Adv. Math. Fin. App., 2022, **7**(4), P. 929-944

Advances in Mathematical Finance & Applications
www.amfa.iau-arak.ac.ir
Print ISSN: 2538-5569
Online ISSN: 2645-4610
Doi: 10.22034/AMFA.2021.1924365.1569

Research Paper

Using Fuzzy Delphi Technique to Identify Financial Factors Affecting Risk Management in Iranian Banks

Marzieh Fatemi Moghadam[a], Hassan Ghodrati [a, *], Hossein Panahian[a], Ali Akbar Farzin Far[a], Mehdi Madanchi Zaj[b]

[a] *Department of Accounting, Kashan Branch, Islamic Azad University, Kashan, Iran.*
[b] *Department of Financial Management, Electronic Unit, Islamic Azad University, Tehran, Iran*

ARTICLE INFO
Article history:
Received 2021-02-23
Accepted 2021-05-10

Keywords:
Financial Factors, Risk, Organizational Risk Management, Key Success Factors, Fuzzy Delphi.

ABSTRACT
The intermediary role that commercial banks play between borrowers and lenders is significant for the development of a sustainable and healthy economy. If the banking system uses its collected resources properly, it will have a positive contribution to economic development. However, for this to happen, a bank must ensure that risks are accurately assessed and that appropriate approaches are designed to address potential risks. Due to the increasing integration of risk management plans in the culture and processes of organizations, various approaches have emerged to oppose the issue, which has caused doubts and shortcomings in its implementation. Therefore, identifying the financial and key factors for the success of risk management implementation in the organizational environment can help prevent possible defects in the implementation of processes. Therefore, in this study, the key financial factors of the success of implementing organizational risk management in Iranian banks were investigated. To investigate which of the identified factors in Iranian banks is significant, the fuzzy Delphi technique was used and effective factors were identified using the perspective of experts. The results showed that the factors of "appetite and risk tolerance", "willingness to take advantage of opportunities", "identification, analysis and response to risk" and "relationship of sectors", can be effective factors in implementing risk management Be an organization in Iranian banks.

1 Introduction

The intermediary role that commercial banks play between borrowers and lenders is significant for the development of a sustainable and healthy economy. If the banking system uses its collected resources properly, it will have a positive contribution to economic development. However, for this to happen, a bank must ensure that risks are accurately assessed and that appropriate approaches are designed to address potential risks ([1-5, 47]). As Ozturk and Aktan [42] state, risk management is the process by which managers meet their needs for risk-taking. This need is met by identifying key risks, achieving comprehensible, operational, and consistent risk assessment criteria, choosing which risks to control or abandon, and ultimately selecting the appropriate method of dealing with them. In addition, to meet the need for risk-taking, managers must develop procedures to control the risk situation that arises. This means that risk management seeks to assess the risks associated with a particular situation by measuring its extent and reducing such exposures so that the bank's institutional goals are not destroyed [6-11].

* Corresponding author.
E-mail address: Dr.Ghodrati42@Gmail.com

© 2022. All rights reserved.
Hosting by IA University of Arak Press

In recent years, especially after the 2007 crisis, there has been a major shift in the way organizations choose to manage risk, and this was the starting point for focusing on executive and professional involvement in projects. Various financial reporting scandals, which resulted in damages to stakeholders or shareholders, led to the expansion of regulations on effective management and corporate governance [12-15]. From this perspective, a holistic view of risk management replaced the unit-based approach [16]. This new and more complete view of corporate risk is commonly referred to in the literature as organizational risk management. Organizational risk management is a process consistent with the business strategy used by the board, management and other personnel in all institutions to identify potential events that may affect the business unit and manage the risks that organizations seek to control. To provide a reasonable guarantee of achieving the unit's goals [17-21]. In recent years, organizational risk management has received increasing attention, especially due to the increasing complexity of risks, increasing dependence between sources of risk, more advanced methods of risk identification and quantity and information technology, etc. [22-25]. Implementing a company-wide vision of a company's total risk portfolio is therefore the goal of increasing a company's shareholder value by supporting a company's board of directors and senior management to ensure adequate oversight and management of the company's entire risk portfolio [26-28]. Organizational risk management measures help to create and maintain value through adequate risk control and taking advantage of opportunities [29].

Interest in this issue continues to grow, and more organizations have already implemented or are in the process of implementing organizational risk management programs. This movement leads to an increase in the value of the organization from a market perspective, and now the agencies related to the ranking of companies consider the management of organizational risk during the job classification process [30-32]. It can be seen that due to the increasing integration of risk management plans in the culture and processes of organizations, various approaches have emerged to oppose the issue, which has caused doubts and shortcomings in its implementation. Therefore, identifying the key factors for the success of risk management implementation in the organizational environment, can help prevent possible shortcomings in the implementation of processes [33-35]. Therefore, in this study, the key factors for the success of implementing organizational risk management in Iranian banks are investigated.

2 A Review of Research Literature

2.1 Theoretical Foundations

In recent years, the term sovereignty has become dangerous, popular, and present in the literature specializing in international relations, sociology, technology, and research [36]. Thus, risk governance connects the core of governance principles to the control of risks and uncertainties related to the decision-making process. This method includes three known elements for risk analysis (risk assessment, management and communication) and is not necessarily limited to them [37]. From the perspective of risk management, legal, institutional, social and economic contexts are considered in which risk is assessed with the participation of various stakeholders. These processes include analyzing complex relationships between different stakeholders, laws, conventions, internal processes, and mechanisms for how to collect, analyze, communicate relative risk information, and visualize decisions [38].

