

Analyzing the Determinants of Crisis Management in Vietnamese State-Owned Enterprises During Economic Shocks: Evidence from Civil Servants in the COVID-19 Pandemic



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ABSTRACT

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Crisis management can be essential in enhancing the working of state-owned enterprises. In global economic conditions, the operation of enterprises is developed in an insecure environment. The management of the crisis can be considered as a specific method of the state-owned enterprises in order to prevent and dominate proceedings that may endanger or impede the further existence of the enterprises. By systematizing theoretical issues and providing empirical evidence, the paper clarifies the influence of factors affecting crisis management at state-owned enterprises in the context of exogenous shocks like the COVID-19 pandemic. The paper uses the Exploratory Factor Analysis and the Analytic Hierarchy Process (AHP) technique to identify the influence of the factors on crisis management in state-owned enterprises with 259 civil servants. The findings show that the policy dimension is the most important factor that contributes 40% toward the overall crisis management, followed by the leadership traits and skills dimension (23%). Besides, this study proposes some recommendations to enhance the crisis management of state-owned enterprises in the context of exogenous shocks in Vietnam.

1. INTRODUCTION

In the context of shocks, crisis management can play an essential role in enhancing the working of enterprises. Crisis management is a special type of change management caused by unexpected changes in the scale, duration, and severity of events. In the period of economic shocks, the operation of enterprises is developed in an insecure environment. So, management of the crisis can be considered as a specific method of the enterprises in order to prevent and dominate proceedings that may endanger or impede the further development of the enterprises. Hence, improving crisis management is necessary for enterprises to continue a business successfully during economic shocks.

In some developing countries like Vietnam, the role of state-owned enterprises in the economy is essential to ensure economic development and social security issues [1]. State-owned enterprises are defined as corporate entities recognized by national law as enterprises and in which the state exercises partial or full ownership. State-owned enterprises are used to support collaboration between the public and private sectors [2]. In Vietnam, state-owned enterprises are an important part of the economy and determined to play a leading role in the economy. In order to enhance the effectiveness of their performance, state-owned enterprises need to adapt quickly to the changes in exogenous shocks. Hence, Vietnam has issued a Master Program on State Administrative Reform for the period 2021 - 2030 to reform these enterprises. One of the most important aims of the Program is reforming state-owned

enterprises in order to improve operational efficiency and crisis management ability when the world has many changes and disasters like the COVID-19 pandemic. In general, effective crisis management can help Vietnamese state-owned enterprises mitigate risk, reduce damage, and maintain customer and public trust. Successful crisis management helps Vietnamese state-owned enterprises have a plan to solve potential threats and keep operations running smoothly during economic shocks.

By using the by using Exploratory Factor Analysis method, this study was conducted to determine the factors affecting crisis management in state-owned enterprises in Vietnam during the COVID-19 time. Besides, the paper uses the Analytic Hierarchy Process (AHP) technique to rank those important factors according to their contributions to crisis management in Vietnamese state-owned enterprises in the context of exogenous shocks. Although some of those studies did evaluate factors of crisis management in enterprises, not even one emphasized factors that influenced the crisis management in state-owned enterprises in Vietnam during of the COVID-19 pandemic as well as divided into group factors including policy, organizational structure, leadership traits, and skill, information, work environment. From our findings, we also recommend that state-owned enterprises should be more and more active and improve their ability to respond to economic shocks, as well as state-owned enterprises should enhance the role of crisis management in improving the development of state-owned enterprises during the COVID-19 pandemic.

2. LITERATURE REVIEW

2.1 Definition and characteristic of exogenous shocks

Röglinger et al. [3] define a crisis as extreme, unexpected, and unanticipated circumstances that pose difficulties for enterprises and necessitate swift actions. By their causes, severity, scope, and effects, various crises can be distinguished. Besides, crisis categories (such as conflict, illness, and terrorism) and themes (such as risk, preparedness, and decision-making) are based on their comprehensive literature review on crises. Natural catastrophes are the primary focus of crisis literature, with preparation as the overarching theme and managerial efforts to evaluate the adverse impacts of crises.

