International Journal of Finance and Managerial Accounting, Vol.7, No.27, Autumn 2022 IJFMA

Providing a framework for identifying and assessing the risks faced by subsidiaries in holdings: Emphasizing on the Impact of the parent company's strategies

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Submit: 13/04/2021 **Accept:** 28/04/2021

ABSTRACT

In the structure of holdings, the main activity on investment and management is generally focused on companies called subsidiaries. thus risk management in subsidiaries (as the risk management of investments by the holdings), is too importance. Therefore, in this study, in the form of providing a framework, the effective risks of subsidiaries on the strategies of the parent company have been evaluated and analyzed.

To extract the initial list of types of risks related to the main activity of the holding, library studies and then utilizing the delphi technique and questionnaire tools, the opinion of two groups of specialists, including experts in the field of risk and industry experts, were used to categorize and extract the final risk factors related to the industry in question in Iran. In the quantitative part of the research and in order to determine the risk components for compiling the risk map and ranking it, the opinions of the audit/risk committees of the subsidiaries have been used in the form of an open questionnaire. Using the obtained results, the holding company will be able to identify the types of risks affecting its subsidiaries and determine their relationship with the parent company's strategy to manage them in the form of an enterprise risk management program as part of its strategic planning.

Keywords:

Enterprise Risk Management, Holding Company, Risk Map, Risk Scoring, Risk Evaluation.

1. Introduction

In today's challenging and turbulent business environment, exposure to environmental and internal risks is inevitable. Enterprise risks are simultaneously the most important factor for the growth and use of opportunities for the organization and also can be considered the most important threats to the survival of the organization. Therefore, Enterprise risk management has now attracted the attention of companies as one of the main topics of business analysis, prompting leading managers to establish and effectively manage them in world-class organizations.

Implementing Enterprise risk management has many tangible and intangible benefits. By establishing ERMs, organizations pursue improved decision-making, data collection effectiveness, and corporate governance. The basis of Enterprise risk management is based on the principle which states that since the inherent duty of any organization is to create value for its shareholders and considering that at the same time every company in its business environment is faced with many uncertainties, the senior manager of the organization should decide which one of these uncertainties he can accept in order to achieve the expected value for shareholders and which one of them should be discarded. Uncertainties in the business environment can be considered as an opportunity or threat, so Enterprise risks will typically bring threats and opportunities to the organization. The Enterprise risk management process is based on the goal of being able to identify and effectively manage the risks of uncertainty in the environment and within the organization.

Organizational value creation is maximized when the manager can apply appropriate strategies and goals to create a proper balance between growth and revenue goals and the related risks and use the organization's resources to overcome the risks or strengthen their effects. Therefore, the scope of Enterprise risk management objectives will include the following (Nourian, 2018):

- Identification of Enterprise risks and its effects to determine the organization's strategies (environmental and internal analysis stage)
- Precise determination of risk management methods including acceptance, avoidance, reduction and sharing
- Reducing the costs of surprise in the business of the organization by identifying the risks ahead and eliminating and reducing their risks
- Increasing the impact of opportunities by identifying the upcoming events for the organization and reaping the benefits
- Optimal use of capital with its optimal allocation in different areas according to their risk-taking

Enterprise risk management enables the senior manager of the organization to ensure the alignment of the organization's activities with the rules and regulations and avoid destroying the reputation and brand of the organization. In other words, it can be said that Enterprise risk management enables the company to move in the specified direction and achieve the vision without the events, changes and uncertainties that can prevent it.

With the scope of the economic and financial crises getting broader following the 2008 financial crisis, managers of the crisis-stricken companies stepped up their efforts to implement strategies that would save them from bankruptcy and halt their decline. Rahman Seresht et al., 2015). Over the years, Enterprise risk management has emerged as a way to strategically manage the set of risks in an organization (Al-Amri and Davidow, 2016). However, the role of Enterprise risk management is not only as a guardian of shareholder value, but also as a positive force for value creation (Noko and Stolls, 2006; Mikes, 2009; Woods, 2011), which over the last several decades has been highly developed as an important topic at the academic and practical level (Wu, Olson and Dolgui, 2015; Oliva, 2016). Major developments in the business environment such as globalization and high speed changes in technology have increased competition and management challenges in organizations (Khodamipour and Mahroomi, 2015). The goal of any activity in any business unit is to achieve the highest level of effectiveness and efficiency, which is called performance (Gordon, Loeb and T. Stone, 2009). Risk management is a fundamental concern in today's dynamic global environment (Gordon et al., 2009). In today's world, change is rapid, and successful quick adaptation is an important part of success in the present age. Studies show that there is a direct relationship between the strength of corporate risk management processes and

environmental control (Beasley et al., 2005). The international literature on Enterprise risk management also argues that organizations can improve their performance by adopting a comprehensive approach to risk management (Pape and Speckle, 2012). In order to achieve their goals, organizations need to identify and manage the risks, because they are always faced with a wide range of potentially destructive risks. And it seems that successful organizations are the ones that can fully and properly manage the risks they are exposed to. Risk management tries to identify, evaluate and measure the risks and then take countermeasures to manage rather than eliminating them (Tarantino Sernavankas, 2011). Dynamic corporate risk management requires comprehensive decision making for an integrated company with multiple business segments. In particular, risk management plays an important role in the decision-making process because it is naturally related to other important functions of the firm (such as capital budgeting, asset and debt matching) through exposure to shared risk and the firm's internal relationships. As companies grow and diversify, interactive complexity increases, so none of the organizational components (such as a business segment) can be easily separated. Meanwhile, the issue of complexity in organizations that operate as holdings will have new dimensions.