Risk management activities are not limited to a single reference. In other words, they involve the actions of the government and private shareholders with common interests and risks. Thus, the nature of risk requires cooperation and coordination between different stakeholders. Thus, risk management is not limited to a risk process with many interactions and stakeholders, but also takes into account underlying factors such as institutional rules (e.g. regulatory and legal standards) that determine stakeholder relationships, roles and responsibilities, and Coordination of mechanisms, incentives or norms, culture

and politics, including risk perception [39-41]. The literature generally identifies the term risk management as a combination of governance, risk, and compliance, which was first used in management consulting and later published in other business sectors. In this approach, governance makes it possible to divide power between the board, management and shareholders, or it can also be understood as a series of actions taken by the company with the support of different levels of management. In the following, risk is a term that has been used in many different ways since the simple risk assessment to control complex business risks. Compliance means adhering to applicable laws and regulations, as well as supporting the company's internal policies [42-43]. Risk management can be a mechanism that identifies, analyzes and communicates risks at a strategic level, with the participation of stakeholders, the rules, processes and criteria that the company determines how relevant the information collected is about the risks. And the level of analysis and their relevance. Key approaches are guided by transparency, effectiveness and efficiency, accountability, strategic focus, sustainability, equity and legal compliance, in a way that the developed solutions are accepted by the community and other stakeholders [44-46]. The importance of risk management throughout the company has increased significantly in recent years. While previously companies focused on reducing financial risk and risk in their risk management activities (Farrell and Gallagher [26]), companies with a comprehensive risk management approach now pursue risk management using a strategic and systematic approach. they do. Unlike traditional risk management, organizational risk management also measures, analyzes, prioritizes, and responds to models in a coordinated framework consisting of firms and various other types of risk, such as operational risk and credit [47]. An integral part of comprehensive risk management approaches is the integration of the company-level risk-reward perspective into strategic management decisions of companies [48].
Unlike traditional unit-based risk management, organizational risk management enables companies to describe risks throughout the organization in an integrated, structured, dynamic, and continuous manner with a long-term perspective. Involve the company's strategy, employees, knowledge base, processes and technologies [49]. Given the integration of risk management into the company's strategy, organizational risk management should be a top-down process (rather than a mid-level technical performance) with responsibility at the board level [50].

2.2 Research Background

Bohnert et al. [14] in a study entitled "Motivations and Value of Organizational Risk Management: Evidence of ERM Ranking" to analyze the determinants (characteristics of the company) as well as the impact of ERM on shareholder value of European insurers using The ERM ranking is the standard for identifying ERM activities. The results show a significant positive effect of ERM on company value for European insurers. Also, the results showed the effect of firm size, financial leverage and profitability on risk management. In a study entitled "Key Success Factors Related to Organizational Risk Management", Oliveira et al. [41] identified the most important success factors that have the greatest impact on the implementation of organizational risk management. To this end, they have the important mission of this approach to ensure the survival, growth and sustainability of jobs in an environment with strong global technology integration. Competition, and political, cultural, and economic contexts were considered. To achieve this goal, a systematic and structured literature review was conducted and ten critical factors for success in implementing organizational risk management were identified and analyzed.
Lechner and Gatzert [35] in a study entitled "Determinants and value of organizational risk management: empirical evidence from Germany" to empirically analyze the characteristics of the company that determines an organizational risk management system and examine the impact of organizational risk management on value The company paid. Their focus was on companies listed on the German Stock

Exchange. Findings show that size, international diversity and industry sector (banking, insurance, energy) have a positive effect on the implementation of organizational risk management system and financial leverage has a negative relationship with the interaction of organizational risk management. The results also confirm the significant positive impact of organizational risk management on shareholder value. Riaz [47] in a study entitled "Study of factors affecting the risk management of commercial banks" focuses on the factors affecting the efficiency of risk management in the Pakistani banking industry. Panel regression analysis using a class of time series data and cross-sectional types of macro and banking factors for the period covered from 2009 to 2013 was used to examine the relationships. Experimental results show a positive relationship between liquidity, profitability, operating efficiency, integration and economic growth with capital adequacy ratio, while portfolio risk and inflation rate have the opposite effect. Piyananda et al. [45] in a study entitled "Specific Banking Characteristics of Risk Management Efficiency: Evidence from Limited Commercial Banks in Sri Lanka" to identify specific bank determinants of risk management efficiency in Sri Lankan commercial banks, covering 11 banks issued financial statements from 2008 to 2014. Panel regression analysis was used as a data analysis tool. Capital adequacy ratio (CAR) as a dependent variable as collateral for risk management efficiency and credit risk, liquidity risk, market risk, return on assets (ROA), bank size and operational efficiency as determinants of bank productivity The results showed that credit risk, liquidity risk, ROA, operating efficiency and bank size are important factors in determining the efficiency of risk management of commercial banks in Sri Lanka.

Dabari and Saidin [21] in a study entitled "A theoretical framework for the implementation of risk management in the Nigerian banking sector: the moderating effect of senior management support" examined the implementation of risk management in the Nigerian banking sector. It also determines the backgrounds of risk management implementation. This research will take a quantitative approach using a questionnaire. The need for more research on the implementation of risk management in the banking sector has become necessary due to the lack of research in the field of risk management and the fact that risk management is still in its infancy in Nigeria. Zhao et al. [57] in a study entitled "Key success factors for organizational risk management in China's construction industry" identified key success factors for organizational risk management and analyzed the interrelationships between these factors in Chinese construction companies. To achieve this goal, the key success factors were identified through a comprehensive literature review and 89 complete survey questionnaires were obtained. The results of the analysis show that three important success factors are: "commitment of the board and senior management", "risk identification, analysis and response" and "goal setting". In addition, the three basic groups affecting organizational risk management are (1) implementation and integration, (2) communication and understanding; And (3) commitment and participation of senior management. The commitment and participation of senior management positively contributes to communication and understanding as well as the implementation and integration of organizational risk management, while facilitating communication and understanding, implementation and integration of organizational risk management.

