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Ranking of indicators of forward-looking information disclosure by the fuzzy analytical hierarchy process

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ABSTRACT

Auditing provides an overall image of the companies' situation. So, in addition to disclosure of historical information, disclosure of prospective information is needed by the investors, and it leads to an improved quality of reporting and decision making. The reporting variations due to business changes have caused great challenges for firms regarding the preparation of discretionary information disclosure, in particular forward-looking information. Accordingly, this study aimed at determining the significance order of forward-looking information factors and components by the qualitative grounded theory approach. To this end, by distributing a questionnaire among seven financial experts selected through judgmental purposive sampling, the factors were evaluated by the fuzzy analytical hierarchy process (fuzzy AHP). A tool was eventually proposed for weighted components to prepare and assess forward-looking information. According to the results, "predicting and analyzing managers" ranked first with the highest importance coefficient, and "future financial and non-financial information" and "future objectives and strategies" ranked the next places.

Keywords:

Fuzzy hierarchy analysis, Fuzzy logic, Multivariate decision-making, Forward-looking disclosure checklist.

1. Introduction

The optimal allocation of resources is considered a necessary challenge in all economies, and financial markets play a key role in this regard (Palepu *et al.*, 2013, 16-20). Thus, the disclosure of information by firms is considered a vital factor for improving the performance of the capital market. This in turn causes an ever-increasing demand for financial and non-financial reporting and disclosure. Branco and Rodrigues (2006, 233) considered annual reporting an important tool for the transfer of the business entity information to investors and other stakeholders. McLaney and Atrill (2016, 160) pointed out the growing interest of firms in disclosing a wide range of information. According to Beretta and Bozzolan (2008, 334), the recent fundamental changes including the increased complexity of regulations, business concepts, strategies, and firm operation have made understanding the nature of the financial statements and firm vision difficult without the analysis and description. Eventually, such changes led to new financial reporting literature. Accordingly, Berton and Taffler (2001, 91) and Betty (2000, 2) argued that financial reporting has been gradually evolved over time. In other words, traditional reporting mainly focuses on backward-looking, financial, and quantitative information and is unable to make a difference in decisions, and thus is not appropriate for information demand by stakeholders in the present business environment. In general, historical reporting is not able to depict the perspective of the future and what will occur in the future.

The reports by the Institute of Certified Public Accountants (AICPA), also known as Jenkins Reporting, also affected the formation of such a perspective. Key recommendations such as introducing and paying attention to forward-looking information were proposed to improve the reporting quality. To take investment decisions, investors make their best to exactly predict the future performance of the firm as much as possible. Accordingly, forward-looking information is useful for obtaining a more comprehensive perspective of the future. According to the Financial Accounting Standards Board (FASB, 2001, 11), the provision of quantitative and qualitative information affecting the firm operation and future increases the awareness of investors leading to the continuation of activities of the business entity. Moreover, investors may better evaluate the firm trade and future (PWC, 2007, 4). On the one hand, the literature shows that firms do not disclose all information on the future of the firm (Maria, 2018, 1), because forward-looking information refers to a situation in the future that its accuracy cannot be confirmed easily, and its disclosure is affected by different factors. Hence, the provision of forward-looking information is considered a great challenge for firms. Extensive international studies in developed and developing countries show the great interest of academics and scholars in forward-looking information disclosure, and most studies on forward-looking information disclosure have particularly focused on the managerial predictions on revenues. However, studies on forward-looking disclosure are completely qualitative (Betty *et al.*, 2004, O'Sullivan *et al.*, 2008, Athanasakou and Hussainey, 2004) and cover topics beyond the revenue (Schleicher and Walker, 2010).