Holding companies, due to the nature and different investment decisions they face, are not in complete confidence in terms of decision making and face various risks in an atmosphere of uncertainty. The importance of various financial and non-financial risks requires holding companies to take managing these risks seriously. Despite extensive studies around the world in this regard, it still has many holes/flaws in this country and despite different approaches seen in the world, Enterprise risk management is being neglected by domestic researchers.

Since due to the structure of holdings, the main activity on investment and management is generally focused on companies called subsidiaries or subsidiaries, risk management in subsidiaries because the risk management of investments made by holdings are among the tasks of the risk management department in a Holding and is of considerable importance .This is even more of an importance for holding companies that have strategic goals for their investments. Therefore, the purpose of this study is to provide a framework for identifying and evaluating the risk of subsidiaries affecting the parent company's risk strategies in holdings and ranking it for use in the organizational risk management process as an important part of the holding's strategic planning.

2. Literature Review

2.1. Holding companies

Holding is synonymous in English with the words Head Quarter, Parent and Corporate, and in Persian with headquarters, head office, inclusive, parent company. In general, holdings can be defined as: "a group of organizations that are responsible for the ownership and management of other companies" (Babaei Zikilki, 2004). Holding companies operate in two ways:

- **Parent company (holding company):** These companies, by acquiring management shares and selecting the managers of the subsidiary companies, operate in those companies and apply different parenting methods on them.
- **Investment company:** These types of companies operate on only buying and selling shares of companies on a small or large scale and have a short-term approach to investments (Babaei Zekliki, 2004).

In accounting standards, a holding company is a major business unit that has one or more subsidiaries, and these subsidiaries are under the control of the parent company, which seeks to strategically manage the financial and operational policies of the subsidiaries, gaining economic benefits from them (Hanafizadeh and Shafiei, 2009).

Holding companies are established as economic enterprises with the aim of acquiring other companies' shares and various activities. These companies have an investment portfolio containing independent units. These companies have the advantages of low overhead of the headquarters, ease of compensation of units, risk dissemination and decentralization (Rostami-Norouzabad et al., 2019). A holding company is the most efficient method and tool that can be used to jointly control and manage two or more units that have been so far independent. A Holding company is a company that controls and monitors the basic and key strategies of one or more companies in terms of the percentage of share ownership or due to the selection

of the majority of managers and the determined policies (Khodamoradi and Raei Ezzabadi, 2014).

Given that decisions about the subsidiaries of the parent company can have an affect on other companies and accept the high impact of decisions taken related to the entire portfolio, and also given that the risks imposed on different companies in the whole holding, it can overshadow other companies with the risks being transferred from one company to another in a systematic way, thus making the implementation of the Enterprise risk management system on the whole portfolio and in the holding a requirement.

According to Gould et al., Just as a business-level strategy guides decisions at the business level, a corporate-level strategy should guide the decisions at the parent company level. Decisions at the parent company level also face two main questions:

- In what businesses and how (equity ownership, minority interest/shareholder, joint ventures and partnerships) should the parent company's resources be invested?
- How should a parent company influence and communicate with the controlled businesses?

These two decisions are always associated with risks that prevent holdings from achieving their goals in the two cases (Safari and Ebrahimi, 2016). In this regard, the second question is more about the approach taken in managing and controlling subsidiaries in a holding company, so management in this type of investment will be directly related to risk management.

2.2. Enterprise risk management(ERM)

Over the past two decades Enterprise risk management has grown rapidly in organizations, and shareholders, lawmakers, professional institutions and ranking organizations use risk management and internal control to better manage the firms' affairs. Enterprise risk management is a relatively new phenomenon and a number of studies still seek to examine how risk managers influence the process of decisions in organization (Meidel and Carbo, 2016). But what is Enterprise risk management? Wu et al. (2015), consider Enterprise risk management an integrated approach to managing existing risks in an organization, looking for the most effective ways to deal with these risks. According to Al-Amri and Davidow (2016), Enterprise risk management can be considered as a process of corporate risk management in which both financial and non-financial risks such as operational risks and strategic risks are managed in an integrated manner. Finally, according to the definition of Insurance and Risk Management Association, Enterprise risk management is a strategic discipline of the business that supports the achievement of the organizational goals by addressing the full range of risks and managing the effects of those risks (Meidel and Carbo, 2016). ERM is an integrated and continuous process for managing risks across all aspects of the company - including strategic, financial, operational, adaptive and credit risks - to minimize unexpected performance changes and maximize the firm's intrinsic value.