Paape and Speklè [43] in a study entitled "Approval and design of organizational risk management practices: an empirical study" firstly the level of implementation of organizational risk management and factors related to its level of acceptance and secondly specific design options They examined risk management and their impact on risk management effectiveness. They found that the level of implementation of organizational risk management is influenced by the regulatory environment, internal factors, ownership structure and characteristics of the company and industry. In addition, the effectiveness of perceived risk management is associated with the frequency of risk assessment and reporting and the use of quantitative risk assessment techniques. Vala [7] in a study entitled "Leveling the indicators affecting organizational risk management using ISM technique" using ISM technique

leveled the indicators affecting organizational risk management and the factors of change in the political environment and lack of asset transparency Were identified as the most influential indicators and the factor of changing tastes as the most influential indicators. Rezazadeh et al. [6] in a study entitled "Study of risk management factors of banks" stated that the correct relationship between financial and production systems in each country is one of the most important factors of economic growth and development. Countries that have an efficient model of allocating capital to different economic sectors often have higher economic development and consequently higher social welfare. Equipping and allocating investment resources to economic activities is done through the financial market, of which the bank credit market is a part. Currently, due to the high volume of bank facilities, the risk of their repayment is a major challenge for banks. In fact, the risk lies in the nature of banking activities. And it seems practically impossible to eliminate risk from banking operations. Hence the only solution is to manage it. Farid et al. [3] in a study entitled "Study of factors affecting the risk management of banks listed on the Tehran Stock Exchange and OTC" to examine the factors affecting the risk management of banks on a sample of 14 banks among the banks listed in Tehran Stock Exchange and OTC exchanged in the period of 5 years 2010-2014. The results indicate that among the specific banking factors, there is an inverse and significant relationship between the total capital of the bank and its risk; It is also evident that bank returns are inversely and significantly related to all risk measurement criteria; Also, there is no significant relationship between bank diversification and its risk and cannot be commented on; The results indicate that relying on non-deposit funds as a source of financing increases the bank's risk and finally studies show that there is a positive and significant relationship between the dividend rate paid by the bank and its risk.

Memar and Reshadatjoo [5] in a study entitled "Identifying the determinants of risk management and measuring its impact on strategic management in Tondgooyan Petrochemical Company" showed that risk management can largely affect strategic management (risk transfer, risk avoidance, Risk reduction, risk acceptance) is effective. And in terms of content, activities and outcomes can greatly affect strategic management. Also, according to Friedman test rankings, there is a significant difference between the mean scores of the impact of risk management determinants (content, activity, conditions, consequences) on strategic management. The effect of risk management in terms of content on strategic management with an average rating (2.88) is the highest and their availability and the effect of risk management in terms of conditions on strategic management with an average rating (2.17) shows the weakest effect. Hamdi et al. [1] in a study entitled "Providing a theoretical framework for determining the factors affecting organizational readiness to implement project risk management" identified a list of key success factors for implementing risk management by reviewing the relevant literature and then identified these factors to identify the effect. Their rankings were distributed among experts and finally a framework for implementing project risk management was obtained through final factors and statistical calculations were provided.

3 Research Methodology

After identifying the factors affecting organizational risk management, to investigate which of the identified factors can affect organizational risk management in Iranian banks, an email containing the research objectives and the importance of accuracy in answering design questions and provided to experts The banking industry was located in Iran. Experts include people active in the banking industry with a position in the banking industry with more than 10 years of experience and a master's degree or higher. According to the filter, 27 people were identified and a questionnaire was given to them. Out of 27 distributed questionnaires, 19 questionnaires were returned, of which 15 were complete and were used for analysis. Fuzzy Delphi technique was used to analyze the data and achieve the final pattern.

Delphi is a technique for structuring a structured communication process used to solve a problem. In this method, the researcher intends to use the maximum group opinions (experts) and at the same time minimize opposition and inconsistency. Delphi in the present study has been done in three rounds, so that in each round a questionnaire has been designed and distributed among the experts, they are asked to rank the indicators in the fuzzy range of 1 to 9 and based on Calculate the average of minor obstacles (with an average of less than 0.5) are eliminated. In the next round, a new questionnaire will be designed and, along with the obstacles removed in the previous round, will be heard by experts to review the obstacles that were eliminated in the previous round in addition to the new survey. The following section presents the findings from each round separately.

Table 1: Fuzzy scores in Delphi technique

Impact rate	Very Low	Low	Average	High	**Very High**
Numerical value	1	2	2	3	
Fuzzy	(0/0،0،25)	(0/0،5/0،25)	(0/0،75/0،5/25)	(0،1/0،75/5)	**(0،1،1/75)**

To measure the fuzzy score for each index j in terms of expert i, the following method is used.

To convert a fuzzy number to a definite number, the average of the three elements is calculated for each criterion. According to the fuzzy numbers used, if the average obtained is more than 0.5, the index is acceptable and otherwise it is removed from the model. An example of the experts' response to the index and reaching the final answer is shown below.

Table 2: Example of fuzzy Delphi calculations

Expert							**Defuzzified Value**
1	0	0	0/3	0	0/383333	1	0/461111
2	0	0	0/3				
3	0/5	0/8	1				
4	0	0	0/3				
5	0/3	0/5	0/8				
6	0	0	0/3				
7	0	0	0/3				
8	0	0/3	0/5				
9	0/8	1	1				
10	0/3	0/5	0/8				
11	0/3	0/5	0/8				
12	0	0	0/3				
13	0/8	1	1				
14	0/8	1	1				
15	0	0/3	0/5				