According to Fridgen et al. [4], extant crisis typologies relate to a variety of criteria including predictability, controllability, and effect. Consistent with the previously discussed concepts, the term exogenous shock appears in the literature across a variety of disciplines, most frequently in economics, politics, and finance. According to the IMF, crises are conceptualized as the consequence of an external shock event. Exogenous disturbances cannot be predicted with precision in advance. Their existence necessitates a significant reorientation of the organization, including simultaneous and discontinuous modifications in structure, process, and control mechanisms. An external jolt may necessitate a long-term reorientation of an organization's processes, structures, and strategies in order to adapt to a new environment. According to the research, exogenous disruptions can be caused by a wide range of factors, such as natural calamities, political crises, and armed conflicts. Exogenous disruptions can result in both long-term and short-term adverse internal conditions, such as a shortage of high-quality human resources that results in a lack of productive capability or technical understanding. Some external impacts may last effects, while others will not. External shocks can severely limit a company's ability to access critical resources or pursue development opportunities, which can have a significant impact on the company's primary business or target markets. Exogenous disruptions have an impact on organizations when they are compelled to modify their plans, business models, and methods of producing goods in order to survive [5].

2.2 Definition and role of crisis management

Crisis management is a broad term that encompasses the decision-making, particular activities, and technologies engaged in all stages of a catastrophe. In the pre-crisis phase, the emphasis is on mitigation and preparedness, in the catastrophe phase, disaster response, and in the post-crisis phase, recovery and organizational learning [6]. In terms of preparation, agencies strive for resilience, which is defined as the capacity to recover quickly from adversity and use the experience to become stronger and more resourceful than before. Researchers have examined organizational resilience from a variety of perspectives, including capability, process, function, and outcomes. Thus, collective mindfulness has emerged as a heightened awareness of change that prioritizes safety over efficiency. Business continuity management is a recommended method for disaster response that entails recognizing, controlling, and minimizing risks that could prevent businesses from mission-critical activities and services. In addition, a disaster contingency plan that outlines

actions to be taken in the event of a disaster is an important element of a business continuity plan [7]. In the aftermath of crises, Broekema et al. [8] analyzed the capacity of agencies to draw lessons from the resolution of crises. Fostering organizational learning not only after a crisis has occurred, but also prior to and during the crisis, has been discovered to have positive impacts on crisis management in general. In addition, the multifaceted nature of crisis management research and associated methodologies provided an overview of essential studies related to the prevention, minimization, and efforts in crisis management of organizations.

Besides, crisis management is referred to as management of emergency and change. A crisis can occur with little to no warning for time and place and an organization can face crises at every stage of development [9]. Crisis management often relates to a planning and mitigation function when the element of surprise appears in order to respond to untoward events [10]. For the public sector, crisis management is understood as an arrangement for minimizing, preparing, responding, and rehabilitating from catastrophes [11]. For enterprises, this process includes problems with finances, public relations, technology, and legislative threats ... [6].

Furthermore, crisis management is considered a significant feature of contemporary administration. During the crisis, one of the most important expectations of communities and members is the ability of leaders to solve inconvenient situations to minimize the negative effects of this crisis [10]. However, the complexity arising from the seriousness of the situations is the factor affecting the managers. This complexity is caused by limited information, and time pressure, and makes leaders stressed when they have to solve the severity of the crisis situation, and the risks being taken to decide on critical issues [12]. Besides, Domdouzis et al. [13] also shows tools and techniques for improving decision-making in crisis emergencies including training, and decision support systems. In general, painstaking preparation is one of the essential methods of crisis management.

2.3 Determinants of the crisis management

Naim and Ustun [14] show that leadership competencies with decisiveness, flexibility, and skill communication impact crisis management in the public sector by using structural equation modeling (SEM). Successful crisis management does not consider only the different factors affecting decision-makers but also the audience of decision-makers. Leaders in state-owned enterprises need to know how to manage crises. This is considered an essential task and skill for them. Hence, leaders need to be fully informed about these duties and responsibilities before they are assigned to manage an enterprise [15]. Furthermore, leaders need to be able to over the pressure from the increase of uncertain expectations, rapid change, and scarcity reaching their peak during times of crisis. Leaders often have to be able to adapt and come up with effective solutions during a crisis. Besides, one of the necessary skills for leaders in state-owned enterprises is the ability to work with new partners with whom they have never cooperated before [10]. In addition to accumulating experience to help leaders resolve crises, participating in training programs will also be the main method to help leaders improve their skills and enhance the necessary management capacity in crisis [12].

Besides, hi-tech applications in solving the economic crisis play an important and useful role. In general, exogenous

shocks often occur unexpectedly and disrupt the production and business processes of enterprises. These changes create instability and disorder within the production operations process during the shock economics. These unexpected changes significantly impact management [12]. After an exogenous shock, enterprises and their existing decision-making processes face highly unstable environmental conditions that require rapid and appropriate action [16]. In such situations, increased transparency through increased digitalization is an effective method. Hi-tech and information support today are used in almost all modern businesses in order to eliminate the shortcomings caused by economic crises. The development and application of software simulators have been started in the field of the economy. In particular, due to the COVID-19 pandemic requiring social distancing, businesses have switched to working and interacting with customers remotely, so the application of digitalization and technology application in transactions is increasing rapidly.