This process, by designing the basic needs associated with the company's management and policy, data and risk analysis, risk management, performance monitoring and reporting, allows the board and management to make more informed and knowledgeable decisions on the Risk–return spectrum (James Lem, 2017). In recent years, several theoretical frameworks that explain the concepts and terms related to Enterprise risk management have been proposed. For example, COSO (Committee of Sponsoring Organizations of the Treadway Commission) defines Enterprise risk management as follows: (Getzbert and Martin, 2013)

> "The process utilized by the board of directors, managers and other employees and used in strategy development throughout the company. This process is designed to identify potential events that affect the company and provide reasonable assurance on the set objectives".

Enterprise risk management not only seeks to minimize corporate risk, but also seeks to create potential opportunities for the organization. In fact, Enterprise risk management emphasizes two basic points; the first is a holistic and meta-partisan view of risk, and the second is that it views risk not as a threat but as an opportunity and creates opportunities from risky situations. This holistic approach to risk expresses a comprehensive process and perspective of risk management that seeks to reduce the likelihood of large profits and large negative cash flows by coordinating and controlling hedging risks (Khodamipour and Mahroumi, 2015). According to other definitions, risk can be defined as any

fluctuations in returns. Therefore, two perspectives can be presented to define risk:

- **First view**: Risk as any possible fluctuations in future economic returns.
- **Second view**: Risk as possible negative fluctuations in future economic returns.

In Enterprise risk management, the first approach is considered. In other words, both undesirable risks (threats) and desirable risks (opportunities) are considered by risk managers. In one of the most comprehensive definitions, risk management process is defined as a systematic and logical process that includes identification, analysis, measurement (called risk assessment) and confronting risk, considering the context or in other words the environment (internal and external) of the organization. Over the past two decades, the use of Enterprise risk management has grown rapidly in organizations, with shareholders, lawmakers, professional institutions, and rating agencies using risk management and internal control to better manage corporate affairs. Also according to the definition of Risk and Insurance Management Society (RIMS), Enterprise risk management is a strategic business discipline that supports the achievement of the organizational goals by addressing the full range of risks and managing the effects of those risks.

According to the definition of ISO 31000 (International Organization for Standardization (ISO)), risk is the effect of uncertainty on objectives, and risk management refers to coordinated activities to guide and control the organization in accordance with the risk (Garp, 2017).

What is present in this study and shows the difference between the present study and previous researches is that it has evaluated the risk of subsidiaries from the perspective of the parent company's strategies in the holding and this action is a kind of investment risk management made in companies. Investing in a holding company is considered a necessity that has not been seen in previous studies on risk management within the holdings.

2.3. Research background

In-house research has been conducted on the issue of Enterprise risk management. Rahnamay Roudposhti et al. in a research with the title "Identifying, analyzing and evaluating the risk of the subsidiaries in the holdings", examined the types of risks associated with subsidiaries of a parent holding company specialized in the cement industry with the aim of examining the investment risk of the holding in question. Also, Jalilvand et al. (2017) in a study examined the implementation of risk management in a financial institution active in the Iranian capital market. Hosseini and Ahmadi (2017) in a study entitled "Integrated risk management in financial holdings: incentives, benefits and challenges" examined the most important challenges in holdings. Rahnamay Roudposhti et al. (2017) in a study entitled "Identification and classification of types of holding companies in Iran", while defining and describing holding companies and its complexities, study the holdings of other countries and the structure of large holding companies around the world and its types according to the types of companies, organizations and banks in Iran. In another study, Ebrahimi et al. (2016) identified strategic risks in holdings as a framework for identifying strategic risks in investment holding companies. Seyed Javadin, Safari and Abbasi (2016) presented a framework theory for identifying strategic risks in investment holding companies using Multi-grounded theory. A review of previous research in the study of Khodamipour and Mahroomi (2015) shows that in most experimental studies, the presence of a senior risk manager is a sign of the implementation of Enterprise risk management in institutions. Also, characteristics such as size and institutional ownership of companies have a positive and significant association with the implementation of Enterprise risk management and the adoption of Enterprise risk management has a positive effect on shareholder value and corporate performance.

In a study abroad, Lee and Wang (2018) presented a new financial risk assessment model for companies based on heterogeneous information and historical data collected in Australia between 2016 and 2017. Sacks & Anderson (2018), in a study entitled "Strategic Risk Management: Integrating Enterprise Risk Management with Strategic Planning", using survey data from 260 large companies in Denmark, examined the issue of risk management and organizational strategies and its relationship to profitability and value added in the organization. The findings of Lechnert and Gatzert (2017) show that size, international diversity and industry sector (banking, insurance and energy) have a

positive effect on the implementation of an Enterprise risk management system and financial leverage has a negative relationship with Enterprise risk management. In addition, the results show that Enterprise risk management has positive and significant effects on stock value. Al-Amri and Davidow (2016) found that managing organizational risks reduces both the likelihood of occurrence and the impact of operational risks. Oliva (2016) presented an organizational risk analysis model in the supply chain of large Brazilian companies. Fraser and Simkins (2016) found that the management of Heidro One feels that after the implementation of corporate risk management, the company has found better conditions than five years ago and is ready to respond to new developments in the favorable and unfavorable business environment.
The results of Idel and Carbo (2016) showed that the structure of technology risk over time changes the performance of Enterprise risk management in decision making and Olson et al. (2015) presented the literature on Enterprise risk management using management science approaches. Eckles, Hoyt and Miller (2014) found that in firms that implement Enterprise risk management, fluctuations in their stock price are reduced.