4 Findings

4.1 Financial Factors of Organizational Risk Management Success

Success financial factors describe several key activities in which there are good results for the manager to achieve his goals. To gain an in-depth understanding of organizational risk management and ensure its success, it is necessary to articulate the key activities that are essential for the success of

organizational risk management. Therefore, the key success factors method in this study has been adopted to identify the key activities of a successful organizational risk management program. Identifying key factors allows the necessary measures to be taken to ensure more effective implementation of organizational risk management. Therefore, this section describes the factors that have the greatest impact on the implementation process of organizational risk management by reviewing the literature in this area. High commitment of management is recognized as an internal driving force for the implementation of organizational risk management and can accelerate other risk management drivers [27]. Management's commitment to implementing risk management leads to increased alignment of risk management strategy with the goals of the organization [25, 29, 33, 41].
The level of appetite for risk and the degree of risk tolerance are effective factors on organizational risk management. Risk tolerance is the amount or volume of risk that an organization is willing to resist, and risk appetite is the level of risk that a company is willing to expect in return for a reward. Therefore, the balance of these two indicators affects the acceptance of organizational risk management [51].
The tendency to take advantage of opportunities, according to Sharman [51], is the key to success in organizational risk management strategies. According to Berry and Phillips [13], when an organization has a higher capacity to generate risk than competitors, it makes an important competitive distinction. Increases. Having a focal point for risk management that is responsible for risk management and monitoring can affect the acceptance and quality of organizational risk management implementation (Banham, 2004). In some cases, there is a department or individual, which is responsible for risk management and provides a mechanism to facilitate communication between investors and other stakeholders in risk management issues [9].
The availability of resources, which can include experienced personnel as well as access to the cost and time required to implement organizational risk management, may improve risk management processes [46]. Effective risk management also has access to appropriate resources such as people, tools and technologies. Limited resources have been cited as one of the reasons why many organizations have difficulty developing an effective risk management plan (Meier [37]). Manab et al. [36] stated that quality personnel are the most important resources in managing risk in terms of knowledge, skills and dedication. People with the right attitude are also important for risk management [55]. Booker [15] emphasized that in addition to individuals, tools are also important factors that enable leaders to fulfill their commitments effectively in the context of risk management. Having the right people who understand the company's strategic orientation, customer needs, and tools such as risk management technology can improve the implementation of a risk management program [54]. The ability to identify, analyze, and respond to risk can provide a list of key hazards with potential impact on planned outcomes and help the prioritization process reduce responses and the likelihood of such events occurring or impacted. Can help implement organizational risk management (Fraser and Simkins [27]).
Defining risk indicators, monitoring, reviewing and improving them helps advance organizational risk management. Early warning indicators help the risk monitoring process by setting a limit that triggers precautionary measures to manage risks in accordance with planning. Through the ongoing process of risk monitoring and the efficiency and effectiveness of risk management processes, it can be examined whether organizational risk management processes, policies and procedures meet the needs of the business. Thus, through the process of review and improvement, policies, programs, and processes can be continuously improved to support organizational development (Sanchez and Robert [48]). The relationship between different parts of risk that increase the flow of information between the parties involved in risk processes is a vital factor for the implementation of organizational risk management. Transparency and fluency of the communication process at different levels of management and company performance make risk management strategies better developed by taking into account the greater awareness of the parties about the risks. Another important point of this process is the accuracy

and agility of information, in order to ensure that the risks in the management layers of the organization are reported and integrated into the decision-making process (Hwang et al. [30]). Compliance of the institution with applicable laws and regulations is considered as a factor to approve the activities of companies. If organizational risk management is approved as an activity in accordance with the rules and regulations from the perspective of the organization's stakeholders and the market, it can affect the implementation of organizational risk management (Mensah and Gottwald [38]). The environmental characteristics in which the company operates include market influences, suppliers, competitors, socio-political systems as well as organizational participation and joint venture strategies, which can affect the implementation of organizational risk (Yaraghi and Langhe [56]). Management skills including problem solving, negotiation, communication and organizational influence play a crucial role in organizational risk management [56].

Organizational culture has also been seen as an effective factor in managing and exploiting risk and implementing risk management program [49]. Kleffner et al. [33] found that organizational structure and overall resilience to change are among the reasons why an organization is unable to implement risk management successfully. Organizational risk management program requires an open organizational culture in which managers and employees must report their risk, but some of them are reluctant to show their weaknesses [51].

Table 3: Factors Affecting Organizational Risk Management

No.	Criteria	Symbol	Reference
1	Management commitment	Comm	[8, 30, 32, 38, 41, 52]
2	Appetite level and risk tolerance	Tole	[53]
3	Willingness to take advantage of opportunities	Oppo	[13, 51]
4	Existence of risk management center	Cent	[9, 11]
5	Access to resources	Reso	[15, 36, 37, 46]
6	Identify, analyze and respond to risk	Iden	[27]
7	Definition of risk assessment indicators	Meas	[48]
8	Connecting sections	Relat	[30]
9	Compliance with the rules	Regu	[38]
10	Environmental features	Envi	[56]
11	Management skills	Skil	[56]
12	Organizational Culture	Cult	[25, 33, 36]

According to the above, the model of factors affecting the implementation of organizational risk management can be shown in Fig. 1.