On the other hand, some studies identify some factors affecting forward-looking information and organizational features, financial crises, business complexities, and characteristics of the board of directors (Rasha Mahboub, 2019; Mousa and Elamir, 2018; Julia *et al.*, 2017; Wang and Hussainey, 2013). In Iran as a developing country, there are few studies on forward-looking disclosure, and the relationship of various factors including corporate governance and strategy of managers, and the effect of information disclosure level have been investigated. Reviewing interviews by top managers of the Tehran Stock Exchange shows that stakeholders of this professional entity always pay special attention to the provision of forward-looking information and solving challenges regarding the preparation and presentation of information by firms, and easy analysis and evaluation of such information. Focusing on forward-looking information, while confirming valuable findings of relatively few studies in Iran, this study aims at increasing the academic knowledge and theoretical foundations of forward-looking information. The literature confirms that the provision of clear information on the present and future performance of the business unit is considered a key preliminary element for effective decisions in the capital market.

On the other hand, challenges facing information disclosure including information asymmetry lead to incomplete disclosure of information by managers, and users are unable to distinguish valuable and low-value

information and give a moderate value to both categories. The diversity of information will confuse investors in taking the best and most optimal decision. Hence, the provision of an exact tool for assessing and evaluating forward-looking disclosure, classification, and ranking forward-looking information elements is turned a significant topic in this study, as it improves the understanding of investors leading to the identification of the significance order of various factors. Given the importance and necessity of forward-looking disclosure, firms are less aware of the preparation of relevant factors highlighting the need for an applied tool for the preparation and presentation of such information. Like any new modification and novelty, business entities should be ready for forward-looking disclosure as they will face many challenges and risks (PWC, 2007, 3). According to the above discussion, the main question arising in this study is to evaluate the measurement tool for ranking components of forward-looking disclosure in the Iranian market?

The theoretical foundations are extracted and the literature is then reviewed. The methodology including the method for implementing the research plan is discussed. According to the methodology and the final checklist of forward-looking disclosure, conclusion and recommendations for future studies are presented to resolve challenges facing this field and contribute to increasing the scientific level.

Theoretical foundations

Rapid changes in the business world cause changes in the policies and strategies of the business entity to remain in a competitive atmosphere. In the meantime, reporting should not be lag behind the cycle of changes, and the enterprise prepares and presents information in compliance with the variable needs of users (AICPA, 1994, 5). Information disclosure by the enterprise is necessary for market efficiency and supporting investors. Reporting should provide information to help users for evaluating the firm performance for better management and higher efficiency of companies (FASB, 2001, 60). Forward-looking disclosure is among the most important reporting activities by firms. Forward-looking information is a kind of information disclosure classified as part of discretionary disclosure, which is greatly influenced by different motivations of managers (Kent and Ong, 2003, 283). Various aspects of forward-looking information disclosure have been investigated in the literature. However, no standard definition is found for forward-looking information. The lack of such a standard definition is due to the obviousness of future-related expressions as they show a significant part of its meanings.

According to the first definition suggested by AICPA (1994, 12), forward-looking information disclosure helps to create a vision for a business entity including management plans and evaluating opportunities and risks facing the firm. Aljifri and Hussainey (2007, 883) believe that the disclosure of forward-looking information refers to a class of information in the present plans and future forecasts enabling investors and other users to evaluate the future financial performance of a firm. According to Pepsico (2016, 146), all information related to the future operating performance of the firm and all events and evolutions that a firm is expected to face are part of forward-looking information. Inditex (2013, 173) suggested another definition according which all information related to the business strategies, management plans, and objectives and future operations of the firm are classified in this field of information disclosure. The lack of such a standard definition is due to the obviousness of future-related expressions as they show a significant part of its meanings. Forward-looking expressions include terms such as being capable, possibility, strength, expectation, planning, hope, intention, search, project, forecast, and goal proposed by Li (2010, 1097) and Hassanein and Hussainey (2015, 61). In general, a common understanding inferred from the above-mentioned definitions is that forward-looking information disclosure presents information on the future status of a firm and contains messages related to the future (Bravo, 2016, 123).