3. Research methodology

The present study is applied in terms of purpose; In terms of data, it is an exploratory mix (qualitative and quantitative), in terms of nature and type of study in qualitative dimension, it is an emerging foundation data type and in the quantitative dimension, it is a cross-sectional study.

Also, the statistical population in this study was one of the holding company active in Iran's cement industry and its subsidiaries with an ownership percentage of more than 40% and in conducting research, the point of view of experts in the field of risk management, experts in the cement industry, including members of the Cement Industry Association and the Audit / Risk Committee (consisting of one board member, director of internal audit and two technical and financial experts) of holding subsidiaries have been used. The sample size of the present study in both qualitative and quantitative dimensions is conscious and purposeful. It should be noted that the optimal number of sample sizes in the dimension of qualitative research is theoretical saturation.

In implementing risk management, the first step is to identify the risk. The risk must be formally identified. Conversations in informal negotiations can be dangerous because the key risk indicators may be overlooked. Operations managers are often better able to identify the threats they face (Rostami Norouzabad, 2019). There are many techniques to help identify risks. Risk identification methods include the checklist method, delphi technique, workflow, brainstorming, focus center, risk questionnaire, risk failure structure, visit and view, interview, system analysis method, and SWOT technique.

In this study, due to the limitations caused by the prevalence of the Coronavirus (Covid-19), the following steps have been performed based on library studies and the Delphi technique:

- **Step 1:** Using the library research method as well as the annual reports of some domestic and foreign cement companies and holdings related to the issue of cement industry, a list of risks including 128 titles related to cement industry was extracted.

- **Step 2**: Using the Delphi technique, the opinion of experts in the field of risk management, including professors and experts in this field, was obtained in the form of a designed questionnaire. The questionnaire used in this stage was an open questionnaire and each professor was asked to agree with the type of risk classification based on the 5 Likert scale (from "Strongly disagree" to "Strongly agree"), and give their opinion And if they come up a category or subject other than the items in the questionnaire, specify it in the relevant table. At this stage, 10 professors in the field of risk management participated.

- **Step 3:** At this step, in order to extract the list of risks related to the cement industry in Iran, an open questionnaire was prepared based on the results of the previous stage and respondents, including Cement industry specialists, and were asked to agree with the list of risks in the questionnaire based on the 5 Likert scale (from "Strongly Agree" to "Strongly Disagree") and state if there are any more titles other than the list provided. After

that, in order to measure the agreement, especially regarding the types of risks added to the previous list, the experts were again consulted. In this stage, 21 experts in the cement industry, including members of the Cement industry union, who mainly have managerial positions (board of directors, CEO, other senior managers) in cement companies and holdings in Iran participated. After summarizing and analyzing the results, 79 risk items were finally approved from the previous list, which more than 70% of the respondents had chosen with the option "Agree" and "Strongly Agree".

- **Step 4**: In this step, the list of risks that were finalized from the previous step in order to determine the risk criteria, including the probability of the occurrence of the risk, the impact of the risk on operations and the degree of risk control in the company, was sent in the form of a closed questionnaire for the audit committee which are responsible for the risk management) of each of the four subsidiary companies and the results were analyzed.

In parallel, the companies planning unit under the supervision of the board of directors was asked to determine the impact or ineffectiveness of each of the risks on the holding's strategies announced by the holding. According to the strategies communicated by the holding to the subsidiaries and since the outcome of the strategies can be measured in the form of consolidated profit, the weight of each subsidiary is determined in the consolidated budget of the holding and in order to normalize the weights. The risk of the subsidiaries depends on the strategies of the parent company, through the weighted average (excluding the performance of the parent company in the merger) the profit weight of each company was calculated from 100.

- **Step 5:** The purpose of this step was to prepare a risk map for the holding (based on the effect of the risks of subsidiaries on the parent company's strategies) and finally rank the risks in terms of the importance of the impact and risk control. The following equations have been used to obtain consolidated data in order to prepare the holding risk map:

1) Determining the probability of occurrence of the consolidated risk in the holding: (for each of the sub-risks)

$$\sum_{i=1}^{n} \boldsymbol{W_i P_i}$$

W_i: The weight of each company in the consolidated profit (budget) of the holding
P_i: The probability of (sub) risk occurring in any company

2) Determining the effect of the risk on the performance (consolidated profit) of Impact Holding: (for each of the sub-risk)

$$\sum_{i=1}^{n} \boldsymbol{W_i I_i S_i}$$

W_i: The weight of each company in the consolidated profit (budget) of the holding
I_i: Number of the effect of the risk (sub) on performance (profit) in each company
S_i: Ratio of risks related to the total strategies communicated by the parent company for each risk

3) Determining the control risk degree in the holding:

$$\sum_{i=1}^{n} \boldsymbol{W_i C_i}$$

W_i: The weight of each company in the consolidated profit (budget) of the holding
C_i: Risk control degree (sub) in each subsidiary companies