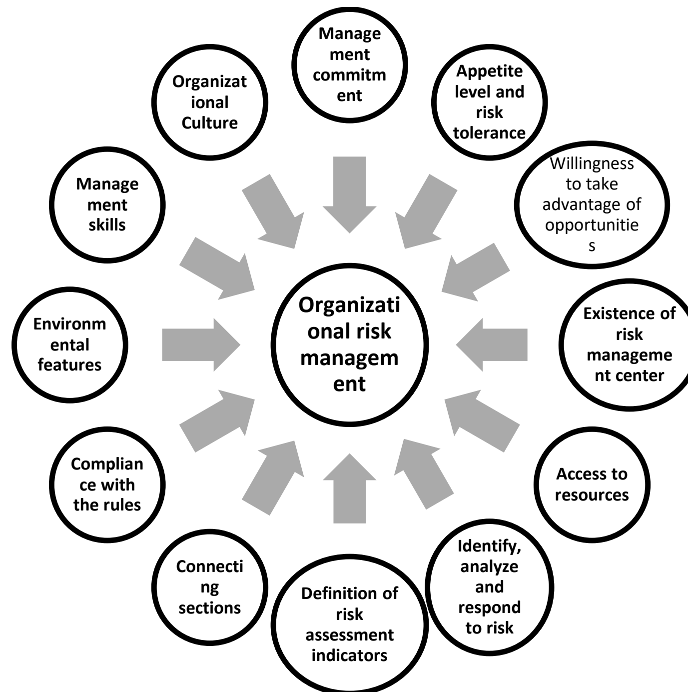

Fig. 1: Factors affecting organizational risk management

4.2 Delphi Implementation

In this section, the results of three fuzzy Delphi rounds are presented. In each step, if the index should be maintained, it is indicated by the number one, and if it should be deleted in the next step, it is indicated by zero.

Table 4: Results from the first round of fuzzy Delphi

				Average	More than 0.5
Management commitment	0/00	0/38	1/00	0/46	0/00
Appetite level and risk tolerance	0/00	0/50	1/00	0/50	1/00
Willingness to take advantage of opportunities	0/00	0/62	1/00	0/54	1/00
Existence of risk management center	0/00	0/57	1/00	0/52	1/00
Access to resources	0/00	0/62	1/00	0/54	1/00
Identify, analyze and respond to risk	0/00	0/55	1/00	0/52	1/00
Definition of risk assessment indicators	0/00	0/48	1/00	0/49	0/00
Connecting sections	0/00	0/63	1/00	0/54	1/00
Compliance with the rules	0/00	0/43	1/00	0/48	0/00
Environmental features	0/00	0/58	1/00	0/53	1/00
Management skills	0/00	0/33	1/00	0/44	0/00
Organizational Culture	0/00	0/45	1/00	0/48	0/00

According to the results, 5 factors were eliminated in the first round of Delphi and therefore 7 factors are examined in the second round.

Table 5: Results of the second round of fuzzy Delphi

Criteria				Average	More than 0.5
Management commitment	---	---	---	---	---
Appetite level and risk tolerance	0/00	0/57	1/00	0/52	1/00
Willingness to take advantage of opportunities	0/00	0/68	1/00	0/56	1/00
Existence of risk management center	0/00	0/45	1/00	0/48	0/00
Access to resources	0/00	0/60	1/00	0/53	1/00
Identify, analyze and respond to risk	0/00	0/63	1/00	0/54	1/00
Definition of risk assessment indicators	---	---	---	---	---
Connecting sections	0/00	0/68	1/00	0/56	1/00
Compliance with the rules	---	---	---	---	---
Environmental features	0/00	0/37	1/00	0/46	0/00
Management skills	---	---	---	---	---
Organizational Culture	---	---	---	---	---

According to the obtained results, out of 7 factors, 2 factors were eliminated in the second stage and therefore 5 factors will be evaluated in the third round.

Table 6: Results from the third round of fuzzy Delphi

Criteria				Average	More than 0.5
Management commitment	---	---	---	---	---
Appetite level and risk tolerance	0/00	0/57	1/00	0/52	1/00
Willingness to take advantage of opportunities	0/00	0/52	1/00	0/51	1/00
Existence of risk management center	---	---	---	---	---
Access to resources	0/00	0/40	1/00	0/47	0/00
Identify, analyze and respond to risk	0/00	0/65	1/00	0/55	1/00
Definition of risk assessment indicators	---	---	---	---	---
Connecting sections	0/00	0/60	1/00	0/53	1/00
Compliance with the rules	---	---	---	---	---
Environmental features	---	---	---	---	---
Management skills	---	---	---	---	---
Organizational Culture	---	---	---	---	---

According to the results, out of 5 factors, 1 factor was eliminated in the third stage and therefore 4 factors were identified as the final factors affecting organizational risk management. According to the results, in the factor of "management commitment", "definition of risk assessment indicators", "compliance with rules", "management skills" and "organizational culture" in the first stage, the average score of these indicators is less than 0.5 And these indicators are eliminated in the first stage, and this shows the low importance of these indicators in the implementation of organizational risk management in banks from the perspective of experts. In the factors of "existence of risk management law", "environmental characteristics" and "access to resources", the opinion of experts has changed in the final stages and the importance of these factors from their point of view against other factors and in proportion to the views of other experts has decreased.

In the factors of "appetite level and risk tolerance", "willingness to take advantage of opportunities", "identification, analysis and response to risk" and "relationship of departments", from the experts' point of view, these factors can be an effective factor on management implementation. Organizational risk in Iranian banks.

5 Conclusion

Risk, as a form of uncertainty, often has serious financial consequences for businesses and industries around the world. Risk and uncertainty management has always been a challenge for any type of organization because they are constantly striving for excellence while reducing risks and minimizing the potential losses that lead to financial ruin. In this regard, businesses and industries have realized the importance and necessity of risk management based on the activity of the enterprise.
Growing concerns about risk management affect not only organizations but also individuals and communities. Risk management is considered as an important tool that enables an organization to progress towards its goals, strengthen its corporate governance and at the same time fulfill its obligations to stakeholders. Failure to improve the risk management process can cause severe financial damage and damage to reputation. This will be reflected in the trust and confidence of the stakeholders. Therefore, it is important to conduct a comprehensive study on risk management by examining the critical factors for the effectiveness of risk management practices. In this study, the most important factors that are effective in the successful implementation of organizational risk management were studied.