At the same time, information systems supporting manager processes production are important. With the ever-growing complexity of crisis management, utilizing technology to optimize operations and remaining competitive are becoming increasingly important in a global market [17]. Moreover, Ahmed [18] shows that the demand for information increases more and more. Providing an effective information system may enhance the power of state-owned enterprises and help to create smooth operational action during economic shocks.

In addition, Broekema et al. [8] confirm that the organizational structure also influences crisis management. Applying innovations in administrative reform and crisis management needs to take into account organizational structural factors. This organizational structure is required to be designed in an inversely structured manner for high flexibility in an uncertain environment associated with centralization, formalization, and the ability to integrate horizontal and vertical differentiation capabilities which represent the most important and relevant aspects of the organizational structure. Creating a fit and logic in organizational structure is seen as a factor that can influence significantly the management process in times of crisis [9]. Davenport and Short [19] also show that crisis management relates to reorganizing the structure and the policy. Organizing the operating structure and making policies of state-owned enterprises often aims at goals such as improving labor productivity, streamlining production processes, minimizing costs, and using the most efficiently available resources in times of economic shocks. The reorganization involves reviewing and redesigning the production and business processes, and the methods of organizing operations of state-owned enterprises in order to achieve improvements in quality, productivity, efficiency, and customer satisfaction [20].

Furthermore, a friendly work environment is important to help employees maximize their working abilities, and create more motivation to help employees improve their work performance. Therefore, improving the working environment needs to be enhanced in the process of crisis management. Improving the work environment for workers will help state-owned enterprises develop more sustainably, and create sustainability for the economy. At the same time, the work environment also improves workers' qualifications, happiness, and experience. Crisis management efforts are often placed in relation to the work environment relating to structural organization, culture, and teamwork to maintain the

continuous process development of enterprise during economic shocks [6].

Overall, factors impacting crisis management are studied in the literature including leaders, policy, organizational structure, information, and work environment. Some prior studies have used structural equation modeling (SEM), and regression models to evaluate the factors influencing crisis management. Although they did some tests of the influence, not a single one mentioned the influence of factors influencing crisis management in state-owned enterprises in times of economic shocks like COVID-19 by using the Exploratory Factor Analysis (EFA) and the Analytic Hierarchy Process (AHP). Therefore, this paper will be written to study this bank gap.

3. METHODOLOGY

3.1 Procedure and sample

In Vietnam, a comprehensive program of state administrative reform for the period 2021-2023 has been issued with the goal of promoting the operational efficiency of state agencies, especially state-owned enterprises. One of the important duties of the program is to train good civil servants to meet the requirements and development of the country in the context of integration and digital transformation. According to that requirement, management civil servants working in state agencies need to be able to adapt to changes during crises like the COVID-19 pandemic.

The paper's data were collected from a survey of civil servants in Vietnamese state-owned enterprises applying the Master Program on State Administrative Reform. State-owned enterprises in Hanoi, Ho Chi Minh City, and Lai Chau were selected for the survey. Because state-owned enterprises in three areas are the largest state-owned enterprises including enterprises with 100% state-owned capital and over 50% state-owned capital.

We used a multi-phase approach to collect data from state-owned enterprises for analysis. The local government provided a list of successful state-owned enterprises in three survey areas and 259 civil servants were selected from the members on the list for interview. With the support of local authorities, interviews with successful state-owned enterprises were held, including:

Firstly, the sample of state-owned enterprises was taken from the complete list in each sector provided by local authorities. The state-owned enterprises included in this interview process are located in three regions of Vietnam (Ho Chi Minh City, Hanoi, and Lai Chau). These state-owned enterprises are successful, over 10 years old, and have at least 200 employees. In this step, the state-owned enterprises are required by the local government to participate in the interview at the district People's Committee office with 2 groups including the APS level group and the executive level group. The number participating in the interview was 259 civil servants.

In the second step, a questionnaire was used to interview these civil servants managing the state-owned enterprises. Interviews were conducted to collect information on crisis management and factors impacting crisis management. 259 civil servants were viewed as a final sample with questions related to the factors on crisis management in state-owned enterprises and factors influencing crisis management in the

state-owned enterprise during the COVID-19 time including policy, organizational structure, leadership traits, and skill, information, work environment.

3.2 Research methods and measures

To identify the influence of the factors on crisis management in the state-owned enterprise, the paper uses the Exploratory Factor Analysis and the Analytic Hierarchy Process (AHP) technique.