Figure (1): Executive research process

Qualitative part		
Step 1	**Step 2**	**Step 3**
Identifying the types of risks related to the cement industry (internal and external sources)	Using the consensus of risk experts on listing and classification	Identifying the types of high-impact risks in the cement industry using the consensus of cement industry experts
Method: Library study	Method: Open questionnaire Technique: Delphi	Method: Open questionnaire Technique: Delphi
Quantitative part		
Step 4		
- Determining the risk components of holding subsidiaries (probability of occurrence, impact, degree of control) - Determining the relationship between the parent company's strategy and the types of risks in subsidiaries - Determining the weight of profits of subsidiaries in the consolidated profit of the holding budget		
Step 5		
- Preparing the integrated risk map of the holding from the perspective of the relationship between the risk of subsidiaries and the strategy of the parent company - risk ranking (in terms of importance)		

3.1. Risk segmentation and risk map extraction

According to the results of the previous section, the types of risks in the companies under study are divided into two types of financial and non-financial risks, and below each, the types of sub-risks up to the level of sub-risks are described in Table (1). It should be noted that the main list contains a total of 79 risk titles that are categorized under the risk subheadings.

Also, based on the results of step 4 and based on the survey output of the audit committee of the companies under study, which are also responsible for risk management, in the form of a closed questionnaire and based on the 7-point Likert scale of numbers related to risk probability, the effect of risk on the performance and level of risk control of each company was determined. The probability range, risk impact and risk control degree using the Likert spectrum are indicated in Table (2).

3.2. Data analysis

The collected data include "probability of risk occurrence", "risk impact" and "risk control degree" and the corresponding numbers for each source of risk in each subsidiary were determined according to Table (3). It is necessary to explain that in order to obtain the numbers of sub-risk branches, the average of each sub-branch in each of the three titles has been calculated separately for each company. Other required information after analysis is provided in Tables (5) to (7).

Table (1): List of risk sources of the studied companies

Main Risks	Sub-risks
Financial risks	Investment ~~risk~~
	Liquidity risk
	Capital structure risk
	inadequate insurance coverage Risk
	Financing risk
	Exchange rate risk
	Interest rate risk
	Inflation risk
	Financial reporting risk
	Tax increase risk
	Income reduction risk
Non-financial risks	operational risk
	Business / industry risk
	Human resource risk
	Terms and Conditions Risk
	Structural / managerial risk

Main Risks	Sub-risks
	Political / country risk
	Environmental risk
	Information technology risk

Table (2): Probability range, impact factor and control risk degree

Qualitative class	Equivalent number	Probability of risk	Impact risk	Risk control degree
Very weak	1	۱۵ %	-۱۵ %	۱۵ %
Weak	2	۳۰ %	-۳۰ %	۳۰ %
Somewhat weak	3	۴۵ %	-۴۵ %	۴۵ %
Medium	4	۶۰ %	-۶۰ %	۶۰ %
Somewhat strong	5	۷۵ %	-۷۵ %	۷۵ %
Strong	6	۹۰ %	-۹۰ %	۹۰ %
very strong	7	۹۵ %	-۹۵ %	۹۵ %

Table (3): Summary of data collected in step four

Sub-risks	Company ۱			Company 2			Company 3			Company 4		
	Risk probability	Risk impact	Risk control degree	Risk probability	Risk impact	Risk control degree	Risk probability	Risk impact	Risk control degree	Risk probability	Risk impact	Risk control degree
Investment risk	0.600	0.900	0.900	0.375	0.225	0.675	0.150	0.825	0.750	0.300	0.450	0.450
Liquidity risk	0.900	0.950	0.750	0.600	0.825	0.450	0.375	0.750	0.750	0.450	0.900	0.750
Capital structure risk	0.900	0.950	0.900	0.450	0.750	0.525	0.150	0.450	0.525	0.600	0.750	0.750
inadequate insurance coverage Risk	0.900	0.900	0.900	0.300	0.675	0.600	0.225	0.450	0.675	0.450	0.750	0.950
Financing risk	0.450	0.950	0.750	0.450	0.525	0.525	0.375	0.825	0.750	0.450	0.900	0.900
Exchange rate risk	0.950	0.950	0.450	0.850	0.750	0.525	0.675	0.900	0.750	0.750	0.600	0.450
Interest rate risk	0.750	0.750	0.750	0.375	0.375	0.675	0.300	0.450	0.525	0.450	0.450	0.600
Inflation risk	0.950	0.950	0.450	0.825	0.750	0.675	0.750	0.825	0.525	0.950	0.750	0.450
Financial reporting risk	0.900	0.750	0.450	0.375	0.450	0.825	0.375	0.675	0.750	0.450	0.600	0.900
Tax increase risk	0.900	0.950	0.600	0.450	0.750	0.750	0.375	0.450	0.750	0.450	0.600	0.600
Income reduction risk	0.600	0.950	0.600	0.675	0.850	0.600	0.525	0.750	0.525	0.450	0.900	0.600
operational risk	0.788	0.906	0.619	0.441	0.769	0.697	0.406	0.763	0.744	0.525	0.825	0.825
Business / industry risk	0.836	0.900	0.559	0.545	0.620	0.723	0.459	0.686	0.670	0.668	0.777	0.545
Human resource risk	0.850	0.832	0.559	0.464	0.586	0.689	0.402	0.655	0.620	0.573	0.723	0.836
Terms and Conditions Risk	0.929	0.836	0.579	0.386	0.632	0.700	0.225	0.546	0.579	0.407	0.600	0.729
Structural / managerial risk	0.910	0.880	0.630	0.420	0.645	0.615	0.315	0.630	0.600	0.330	0.720	0.810
Political / country risk	0.879	0.886	0.707	0.521	0.655	0.623	0.452	0.679	0.634	0.461	0.729	0.871
Environmental risk	0.900	0.867	0.550	0.758	0.858	0.458	0.500	0.758	0.225	0.650	0.800	0.300
Information technology risk	0.911	0.922	0.517	0.308	0.550	0.833	0.325	0.633	0.642	0.433	0.700	0.783