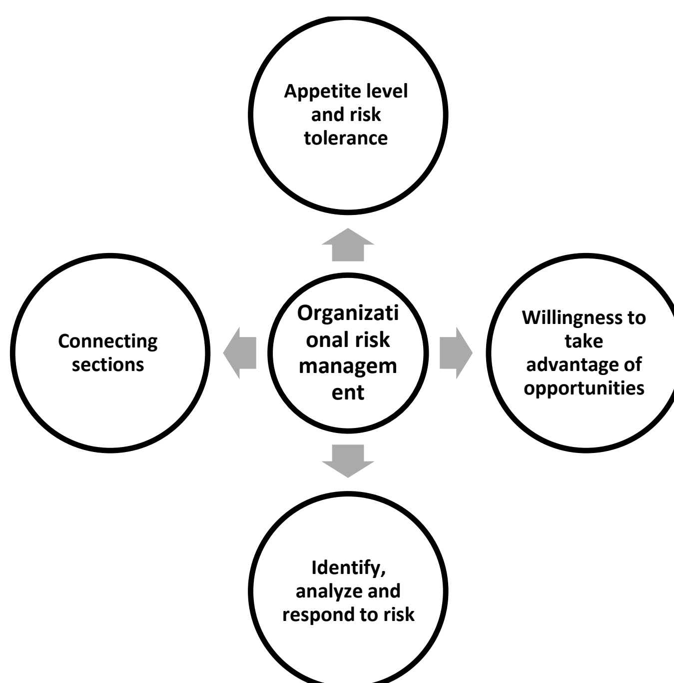

Fig. 2: The final model of factors affecting organizational risk management

According to the reviewed literature, access to resources, corporate governance, compliance, organizational culture, management perspective and skills, environment and risk management are the factors that have been suggested as critical factors for organizational risk management success. To investigate which of the identified factors in Iranian banks is significant, the fuzzy Delphi technique was used and effective factors were identified using the perspective of experts. The results showed that the factors of "appetite and risk tolerance", "willingness to take advantage of opportunities",

"identification, analysis and response to risk" and "relationship of sectors", can be effective factors in implementing risk management Be an organization in Iranian banks. Appetite level and risk tolerance based on Gibson and Young [28], Thomya and Saenchaiyathon [54], Dionne [22], Agarwal and Ansell [8] have a prominent role in organizational risk management because it is one of the determining factors in establishing methods. Risk management is in companies, where companies that are more risk-averse tend to take more stringent measures to control risks, processes, seek out specific policies and procedures. The results of this study are consistent with them.

The importance of seizing opportunities as an effective factor in meeting management expectations that can have a significant impact on organizational risk management has been confirmed by Sax and Torp [49], Sharman [51] and Berry and Phillips [13]. The results of this study are consistent with them. The activities of identifying, analyzing and responding to risk are closely related to the main purpose of the work of consulting specialists and the performance of their activities. They must identify and understand the risks, given the need to structure safety programs according to customer needs. The importance of this index as an influential factor on organizational risk management has been confirmed in the studies of Botha and Van Niekerk [17], Sax and Torp [49], Stoll and Laner [53] and Fraser and Simkins [27]. The results of this study are consistent with them.

In the study of Hwang et al. [30] it has been proven that the existence of relationships between different parts of risk that increase the flow of information between the parties involved in risk processes is a vital factor for the implementation of organizational risk management. The results of this study are consistent with them. According to the results of the study, it is suggested that banks increase their ability to identify and analyze risk by using scientific methods and benefiting from people familiar with risk management. They can develop financial and statistical plans that periodically assess the level of risk in each sector (credit, liquidity, etc.) and then convene meetings so that experts can come up with strategies to reduce the risks involved. They have a negative impact on the future of the organization. Banks need to assess their risk-taking and risk-taking appetites and, accordingly, develop risk-acceptance or risk-taking programs. For example, in lending to small and medium-sized businesses, which some consider risky, banks should consider whether, given their financial position and the position of the product or service that the company offers and its return to the market, they are willing to Pay credit to them or not.

Banks should use an integrated system to see the different risk-generating sectors and increase the relationship between the sectors so that the related sectors can be involved in controlling the risk and seeing the risk of the sector that affects them. For example, various studies show that in banks, liquidity risk is related to credit risk, and if the bank's overdue receivables increase, the bank will lose liquidity and will not be able to take advantage of the profitable opportunities in the market, so Obviously, liquidity and credit risk control must be done simultaneously. Banks, on the other hand, use cost-benefit methods to assess risk-related opportunities and costs, and accept risks whose opportunity level outweighs their cost, or otherwise control or reject them. For example, in lending to small and medium-sized enterprises, banks must assess whether the costs incurred are reimbursable in return for the benefits that the firm makes to the economy, both micro and macro.

References

[1] Hamdi, K., Reshadatjoo, H., Haj Ghanbari, H., *Provide a theoretical framework for determining the factors affecting organizational readiness to implement project risk management*, Urban Management Studies, 2014, **6**(19), P.41-32. (In Persian)

[2] Lin, T. J., Chang, H. Y., Yu, H. F., Kao, C. P., *The Impact of Political Connections and Business Groups on Cash Holdings: Evidence from Chinese Listed Firms*, Global Finance Journal, 2019, **40**, P.65-73.
Doi: 10.1016/j.gfj.2018.10.001

[3] Farid, D., Sadeghi, H., Gholami, A., *Investigating the factors affecting the risk management of banks listed on the Tehran Stock Exchange and OTC*, International Conference on Change Management, Tehran, Center for Applied Information Development, 2016. (In Persian)

[4] Anvary Rostami, A., Saberi, M., Hamidian, M., Esfandiyar Pour, M.*, Evaluating and Ranking the Firms in Chemical Industry Listed in Tehran Stock Exchange with TOPSIS*, Advances in Mathematical Finance and Applications, 2017, **2**(2), P.73-79. Doi: 10.22034/amfa.2017.531319

[5] Memar, A., Reshadatjoo, H., *Identifying the determinants of risk management and measuring its impact on strategic management in Tondgovian Petrochemical Company*. Management Quarterly, 2014, **11**(34), P. 82-73. (In Persian)