Firstly, the paper uses the Exploratory Factor Analysis (EFA) method, which is a method in factor analysis with the overarching goal of determining the underlying relationship between the factors whose influence is measured. The EFA method was used to measure the influence of factors on crisis management in state-owned enterprises with 259 Vietnamese civil servants during the COVID-19 epidemic. The main goal of EFA is to describe the relationship between a set of k (smaller) observable variables and unobservable variables. Criteria in EFA factor analysis include the KMO (Kaiser-Meyer-Olkin) coefficient, whose value must be 0.5 or more ($0.5 \leq KMO \leq 1$) is the indicator number to consider the appropriateness of factor analysis.

Secondly, the Analytic Hierarchy Process (AHP) model was used to evaluate the impact of elements on the crisis management of civil servants in Vietnam during the COVID-19 time.

The AHP model was proposed by Thomas L. Saaty in the 1970s and continues to be extensively researched and widely applied in many fields [21]. The pair comparison ratio is based on Saaty's 9-point scale system (with score 1: factor is very unimportant compared to the goal; score 3: factor is less important; score 5: factor is moderately important; score 7:

important factor; score 9: very important factor; and even scores, 2, 4, 6, and 8 are used when compromise is necessary over odd numbers). In the AHP algorithm, the comparison hierarchy will be built, by arranging the indicators in a set of defined criteria, with level 1 including 1 indicators, level 2 including 5 indicators, and level 3 including 18 indicators, creating a premise for the process of pairwise comparison between corresponding indexes at the same level. After the pairwise comparison scoring process, the vector weights of the indicators will be determined. Next, the average value of the vector weights will be calculated to determine the weights of the indexes and components. Finally, synthesize and calculate the value from the components.

In general, the AHP approach includes three stages including structuring the criteria into a hierarchic system, using the surveyed data to calculate the pairwise comparison matrices and the relevant statistics (the eigenvectors, the consistency index, and the consistency ratio), and assessing the relative importance of each criterion in different hierarchies. Policy, organizational structure, leadership traits and skills, information, and work environment are five group factors to be used for the AHP model. Each group of criteria had its subcriteria that influenced the crisis management in Vietnamese state-owned enterprises during the COVID-19 time (see Table 1).

Table 2 shows descriptive statistics for the state-owned enterprises that were polled. Men are dominant (about 71.33%) in these state-owned enterprises, with an average age of 39.85 years old. The year of working is about 10.98%.

These state-owned enterprises typically span about 10.96 years, the average revenue is about 127.47 billion VND and each enterprise averaged 471.73 labors.

Table 1. The factors of crisis management in the state-own enterprise

Level 1	Level 2	Level 3
Crisis management (CM)	Policy (PO)	Recruitment policy (PO1)
		Training policy (PO2)
		Digital policy (PO3)
		Support policy (PO4)
	Organizational structure (OS)	Centralization (OS1)
		Horizontal integration (OS2)
		Formalization (OS3)
		Vertical differentiation (OS4)
		Decisiveness (LTS1)
	Leadership traits and skill (LTS)	Flexibility (LTS2)
		Communication (LTS3)
		Easier access to information (IN1)
	Information (IN)	Securing information (IN2)
		Decision-making support (IN3)
		Resource optimization (IN4)
Culture (WE1)		
Work environment (WE)	Teamwork (WE2)	
	Hi-tech application (WE3)	

Source: Author's compilation

Table 2. Profile of the sample used in this study

City	Obs	Age		Gender (Male=1)		Startup Year		Experience (Year of Working)		Revenue (Billion VND)		Labor (Persons)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Ha Noi	102	37.61	11.76	0.77	0.42	14.23	6.21	15.70	7.26	102.81	8.91	518.21	22.98
Ho Chi Minh	81	41.82	12.57	0.65	0.26	12.56	3.25	10.48	5.32	198.41	11.23	615.41	16.71
Lai Chau	76	40.12	14.23	0.72	0.43	16.21	4.81	6.74	4.12	81.21	15.91	281.58	19.41

Source: Author's survey (2022)

4. RESULTS AND DISCUSSION

4.1 EFA results on the relationships between factors affecting crisis management in state-owned enterprises

Calculation results from Cronbach Alpha for 5 individual components making impacts on crisis management in the state-owned enterprises during COVID-19 time in Table 3. These elements and their scales have Cronbach Alpha>0.7; Total correlation>3, and all of the Cronbach alpha of research concepts>Cronbach alpha of observation variables. The results show that they meet the quality test and they are used to test by EFA. The PO4 observation variable has Alpha=0.423 (<0.6), so it is not used for the EFA test.