Table (4): The ratio of the effect of risk of subsidiaries on the main strategy of the parent company

Main Risks	Sub-risks	Risk ratio related to the parent company's core strategy			
		Company 1	Company 2	Company 3	Company 4
Financial Risks	Investment risk	0.00	0.22	0.33	0.22
	Liquidity risk	0.44	0.33	0.67	0.89
	Capital structure risk	0.44	0.22	0.78	0.00
	inadequate insurance coverage Risk	0.11	0.00	0.22	0.56
	Financing risk	0.33	0.44	0.67	0.78
	Exchange rate risk	0.33	0.44	0.33	0.44
	Interest rate risk	0.11	0.00	0.56	0.00
	Inflation risk	0.56	0.44	0.78	0.89
	Financial reporting risk	0.00	0.22	0.89	0.00
	Tax increase risk	0.00	0.11	0.67	0.00
	Income reduction risk	0.56	0.67	0.78	0.11
Non-financial risks	operational risk	0.56	0.78	0.29	0.40
	Business / industry risk	0.57	0.56	0.45	0.43
	Human resource risk	0.45	0.59	0.63	0.17
	Terms and Conditions Risk	0.48	0.56	0.38	0.41
	Structural / managerial risk	0.33	0.53	0.31	0.33

Main Risks	Sub-risks	Risk ratio related to the parent company's core strategy			
		Company 1	Company 2	Company 3	Company 4
	Political / country risk	0.88	0.72	0.71	0.92
	Environmental risk	0.78	0.63	0.44	0.85
	Information technology risk	0.69	0.04	0.89	0.68

Table (5): Composition and weight of operating profit of subsidiaries in consolidated operating profit (budget)

Description	Company 1	Company 2	Company 3	Company 4	Other companies in holding	Sum
Consolidated operating profit (million rials)	۲,۲۹۴	۱,۹۱۸	۸۳۷	۲,۵۰۶	۶,۱۹۱	۱۳,۷۴۶
Weight in consolidated profit (%)	۱۷٪	۱۴٪	۶٪	۱۸٪	۴۵٪	۱۰۰٪
Normalized weight profit (%)	۳۰٪	۲۵٪	۱۱٪	۳۳٪	۰٪	۱۰۰٪

Table (6): Consolidated risk components of the holding (Based on the relationship between the risk of the subsidiaries and the main strategy of the parent company)

Main Risks	Sub-risks	Risk probability $\sum_{i=1}^{4} W_i P_i$	Risk Impact $\sum_{i=1}^{4} W_i S_i I_i$	Risk control degree $\sum_{i=1}^{4} W_i C_i$
Financial risks	Investment risk	0.35	0.12	0.71
	Liquidity risk	0.58	0.53	0.72
	Capital structure risk	0.52	0.26	0.70
	inadequate insurance coverage Risk	0.50	0.17	0.80
	Financing risk	0.42	0.48	0.76
	Exchange rate risk	0.80	0.30	0.56
	Interest rate risk	0.48	0.11	0.63
	Inflation risk	0.87	0.58	0.50
	Financial reporting risk	0.55	0.21	0.70
	Tax increase risk	0.56	0.11	0.67
	Income reduction risk	0.54	0.44	0.57
Non-financial risks	operational risk	0.56	0.38	0.72
	Business / industry risk	0.64	0.38	0.61
	Human resource risk	0.59	0.32	0.66
	Terms and Conditions Risk	0.50	0.29	0.63
	Structural / managerial risk	0.51	0.25	0.66
	Political / country risk	0.59	0.62	0.71
	Environmental risk	0.69	0.55	0.37
	Information technology risk	0.53	0.50	0.66

3.3. Consolidated Holding Risk Map

Based on the analysis performed in the previous step, the consolidated risk map of the holding in terms of risk of the subsidiaries will be in Figure (2) and according to Table (7) as a guide table. Risk map is one of the most common ways to identify major risks faced by an organization. This method is visually appealing and easy to understand and describe. The risk map usually consists of two axes: the vertical axis, which indicates the potential effect of the risk, and the horizontal axis, which indicates the estimated occurrence probability of the risk. The map is often divided into four areas for analytical purposes As follows: (Rostami Norouzabad et al, 2019)

1) **High Impact / Low Probability:** The risks in this area are often critical in nature (such as storms or earthquakes) and are described as "Fat Tail" events in the context of "Value at Risk". Due to their unpredictability, these events are often reduced by using insurance or disaster recovery planning.