[6] Rezazadeh, J., Mohammadi, A., Managerial Ability, *Political Connections and Fraudulent Financial Reporting,* Accounting and Auditing Review, 2019, **26**(2), P.217-238.
Doi: 10.22059/acctgrev.2019.263263.1007956

[7] Vala, S., *Leveling the indicators affecting organizational risk management using ISM technique*, Quarterly Journal of New Research Approaches in Management and Accounting. 2019, **3**(13), P. 70-58. (In Persian)

[8] Agarwal, R., Ansell, J., *Strategic change in enterprise risk management*, Strategic Change, 2016, **25**(4), P. 427-439. Doi: 10.1002/jsc.2072

[9] Arena, M., Arnaboldi, M., Azzone, G., *The organizational dynamics of enterprise risk management*, Accounting, Organizations and Society, 2010, **35**(7), P. 659-675. Doi: 10.1016/j.aos.2010.07.003

[10] Awojobi, O., *Analysing risk management in banks: Evidence of bank efficiency and macroeconomic impact* Journal of Money, Investment and Banking, 2011, **22**, P. 1-16.

[11] Banham, R., *Enterprising views of risk management*, Journal of Accountancy, 2004.

[12] Aghaei, M., Hasanzadeh, B., *Accounting Comparability and Its Effect on Investment Efficiency*, Journal of Accounting knowledge, 2018, **9**(2), P. 7-34. Doi: 0.22103/jak.2018.11156.2531

[13] Berry, A., Phillips, J., *Enterprise risk management: pulling it together*, Risk Management, 2019, **45**(9), P. 53-57.

[14] Bohnert, A., Gatzert, N., Hoyt, R.E., Lechner, P., *The drivers and value of enterprise risk management: evidence from ERM ratings*. The European Journal of Finance, 2019, **25**(3), P. 234-255.
Doi: 10.1080/1351847X.2018.1514314

[15] Booker, F.M., *An EWRM framework: Developing effective risk management strategies to protect your organization*. White Paper, August, 2003.

[16] Chalaki, P., Mansourfar, G., Karami, A., *Review the effect of Management Ability on the Financial Distress, with an emphasis on Financial Flexibility in Tehran Stock Exchange listed companies*, Journal of Financial Accounting Knowledge, 2018, **5**(1), P.153-180. Doi: 10.30479/jfak.2018.1403

[17] Botha, D., Van Niekerk, D., *Views from the Frontline: A critical assessment of local risk governance in South Africa*. Jàmbá: Journal of Disaster Risk Studies, 2013, **5**(2), P. 1-10.
Doi:10.4102/jamba.v5i2.82

[18] Bromiley, P., McShane, M., Nair, A., Rustambekov, E., *Enterprise risk management: Review, critique, and research directions*. Long range planning, 2015, **48**(4), P. 265-276. Doi: 10.1016/j.lrp.2014.07.005

[19] Che, X., Liebenberg, A.P., *Effects of business diversification on asset risk-taking: Evidence from the US property-liability insurance industry*. Journal of Banking & Finance, 2017, **77**, P. 122-136.
Doi: 10.1016/j.jbankfin.2017.01.004

[20] *Committee of Sponsoring Organizations of the Treadway Commission*, Enterprise Risk Management--Integrated Framework (New York, NY: COSO), 2004.

[21] Dabari, I. J., Saidin, S.Z., *A theoretical framework on the level of risk management implementation in the Nigerian banking sector: The moderating effect of top management support*, Procedia-Social and Behavioral Sciences, 2014, **164**, P. 627-634. Doi: 10.1016/j.sbspro.2014.11.156

[22] Dionne, G., *Risk management: History, definition, and critique*, Risk Management and Insurance Review, 2013, **16**(2), P. 147-166. Doi: 10.1111/rmir.12016

[23] Jamei, R. *Investigating the Mathematical Models (TOPSIS, SAW) to Prioritize the Investments in the Accepted Pharmaceutical*, Advances in Mathematical Finance and Applications, 2020, **5**(2), P. 215-227.
Doi: 10.22034/amfa.2020.1880616.1312

[24] Eick, C.L.M., *Factors that promote effective risk management at universities classified by the Carnegie system*, Doctoral/Research Universities-Extensive, 2004.

[25] Ernst, Y., *Risk management guide from theory to practice: Evolving your organization's risk management*, Insurance and Actuarial Advisory Services, 2001.

[26] Farrell, M., Gallagher, R., *The valuation implications of enterprise risk management maturity*, Journal of Risk and Insurance, 2015, **82**(3), P. 625-657. Doi: 10.1111/jori.12035

[27] Fraser, J.R., Simkins, B.J., Narvaez, K., *Implementing Enterprise Risk Management: Case Studies and Best Practices,* Wiley, 2014.

[28] Gibson, M.D., Young, J., *Critical success factors for the implementation of an operational risk management system*, Corporate Ownership & Control, 2012, **10**(1), P. 137-147. Doi: 10.22495/cocv10i1art12

[29] Hoyt, R.E., Liebenberg, A.P., *The value of enterprise risk management*. Journal of risk and insurance, 2011, **78**(4), P. 795-822. Doi: 10.1111/j.1539-6975.2011.01413.x

[30] Hwang, B.G., Zhao, X., Ong, S.Y., *Value management in Singaporean building projects: Implementation status, critical success factors, and risk factors*, Journal of management in engineering, 2015, **31**(6), Doi:10.1061/(ASCE)ME.1943-5479.0000342

[31] Javier, R.S., *Enterprise-wide risk management-The driver of corporate governance*, Loyola University Chicago Law Journal, 2008, **39**(3), P. 1-25.

[32] Kasim, M.A.B., *Unravelling the Myths of Enterprise Risk Management (ERM) and Shareholders'Wealth*, International Journal of Emerging Research in Management & Technology, 2016, **5**(11), P. 4-15.