Table 3. Testing the reliability coefficient of the scale

Sign	Factors/ Dependent Variables	Corrected Item – Total Correlation	Cronbach’s Alpha if Item Deleted
PO	Policy	.931	
PO1	Recruitment policy		.871
PO2	Training policy		.871
PO3	Digital policy		.856
PO4	Support policy		.423
OS	Organizational structure	.948	
OS1	Centralization		.886
OS2	Horizontal integration		.878
OS3	Formalization		.922
OS4	Vertical differentiation		.862
LTS	Leadership traits and skill	.941	
LTS1	Decisiveness		.705
LTS2	Flexibility		.890
LTS3	Communication		.805
IN	Information	.926	
IN1	Easier access to information		.792
IN2	Securing information		.874
IN3	Decision-making support		.876
IN4	Resource optimization		.777
WE	Work environment	.878	
WE1	Hi-tech application		.823
WE2	Teamwork		.793
WE3	Culture		.692

Source: Author’s survey (2022)

EFA analysis for 17 observation variables of 5 elements that make a real impact on crisis management in the state-owned enterprises related to economic activities. KMO=0.789 (>0.5) shows that the exploratory factor analysis is suitable for the research data set. Testing the correlation between observed variables shows that the coefficient sig=0.00 (<0.05) shows that the observed variables have a strong correlation in each factor.

The results of clustering the factors show that the factor loading coefficients of the retained observed variables all have values greater than 0.55 in Table 4. These values ensure a correlation between observed variables and created factors. Among the observed variables, the variable IN2 about securing information has the highest correlation coefficient (0.798).

Table 4. Rotated component matrix

Observation Variables	Components				
	1	2	3	4	5
PO1				0.628	
PO2				0.592	
PO3				0.617	
OS1	0.651				
OS2	0.694				
OS3	0.719				
OS4	0.665				
LTS1		0.796			
LTS2		0.672			
LTS3		0.641			
IN1			0.689		
IN2			0.798		
IN3			0.629		
IN4			0.617		
WE1					0.687
WE2					0.682
WE3					0.709

Source: Author’s survey (2022)

4.2 AHP results on the contribution of the dimensions on the overall crisis management

Based on survey results of 259 civil servants in three areas in Vietnam (Hanoi, Ho Chi Minh City, and Son La), using a reversible relationship function, factors determining the level of exposure contamination will be normalized. Next, the expert opinion matrices, vector weight matrix, and average weight matrix are respectively established from which to calculate and synthesize the weights according to AHP of the indicators and components to determine the contribution of the dimensions on the overall crisis management.

Table 5 shows the priority level for each level 1 option affecting crisis management in state-owned enterprises. The results for each group of factors have different levels of impact on the effectiveness of educational policies in rural areas. Specifically, the weight value of the policy factor is 0.40; next is the leadership factor with a weight of 0.23 and the weights of the organizational structure, information, and work environment factors with weights of 0.21, 0.10, and 0.7 respectively. Besides, the consistency ratio for the average of surveyed state-owned enterprises of level 1 factor is 9.8% (satisfying the condition CR<10%). The results are accepted because this proves that the forecasts about the elements are acceptable to give in the synthesis and evaluate the weights for each group of elements.

In general, the AHP results show that for crisis management of Vietnamese state-owned enterprises during the COVID-19 time, Policy is the most important factor, followed by Leadership (see Table 5). It is not surprising that policy and leadership account for 63% of crisis management because managing a crisis demands inter-organizational collaboration and collaborative leadership skills, suitable policies. Crises create unstable environments so leaders need to make timely decisions. In order to cope with the influence of these high-risk events, every competent leader must take efficient actions during crises [14]. It is noted that while Policy and Leadership reflect the crisis management aspect of Vietnamese State-Owned Enterprises but do not affect maximization at all, the fact that those civil servants see information as the least important factor/dimension with only a 10% contribution. It reflects the lack of information in the management process of state-owned enterprises. Therefore, the role of information is not appreciated.

Table 5. AHP weights and ranks of crisis management dimensions

Dimension	Policy	Organizational Structure	Leadership	Information	Work Environment	Weight
Policy	0.48	0.47	0.50	0.31	0.26	0.40
Organizational structure	0.13	0.08	0.37	0.28	0.20	0.21
Leadership	0.12	0.38	0.09	0.34	0.25	0.23
Information	0.13	0.03	0.02	0.06	0.26	0.10
Work environment	0.13	0.04	0.02	0.02	0.05	0.05

Source: Author’s survey (2022)

