhance their ability to handle crises and errors, public organisations can invest in improving their human resource capabilities. In particular, cognitive-psychological capabilities as a sub-category of human resource capabilities can be considered as a research finding that has received insufficient attention in the past with regard to improving reliability. Müller et al. (2021) and Logan-Athmer (2022) primarily focused on factors related to people's capability and personality. Attitudinal-behavioural capabilities are another influential sub-category of human resource capabilities that has been explored to some extent in earlier studies, such as Hofmann et al. (1995).

The second investment area by which public organisations can enhance their reliability capacity in managing crises and errors is organisational capabilities. One way to achieve this is through improving planning capability, which has been highlighted in prior studies. Specifically, planning capability can involve the development of emergency response plans and scenarios (Agwu et al., 2019), enhancing organisational readiness for crises (Lekka and Sugden, 2011; Cooper et al., 2016), and formulating guidelines, procedures and policies for unexpected events (Lekka, 2011; Harrison et al., 2019). Tillement and Hayes (2019) also emphasised the role of planning in improving reliability. Organising-coordinating capability is another sub-category of organisational

capabilities that can be improved to enhance reliability. Agwu et al. (2019) emphasised the role of organising in improving reliability, including factors such as organisational roles, organisational structure and work groups (Parkes et al., 2012; Jahn, 2017; Müller et al., 2021), organisational structure (Hassandoust and Johnston, 2023), accountability (Hofmann et al., 1995) and the importance of organising-coordinating capabilities (Christianson et al., 2011; Sanchez and Barach, 2012; Busby and Iszatt-White, 2014). Decision-making and delegation capabilities are also important components of organisational capabilities. However, Bagnara et al. (2010) and Howe et al. (2023) received as much attention in previous research. Preventive-supervisory capabilities represent the fourth effective component in organisational capabilities. Cox (2008) and Ciravegna and Brenes (2016) highlighted the importance of developing systems to minimise unexpected events, designing systems to prevent errors and crises (Sanchez and Barach, 2012; Chassin and Loeb, 2013; Agwu et al., 2019; Bieńkowska et al., 2020), monitoring and controlling errors and crises (Lekka and Sugden, 2011; Casler, 2014) and establishing support systems while paying attention to warning signals (Lekka, 2011).

In the realm of knowledge-based capabilities as the third investment area, cultural capability is an important component in improving reliability. Previous research has emphasised the role of organisational culture (Parkes et al., 2012; Sanchez and Barach, 2012; Cantu et al., 2020), safety culture (Sanchez and Barach, 2012), just culture (Frankel et al., 2006; Cox et al., 2006) and the need to change culture (Cooper et al., 2016). To improve cultural capability, it is essential to eliminate the culture of silence, create a blame-free and open culture and encourage employees to openly discuss errors (Lekka, 2011; Chassin and Loeb, 2013; Agwu et al., 2019). Interactive-communicative capability as another subcategory of knowledge-based capabilities is an important research finding that has been explored in earlier studies. This capability can be achieved through clear, open and continuous communication between employees and managers, as well as effective interaction with other organisations to improve reliability (Sanchez and Barach, 2012; Agwu et al., 2019; Logan-Athmer, 2022; Howe et al., 2023). The capability to learn represents the third component of knowledge-based capability, and prior research has emphasised the role of organisational learning (Cox et al., 2006; Casler, 2014; Ciravegna and Brenes, 2016), learning from incidents (Cooke and Rohleder, 2006), tools that facilitate learning (Sullivan et al., 2016), knowledge management (Parkes et al., 2012; Müller et al., 2021), incident analysis and classification (Lekka and Sugden, 2011; Lekka, 2011; Cooper et al., 2016), holding meetings to review experiences of failures (Agwu et al., 2019), sharing lessons learned from errors and crises (Sanchez and Barach, 2012), and learning from errors and crises (Agwu et al., 2019; Bieńkowska et al., 2020). Innovation capability is the final sub-category of knowledge-based capabilities which have been also examined in previous research by emphasising the role of innovation (Logan-Athmer, 2022), designing policies, procedures and methods (Cooper et al., 2016), designing processes (Riley, 2009), utilising process improvement tools and IT solutions and implementing systematic improvement initiatives to achieve a safety culture (Chassin and Loeb, 2013). Other effective strategies include the development of routines and mechanisms to adapt to changing conditions (Ciravegna and Brenes, 2016) and updating procedures in the knowledge base (Lekka, 2011).

The human resource management capabilities are the last investment area for improving reliability that its components are examined in the background literature. For instance, the capability to attract, employ and retain human resources has been explored in earlier studies and is linked to human resource policies and practices (Parkes et al., 2012), as well as the selection and recruitment process (Vogus and Welbourne, 2003; Youngberg, 2004; Neves et al., 2024). Evaluation and empowerment capabilities as another component have also been highlighted in prior research, with an emphasis on evaluating the competence and skills of employees (Youngberg, 2004; Agwu et al., 2019; Harrison et al., 2019) and providing training opportunities (Lekka, 2011; Chassin and Loeb, 2013; Cooper et al., 2016; Agwu et al., 2019; Neves et al., 2024).