2) **Low Impact / Low Probability:** Risks in this area are normal and non-critical business risks that must be accepted or managed with normal operating tools.
3) **High Impact / High Probability:** The risks in this area are emergency and require extensive attention from the organization's board and management. Unless these risks are reduced to an acceptable level, full focus should be placed on them.
4) **Low Impact / High Probability:** The risks in this area are often transactional or predictable errors that must be reduced to acceptable cost / benefit levels through procedural controls.

Ideally, the best way to prepare a risk map is to use the voting process in risk workshops.

According to the information obtained in the holding's risk map and the interpretation table, inflation, political and commercial risks in the emergency zone; Structural risks, liquidity, information technology, revenue reduction, finance and operations, in the critical area; Exchange rate risk in the area of predictable risks and other risks in the area of normal risks are categorized. Accordingly, the holding company can find the suitable strategy for each of the risk sources to control / manage the investment risk on the companies under its control.

Table (7): Risk Maps Guide Table

	Risk number in the risk map																		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
Risk title	Investment risk	Liquidity risk	Capital structure risk	inadequate insurance coverage Risk	Financing risk	Exchange rate risk	Interest rate risk	Inflation risk	Financial reporting risk	Tax increase risk	Income reduction risk	operational risk	Business / industry risk	Human resource risk	Terms and Conditions Risk	Structural / managerial risk	Political / country risk	Environmental risk	Information technology risk

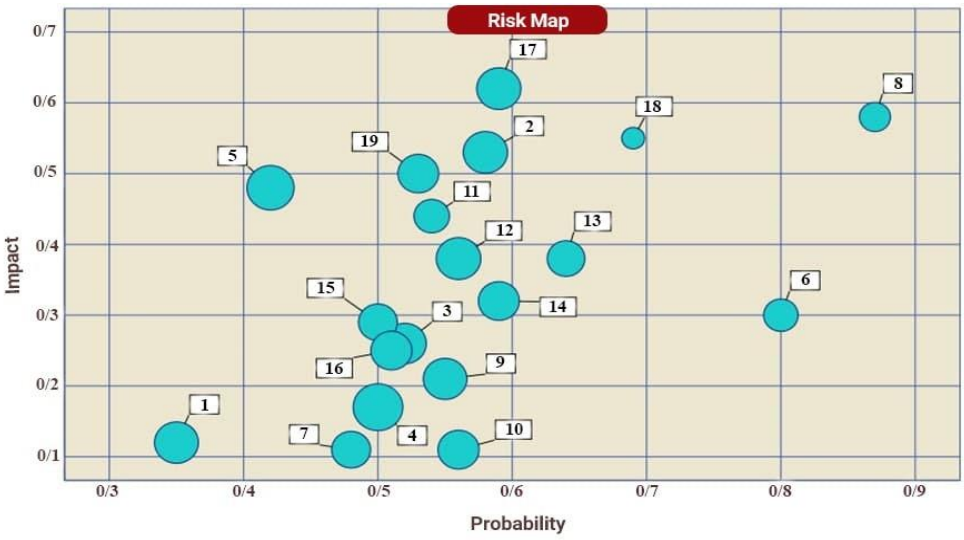

Figure (2): Consolidated holding Risk Map from the Risk Perspective of Subsidiaries Affecting Parent Company Strategies

Table (8): Summary of information and interpretation of the holding's consolidated risk map

Critical risks (low probability - high impact)	**Emergency risks** (high probability-high impact)
Structural / managerial risk	Inflation risk
Liquidity risk Information technology risk	Political / country risk Business / industry risk
Income reduction risk operational risk	
Financing risk	
Normal risks (low probability - low impact)	**Predictable risks** (high probability - low impact)
Human resource risk	Exchange rate risk
Terms and Conditions Risk Capital structure risk	
Environmental risk Financial reporting risk	
inadequate insurance coverage Risk	
Tax increase risk	
Interest rate risk Investment risk	

3.4. Risk rating

Based on the previous information, the rating of the risk types based on the severity of the impact, which is obtained by multiplying the probability of occurrence and risk impact is presented in Table (9). According to this table, inflation and exchange rate risks have higher rankings and financing and interest rate risks have the lowest ranks. Due to the fact that the relevant numbers in the consolidated table are based on the weighted average, in order to prevent the repetition of the weight effect in calculating the combined impact intensity, the weighted average impact intensity in each company has been used.

According to the results, it was found that the first 5 risks in the holding company, derived from the outcome of the risks of subsidiaries are as follows: inflation risk, exchange rate risk, political risk, liquidity risk and business risk, respectively.

Inflation risk: According to the evaluations and opinions of cement industry experts as well as the results obtained from previous findings, one of the problems of the cement industry is the mismatch between sales growth due to rising costs and cost factors due to inflation in Iran. This issue is considered as one of the most influential factors in terms of risk in the profitability of companies and ultimately the profitability of the holding, and if effective action cannot be taken on reasonable pricing of products, the problems in the holding will increase.