4.3 AHP results on the contribution of the indicators on each component

Table 6. AHP weights and ranks of crisis management

Indicators	Weights	Rank
Policy (PO)		
Recruitment policy (PO1)	0.49	1
Training policy (PO2)	0.29	2
Digital policy (PO3)	0.23	3
Organizational structure (OS)		
Centralization (OS1)	0.45	1
Horizontal integration (OS2)	0.16	3
Formalization (OS3)	0.29	2
Vertical differentiation (OS4)	0.10	4
Leadership traits and skill (LTS)		
Decisiveness (LTS1)	0.55	1
Flexibility (LTS2)	0.31	2
Communication (LTS3)	0.14	3
Information (IN)		
Easier access to information (IN1)	0.42	1
Securing information (IN2)	0.19	3
Decision-making support (IN3)	0.29	2
Resource optimization (IN4)	0.10	4
Work environment (WE)		
Hi-tech application (WE1)	0.48	1
Teamwork (WE2)	0.27	2
Culture (WE3)	0.17	3

Source: Author’s survey (2022)

Regarding the priority level for each level 2 option affecting crisis management of state-owned enterprises during the COVID-19 period. We report the weights and consequently, the ranks of the elements in each component in Table 6 show that the ranks indicate which indicator contributes more, or is more essential, toward the elements. First, it is observed that among the three indicators of policy (PO), recruitment policy (PO1) with 0.49, training policy (PO2) with 0.29, and digital policy (PO3) with 0.23. So, recruitment policy (PO1) is the most important indicator, followed by training policy (PO2), whilst digital policy (PO3) is the least important one. The CR consistency ratio of the economic factor group is 3.1%, satisfying the condition of CR<10%, ensuring the compatibility of judgments among survey subjects.

Regarding the organizational structure factor group (OS), the results of AHP at level 2 show that OS1 (0.45) has a weight nearly 4 times higher than OS4 (0.10) and OS2 (0.16). For this group, the CR ratio is 1% (<10%) ensuring the appropriateness of the assessment. For the leadership traits and skills (LTS), the results of factors at level 2 estimate that LTS1 (0.55) is about 4 times higher than LTS3 (0.14), while LTS2 is 0.31. A CR rate is 3% (<10%) indicates that the perceived relevance is acceptable. Information factor group (IN), the factor considered to have the most impact on crisis management is IN1 with a weight of 0.42, followed by IN3 with 0.29, IN2 with 0.19, and IN4 with 0.10. The CR rate is 7.9% (<10%). In the group of work environment (WE), the factor of most interest is WE1 with a weight of 0.48, followed by WE2 (0.27), and WE3 (0.17). The CR ratio is 7.9% (<10%) ensures

the validity of the judgment.

Hence, for each crisis management component, one can also observe from Table 6 that the most important indicators include recruitment policy (PO1), centralization (OS1), decisiveness (LTS1), easier access to information (IN1), and hi-tech application (WC1). These findings are consistent with previous studies on crisis management in enterprises including issues related to recruitment, communication and relations, hi-tech, policy, and information. This is now sometimes included in expanded business continuity strategies and centralization of organizational structure [22].

4.3 The role of the indicators on agriculture sustainability and its implications

The results show that policy factors play a decisive role in the crisis management of Vietnamese State-Owned Enterprises during the COVID-19 time, followed by leadership traits and skills, organizational structure, information, and work environment factors. The weighted results of the factors are as follows:

$$W_{\text{Policy}} (0.40) > W_{\text{Leadership traits and skills}} (0.23) > W_{\text{Organization structure}} (0.21) > W_{\text{Information}} (0.10) > W_{\text{Work environment}} (0.05)$$

Besides, the overall weights are calculated as the products of the weights from each level of the hierarchy system. The ranks of all indicators toward the overall measure will be calculated based on those overall weights. The results are reported in Table 7. In particular, we can observe the crucial role of recruitment policy (PO1) with 0.20, decisiveness (LTS1) with 0.13, and training policy (PO2) with 0.29 in the crisis management of state-owned enterprises during the COVID-19 time and these factors related to managers. A leader's essential competencies are developing the ability to give direction to employees, the ability to communicate tactfully, and other management skills that bring employees together and motivate employees to carry out their duties in the leader's desired form. An excellent leader is someone who knows how to assign tasks in accordance with the abilities of employees to achieve the highest work efficiency. However, employees often only perform their tasks well when they believe in their leaders. The process is a deliberate and continuous interaction between leaders and subordinates to perform tasks appropriate to their abilities. Good leaders use their management skills effectively to positively control management practices during times of crisis [18]. Besides, the least important indicators include resource optimization (IN3) with 0.04, vertical differentiation (OS3) with 0.16, teamwork (WE2), and culture (WE3) with 0.01. Once again, we argue that from the civil servant's perspective, recruitment policy is a reasonable and important factor. In contrast, the aspects of culture, teamwork, resource optimization of information, and communication are less focused on crisis management of Vietnamese State-Owned Enterprises during the COVID-19 time.