In general, to improve organisational reliability, public organisations should focus on and invest in four key areas related to the soft aspects of their operations. By investing in these areas, they can ensure the continuity of service delivery and maintain performance levels even during a crisis, ultimately returning to a more consistent state than before.

To enhance human resource capabilities, managers should create a foundation for improving reliability that enables employees to acquire the necessary attributes and competencies to perform their duties effectively. Additionally, managers should develop employees' skills to enable them to take on larger work roles. To foster such growth, an environment should be created that encourages positive thinking, ethical behaviour, self-reliance in decision-making and problem-solving and a sense of accountability in task performance. Moreover, employees should have a comprehensive and strategic understanding of the organisation's goals, perform their roles effectively and have the ability to work collaboratively as a team during times of crises and failures.

In the realm of organisational capabilities, managers should implement coherent and official programs, along with appropriate instructions and procedures, to enhance reliability. They should engage in comprehensive planning to manage emergencies and develop scenarios in anticipation of potential crises, predicting the scope of problems before incidents occur. Additionally, employees' duties within the organisation should be clearly defined, and there should be integrated management of the organisation's units in alignment with its goals. Delegating authority and responsibility to employees is possible, but the level of authority given should be proportional to their accountability. In addition, organisational decisions should not be based solely on individuals who may leave the organisation, as this can lead to instability. Senior officials responsible for decision-making should have a deep understanding of the organisation's work context, and those who lack knowledge of specialised actions during times of crisis should not interfere in such matters. Another recommendation to reduce errors and increase resilience is to establish systems for regular monitoring of activities, issuing warnings during crises, reviewing job procedures and descriptions, updating equipment and infrastructure and supporting functional systems.

To enhance knowledge-based capabilities, managers should foster a climate within the organisation where employees feel comfortable discussing errors and mistakes without fear of blame. Dealing with employees who make mistakes should be done with sensitivity to the nature of the error and with the intention of learning from it, rather than punishing or shaming the employee. It is important to avoid dealing with errors and mistakes in an unproductive or punitive manner. Moreover, managers should establish communication and collaboration with domestic and international organisations to manage crises. By working with these organisations and leveraging their knowledge and experience, managers can more effectively resolve crises, including through the

formation of working groups with relevant organisations. To capture the insights of experts, managers should establish knowledge-sharing circles within the organisation to gather and retain information and experiences from these professionals. Additionally, meetings, a platform or a system should be established to review and document past crises, enabling managers or teams who have been involved in such situations to share their experiences. This documentation can serve as a basis for reforming and revising the organisation's processes and reducing the role and involvement of human resources in future errors and crises.

Lastly, to enhance human resource management capabilities, managers should consider forming crisis response teams to improve reliability, establish an institution to coordinate and organise during times of crisis and appoint personnel based on merit. Additionally, it is recommended to evaluate employees' strengths and weaknesses regarding their exposure to crises and errors. Holding training courses and workshops to develop individual skills and promote teamwork, as well as conducting drills prior to potential crises, can help prepare personnel. Managers should also provide empowering and restorative counselling services to employees who have experienced crises to improve their resilience.

Finally, according to the characteristics and findings of this research, recommendations for future researches can also be presented. In this research, the soft dimensions of organisational reliability have been calculated mainly based on interviews with managers and employees of public organisations. The reason was that the continuity of services for public organisations and for the security and welfare level of a society is a very important component, and in times of crisis, public organisations should be able to guarantee the continuity of their services in addition to crisis management. Therefore, one of the axes of future research can be the expansion of the concept of organisational reliability in all its forms in public organisations. For example, in future research, researchers can examine the hard dimensions of organisational reliability in public organisations, or examine the soft and hard dimensions simultaneously in public organisations, depending on the importance of reliability for public organisations.

In this regard, the second suggestion is to expand the study sample to other types of organisations. Although in this research the dimensions of organisational soft reliability have been identified in such a way that they are applicable to public and private organisations, but according to the different characteristics of different types of organisations, future researchers can examine the soft dimensions of organisational reliability in private sector companies, family companies or the like or they can do similar research in public and private organisations simultaneously and compare the soft dimensions of organisational reliability in these two categories of organisations.

The last suggestion is to further expand the sample of studies in terms of vulnerability. The organisations studied for the purpose of the interview were crisis-prone government organisations. However, reliability is applicable to all organisations. Therefore, in future researches, researchers can choose their study sample from public or private organisations or all types of organisations that have different types of crisis susceptibility.

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