Table (9): Ranking the importance of consolidated holding risks based on the severity of the risk impact

Rank	**Sub-risks**	**severity of the risk impact**
1	Inflation risk	۰,۷۳
2	Exchange rate risk	۰,۶۶
3	Political / country risk	۰,۵۷
4	Liquidity risk	۰,۵۱
5	Business / industry risk	0.50
6	Income reduction risk	۰,۴۷
7	operational risk	۰,۴۷
8	Structural / managerial risk	0.46
9	Human resource risk	۰,۴۴
10	Capital structure risk	۰,۴۳
11	Tax increase risk	۰,۴۲
12	Information technology risk	۰,۴۲
13	Environmental risk	۰,۴۰
14	inadequate insurance coverage Risk	۰,۳۹
15	Financial reporting risk	0.38
16	Terms and Conditions Risk	۰,۳۷
17	Financing risk	۰,۳۶
18	Interest rate risk	۰,۲۸
19	Investment risk	۰,۲۵

Exchange rate risk: Because of effection on the cost of imported items needed for production and export earnings, exchange rate fluctuations will have a direct impact on corporate profitability and consequently a direct affect on the holding. Given the significant export weight that the holding companies under study have drawn in their strategies, exchange rate risk is also considered as one of the significant risks.

Political / country risk: Among the factors affecting the political risk are changes in government policies and international factors. In this regard, the location of a large portion of the group's company near the border areas and the importance of exports, will have a higher political risk due to international influences. Concerns and ambiguities about rapid changes in government policy are also among the concerns that can be effective in achieving the group's operational goals.

Liquidity risk: Due to the consolidated debt structure of the group and the need for appropriate working capital for production operations, as well as challenges in some areas where the group's companies are sold; Such as the high period of receipt receivables, credit sale conditions, negative competition, reduction of sale rates, etc. liquidity risk is considered as an important risk in the relevant holding.

Commercial risk: One of the major challenges in Iran's cement industry is the existence of excess supply relative to demand, which has led to negative competition among cement companies. This very issue has been seen in cement holdings, especially in the western and central regions of Iran, therefore it is necessary to seriously consider marketing and sales strategies in this regard.

Also, the ranking table of risk importance based on the degree of risk control in the holding, which is based on the risk outcome of subsidiaries, is presented in Table (10).

According to the information in the table, the risks of non-coverage of insurance, financing and operations have the highest level of control, while exchange rate, inflation and political risks have the lowest level of control in subsidiaries and holding companies.

Table (10): Ranking the importance of consolidated holding risks in terms of risk control

Rank	Sub-risks	Level of control
1	inadequate insurance coverage Risk	0.80
2	Financing risk	0.76
3	operational risk	0.72
4	Liquidity risk	0.72
5	Structural / managerial risk	0.71
6	Investment risk	0.71
7	Financial reporting risk	0.70
8	Capital structure risk	0.70
9	Tax increase risk	0.67
10	Human resource risk	0.66
11	Environmental risk	0.66
12	Information technology risk	0.66
13	Terms and Conditions Risk	0.63
14	Interest rate risk	0.63
15	Business / industry risk	0.61
16	Income reduction risk	0.57
17	Exchange rate risk	0.56
18	Inflation risk	0.50
19	Political / country risk	0.37

4. Results and suggestions

In this study, firstly the effective risks in the Iranian cement industry were identified using library studies and then based on the opinion of experts in the field of risk management and the cement industry. Then, with the technique of surveying experts (the Delphi technique) from 4 companies under the control of the studied holding, the probability of occurrence, the amount of risk impact on performance and the degree of risk control for each risk in each company were obtained. Then, by taking the opinion of the planning section in the companies, the effectiveness or ineffectiveness of each source of risk on the

announced strategies is determined by the parent company and based on the weight of each company's profit in the consolidated holding budget, the impact of each sub-risk source on the parent company's strategies was determined in each company. Based on the obtained data, in relation to the calculation of quantitative risk criteria for the preparation of an integrated risk extraction map and different risk levels in four dimensions of the risk map were identified.

Accordingly, considering the location of each of the risks in each of the four areas of the risk map, the holding's strategies can be developed to manage the risk of subsidiaries in order to prevent the deviation of strategic plans from the perspective of investments made in subsidiaries. According to the information obtained in the holding's risk map and the interpretation table, inflation, political and commercial risks in the emergency zone; Structural risks, liquidity, information technology, revenue reduction and operations, in the critical area; Exchange rate risk in the area of predictable risks and other risks in the area of normal risks, and accordingly, the holding company can find the appropriate strategy for each of the risk sources to control / manage the risk of its investment in subsidiaries with management control percentage.

In the next step, the identified risks were ranked from one to nineteen based on the severity of the impact at the holding level. According to the results, it was found that the first 5 risks in the holding group, derived from the outcome of the risks of subsidiaries which are: inflation risk, exchange rate risk, political risk, liquidity risk and business risk, respectively.

Also, using the results of data analysis on numbers related to the risk control degree, according to the information in the relevant table, the risks of non-coverage of insurance, financing and operations of the highest level of control and exchange rate, inflation and political risks, have the least control degree in subsidiaries. Since the results of this study have been prepared in relation to cement production companies as subsidiaries of a specialized parent holding active in the cement industry in Iran, it can only be generalized to other companies in the same industry and its results cannot be extended to other industries.

This study only identifies the risks of the companies under study and evaluates its impact on the parent company's strategies in the studied holding, so relevant holdings can use the results of this research and after testing different strategies, adopt the appropriate risk management policy as part of its strategic plan.

Resources

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