Table 7. The contributions of all indicators toward crisis management

Indicator Level 1	Weight 1 (w1)	Indicator Level 2	Weight 2 (w2)	Overall Weight (w1*w2)	Overall Rank
Policy (PO)	0.40	Recruitment policy (PO1)	0.49	0.20	1
		Training policy (PO2)	0.29	0.12	3
		Digital policy (PO3)	0.23	0.09	4
Organization-al structure (OS)	0.21	Centralization (OS1)	0.45	0.09	4
		Horizontal integration (OS2)	0.29	0.06	6
		Formalization (OS3)	0.16	0.03	8
		Vertical differentiation (OS4)	0.10	0.02	9
Leadership traits and skill (LTS)	0.23	Decisiveness (LTS1)	0.55	0.13	2
		Flexibility (LTS2)	0.31	0.07	5
		Communication (LTS3)	0.14	0.03	8
		Easier access to information (IN1)	0.42	0.04	7
Information (IN)	0.10	Securing information (IN2)	0.29	0.03	8
		Decision-making support (IN3)	0.19	0.02	9
		Resource optimization (IN4)	0.10	0.01	10
Work environment (WE)	0.05	Hi-tech application (WE1)	0.48	0.02	9
		Teamwork (WE2)	0.27	0.01	10
		Culture (WE3)	0.17	0.01	10

Source: Author’s survey (2022)

5. CONCLUSIONS

This paper examined the impact of factors on the crisis management of Vietnamese state-owned enterprises during the COVID-19 time by using the Exploratory Factor Analysis method (EFA) and the Analytic Hierarchy Process method (AHP). Our empirical results showed that, in general, policy factors played a decisive role in the crisis management of Vietnamese state-owned enterprises during the COVID-19 time, followed by leadership, organizational structure, information, and environmental factors. Besides, the recruitment policy (PO1), decisiveness (LTS1), and training policy (PO2) have the most impact on the civil servant’s crisis management in Vietnamese state-owned enterprises during the COVID-19 time. There are some solutions to promote state management in these state-owned enterprises in Viet Nam, including:

Firstly, the government should improve the management capacity of leaders in state-owned enterprises to respond to economic shocks effectively. Solutions include participating in management training courses, improving employee delegation skills and decision-making skills, enhancing innovation capacity in the unstable business environment.

Secondly, the government should enhance the quality of training and fostering managers by combining the form of training and retraining according to grade standards with the form of training and retraining according to job positions.

Thirdly, the government should reform the recruitment policies in state-owned enterprises according to the market mechanism. In general, when economic shocks occur, leaders can face these shocks affecting their management ability in these state-owned enterprises, so the government needs to have some training courses to encourage them to improve their skills to solve crises in management. This also suggests that the government should further introduce skill training courses. Besides, the government should implement support policies on management crisis skills to adapt to economic shocks including multi-skills, specialized professional skills, creative skills in management, problem-solving skills, and teamwork

skills...When managers are professional, they will be able to adapt quickly to changes in the economy.

Fourthly, restructuring the organization of state-owned enterprises focuses on building an effective organizational structure, applying modern technology platforms, improving innovation capacity, and building governance methods according to international standards.

Fifthly, promoting the digital transformation process in state-owned enterprises includes planning digital transformation strategies, preparing digital human and financial resources for digital transformation, building appropriate digital infrastructure, and developing digital data strategies.

In conclusion, our research focuses on assessing the impact of factors on crisis management in state-owned enterprises in Vietnam during shocks such as the COVID-19 pandemic. In the future research direction, we will focus on assessing the impact of factors on crisis management in other enterprises in Vietnam.

REFERENCES

- [1] Thuy, D.T., Viet, T.Q., Phuc, V.V., Pham, T.H.D., Lan, N.T.N., Ho, H. (2022). Impact of leadership behavior on entrepreneurship in state-owned enterprises: Evidence from civil servant management aimed at improving accountability. *Economies*, 10(10): 245. <https://doi.org/10.3390/economies10100245>
- [2] Larsen, A.S.A., Volden, G.H., Andersen, B. (2021). Project governance in state-owned enterprises: The case of major public projects’ governance arrangements and quality assurance schemes. *Administrative Sciences*, 11(3): 66. <https://doi.org/10.3390/admsci11030066>
- [3] Röglinger, M., Plattfaut, R., Borghoff, V., et al. (2022). Exogenous shocks and business process management: A scholars’ perspective on challenges and opportunities. *Business & Information Systems Engineering*, 64(5): 669-687. <https://doi.org/10.1007/s12599-021-00740-w>