[33] Kleffner, A. E., Lee, R., McGannon, B., *Stronger corporate governance and its implications on risk management*. Ivey Business Journal, 2003, **67**(5), P. 1-14.

[34] Tahmasebi, M., Hossein Yari, G. *Risk measurement and Implied volatility under Minimal Entropy Martingale Measure for Levy process,* Advances in Mathematical Finance and Applications, 2020, **5**(4), P. 449-467. Doi: 10.22034/amfa.2020.674944

[35] Lechner, P., Gatzert, N., *Determinants and value of enterprise risk management: empirical evidence from Germany*, The European Journal of Finance, 2018, **24**(10), P. 867-887. Doi: 10.1080/1351847X.2017.1347100

[36] Manab, N., Othman, S., Kassim, I., *Enterprise-wide risk management best practices: The critical success factors*. OIDA International Journal of Sustainable Development, 2012, **4**(3), P. 87-96. https://ssrn.com/abstract=2054977

[37] Meier, R.L., *Integrating enterprise -wide risk management concepts into industrial technology curricula*. Journal of Industrial Technology, 2000, **16**(4), P. 1-15.

[38] Mensah, G., Gottwald, W., *Enterprise risk management: Factors associated with effective implementation*. SSRN, 2015, 2735096, Doi: 10.2139/ssrn.2735096

[39] Nair, A., Rustambekov, E., McShane, M., Fainshmidt, S., *Enterprise risk management as a dynamic capability: A test of its effectiveness during a crisis*. Managerial and Decision Economics, 2014, **35**(8), P. 555-566. Doi: 10.1002/mde.2641

[40] Oliva, F.L., *A maturity model for enterprise risk management*. International Journal of Production Economics, 2016, **173**, P. 66-79. Doi: 10.1016/j.ijpe.2015.12.007

[41] Oliveira, K., Méxas, M., Meiriño, M., Drumond, G., *Critical success factors associated with the implementation of enterprise risk management*. Journal of Risk Research, 2019, **22**(8), P. 1004-1019. Doi: 10.1080/13669877.2018.1437061

[42] Ozturk, M., Aktan, B., *The new Basel capital accord: In search of excellence at bank risk management*. Review of Social, Economic and Business Studies, 2007, **7**(8), P. 151-174.

[43] Paape, L., Speklè, R.F., *The adoption and design of enterprise risk management practices: An empirical study*. European Accounting Review, 2012, **21**(3), P. 533-564. Doi: 10.1080/09638180.2012.661937

[44] Pagach, D.P., Warr, R.S., *The effects of enterprise risk management on firm performance*, Working Paper, North Carolina State University, Raleigh, NC, 2010.

[45] Piyananda, S.D.P., Chandrasena, S.M., Fernando, J.M.R., *Bank-Specific Determinants Of Risk Management Efficiency: Evidence From Listed Commercial Banks In SriLanka*. 6th International Conference on Business and Information (ICBI), 2015.

[46] Renn, O., Sellke, P., *Risk, Society and Policy Making: Risk Governance in a Complex World*. International Journal of Performability Engineering, 2011, **7**(4), P. 349-366. Doi: 10.23940/ijpe.11.4.p349.mag

[47] Riaz, S., *Investigating the factors affecting risk management efficiency of commercial banks*. Pakistan Business Review, 2016, **18**(1), P. 247-266. Doi: 10.22555/pbr.v18i1.671

[48] Sanchez, H., Robert., B., *Measuring portfolio strategic performance using key performance indicators*. Project Management Journal, 2010, **41**(5), P. 64-73. Doi: 10.1002/pmj.20165

[49] Sax, J., Torp, S.S., *Speak up! Enhancing risk performance with enterprise risk management, leadership style and employee voice*. Management Decision, 2015.

[50] Scheer, D., *Risk governance and emerging technologies: learning from case study integration*. Journal of Risk Research, 2013, **16**(3-4), P. 355-368. Doi: 10.1080/13669877.2012.729519

[51] Sharman, R., *Enterprise risk management-the KPMG approach*. Risk Management, 2002, **31**(26), P. 26-28.

[52] Simkins, B., *Enterprise risk management: Current initiatives and issues journal of applied finance roundtable*. Journal of Applied Finance, 2008, **18**(1), P. 115-134.

[53] Stoll, M., Laner, D., *Information system engineering promotes enterprise risk management*. In Innovations and Advances in Computing, Informatics, Systems Sciences, Networking and Engineering. Springer, Cham, 2015.

[54] Thomya, W., Saenchaiyathon, K., *The effects of organizational culture and enterprise risk management on organizational performance: A conceptual framework*. International Business Management, 2015, **9**(2), P. 158-163. Doi: 10.3923/ibm.2015.158.163

[55] Whitman, A.F., *Is ERM legally required? Yes for financial and governmental institutions, no for private enterprises*. Risk Management and Insurance Review, 2015, **18**(2), P. 161-197. Doi: 10.1111/rmir.12045.

[56] Yaraghi, N., Langhe, R.G., *Critical success factors for risk management systems*. Journal of Risk Research, 2011, **14**(5), P. 551-581. Doi: 10.1080/13669877.2010.547253

[57] Zhao, X., Hwang, B.G., Low, S.P., *Critical success factors for enterprise risk management in Chinese construction companies*. Construction Management and Economics, 2013, **31**(12), P. 1199-1214. Doi: 10.1080/01446193.2013.867521

[58] Zhao, X., Hwang, B.G., Low, S.P., *Implementing enterprise risk management in a Chinese construction firm based in Singapore*, in Senaratne, S. and Sandanayake, Y.G. (eds) Proceedings of World Construction Conference 2012, Colombo, Sri Lanka, 28-30 June, Ceylon Institute of Builders, 2012, P.434-444.