- [4] Fridgen, G., Stepanek, C., Wolf, T. (2015). Investigation of exogenous shocks in complex supply networks—a modular Petri Net approach. *International Journal of Production Research*, 53(5): 1387-1408. <https://doi.org/10.1080/00207543.2014.942009>
- [5] Gali, N., Hughes, M., Morgan, R.E., Wang, C.L. (2023). Entrepreneurial entropy: A resource exhaustion theory of firm failure from entrepreneurial orientation. *Entrepreneurship Theory and Practice*, 10422587231151957. <https://doi.org/10.1177/10422587231151957>
- [6] Bundy, J., Pfarrer, M.D., Short, C.E., Coombs, W.T. (2017). Crises and crisis management: Integration, interpretation, and research development. *Journal of Management*, 43(6): 1661-1692. <https://doi.org/10.1177/0149206316680030>
- [7] Cerullo, V., Cerullo, M.J. (2004). Business continuity planning: A comprehensive approach. *Information Systems Management*, 21(3): 70-78. <https://doi.org/10.1201/1078/44432.21.3.20040601/82480.11>
- [8] Broekema, W., Van Kleef, D., Steen, T. (2017). What factors drive organizational learning from crisis? Insights from the Dutch food safety services' response to four veterinary crises. *Journal of Contingencies and Crisis Management*, 25(4): 326-340. <https://doi.org/10.1111/1468-5973.12161>
- [9] Nowotny, S., Hirsch, B., Nitzl, C. (2022). The influence of organizational structure on value-based management sophistication. *Management Accounting Research*, 56: 100797. <https://doi.org/10.1016/j.mar.2022.100797>
- [10] Boin, A., Kuipers, S., Overdijk, W. (2013). Leadership in times of crisis: A framework for assessment. *International Review of Public Administration*, 18(1): 79-91. <https://doi.org/10.1080/12294659.2013.10805241>
- [11] Rubin, A. (2007). Ownership level, ownership concentration and liquidity. *Journal of Financial Markets*, 10(3): 219-248. <https://doi.org/10.1016/j.finmar.2007.04.002>
- [12] Moynihan, D.P., Pandey, S.K. (2010). The big question for performance management: Why do managers use performance information? *Journal of Public Administration Research and Theory*, 20(4): 849-866. <https://doi.org/10.1093/jopart/muq004>
- [13] Domdouzis, K., Akhgar, B., Andrews, S., Day, T. (2017). Identification of critical factors in large crisis decision making processes using computational tools: The case of Athena. *International Journal of Strategic Information Technology and Applications (IJSITA)*, 8(2): 11-28. <https://doi.org/10.4018/IJSITA.2017040102>
- [14] Naim, K., Ustun, Y. (2018). Collaborative crisis management and leadership in the public sector. *International Journal of Public Administration*, 41(7): 548-561. <https://doi.org/10.1080/01900692.2017.1280819>
- [15] Klann, G. (2003). Crisis Leadership: Using Military Lessons, Organizational Experiences, and the Power of Influence to Lessen the Impact of Chaos on the People You Lead. Center for Creative Leadership.
- [16] Ogrodniczuk, M., Rudolf, M., Wójtowicz, B., Janicka, S. (2022). Error correction environment for the Polish parliamentary corpus. In *Proceedings of the Workshop ParlaCLARIN III within the 13th Language Resources and Evaluation Conference*, Marseille, France, pp. 35-38.
- [17] Kuliś, E., Łukasiewicz, M., Ledemann, M., Dykha, A. (2023). The importance of information systems supporting logistics processes production company. In *MATEC Web of Conferences*, 375: 02008. <https://doi.org/10.1051/mateconf/202337502008>
- [18] Ahmed, M. (2006). *The Principles and Practice of Crisis Management: The Case of Brent Spar*. UK: Palgrave Macmillan.
- [19] Davenport, T.H., Short, J.E. (1990). The new industrial engineering: Information technology and business process redesign. *Sloan Management Review*, 31(4): 11-27. <https://doi.org/10.4236/me.2016.78087>
- [20] Darling, J.R. (1994). Crisis management in international business: Keys to effective decision Making, *Leadership & Organization Development Journal*, 15(8): 3-8. <https://doi.org/10.1108/01437739410073047>
- [21] Saaty, T.L., Vargas, L.G. (2001). *Models, Methods, Concepts & Applications of the Analytic Hierarchy Process*. Kluwer Academic Publishers, Boston. <http://doi.org/10.1007/978-1-4615-1665-1>
- [22] Van Wart, M., Kapucu, N. (2011). Crisis management competencies: The case of emergency managers in the USA. *Public Management Review*, 13(4): 489-511. <https://doi.org/10.1080/14719037.2010.525034>