Forward-looking information is among information affecting decisions taken by different stakeholders. The users of financial statements are interested in different data capable of predicting the future, and multiple studies show that this category of information is not provided in business reports. Future information consists of different parts, each provides effective information on future forecasts. The following classifications are presented for future information in the Jenkins Committee Report (1994, 9) and other scholars such as Gehand and Elamir (2018, 11):

A: Predicting and analyzing managers

A reason behind the interest in and demand of investors for forward-looking disclosure is this belief that information on the past performance of a firm can be a reliable source for predicting the future of that firm. Hence, the management analysis of the overall situation of the firm is considered a key factor for stakeholders in evaluating its future situation. Managers are the best information source of the future plan, as they consider the opportunities and challenges facing the business entity in the future planning of the firm in addition to important past information. Even if the business entity does not achieve its predetermined goals due to unpredictable events, its overall understanding is useful for investors.

B: Future objectives and strategies

Another important part of forward-looking information disclosure is to present strategies and plans as well as measures to achieve them, as it eventually leads to a decrease or increase in the firm value. This kind of perspectives provides allows evaluation of opportunities and risks facing the firm. In reporting by firms, uncertainties with both positive and negative results should be presented. Managers tend to disclose optimistic information and no information is presented regarding plans at risk of failure. Hence, a description of future measures to achieve objectives and plans reveals the risk of reaching predetermined goals for investors.

C: Future financial and non-financial information

In reporting forward-looking information, the disclosure of information on the opportunities and risks facing companies and other future financial and non-financial information are among information affecting the assessment of the firm's future. Users need to understand the opportunities and risks of a firm, and their assessment directly affects the decisions of users. Among the key factors in reporting forward-looking information are the emphasis on description and calculation of financial impacts of opportunities, risks, and other financial and non-financial information affecting the firm's status.Users of information may have an incorrect understanding of information leading them into an incorrect evaluation.

Extensive studies show that various factors play a key role in the behavior of business entities regarding the disclosure and level of forward-looking information. In the meantime, two key factors are the nature of business and information related to managers and stockholders. In other words, various organizational attributes such as the firm size, industry status and competition, profitability, characteristics of managers and board of directors, and institutional stockholders are considered by managers to prepare information. For instance, Menicucci (2013, 1667) showed that firms with a larger size and profitability more attempt to disclose forward-looking information than smaller firms. According to Healy and Palepu (2001, 17), capital costs are among the reasons for the disclosure of forward-looking information by firms. They argued that increasing the disclosure level of such information leads to information transparency and eventually reduces debt costs (Hajiha and Oradi, 2018, 86). This is very useful for firms as investors with limited access to information increase the investment risk. These findings are consistent with those reported by Clarkson (1994, 429). According to Clarkson, there is a great motivation for reporting forward-looking information from the capital point of view, in particular, when business entities need funding. Schleicher and Walker (2010, 373) pointed out the theory of managers' signaling and perception. These two theories underlie the level of forward-looking information disclosure by the business unit. Jensen and Meckling (1976) highlighted the likelihood of conflict of interest among managers and other stakeholders and confirmed that some managers do not use their discretion for information disclosure for the interest of stockholders (Mashayekh and Azhang, 2017, 131). Portraying the desirable condition of the firm in contrast to reality, they attempt to mislead users (Clatworthy and Jones, 2006, 494). On the other hand, claims made by managers can be confirmed over time, and in the case of diverting real outcomes from predetermined objectives and plans, the firm reputation is damaged leading to probable costs for the firm. This eventually affects the behavior of managers causing an increase in the level of forward-looking information disclosure (Kent and Ung, 2003, 276). The ever-increasing demand for the disclosure of forward-looking information and a clear image of the future cause concerns for enterprises and business entities continually ask these questions: "Does this mean the

disclosure of sensitive competitive information? Should the business entity publish profitability forecasts in forward-looking reporting?

In this regard, the FASB (2001, 12) emphasizes this point, and some scholars such as Engbers (2016, 14) pointed out these concerns and argued that this factor is an obstacle for the disclosure of forward-looking information, as the business entity may be forced to disclose sensitive competitive information without any benefit for that enterprise. Managers should not be forced to disclose information threatening the competitive advantage of the business entity. This is considered a reason for decisions on not disclosing forward-looking information. The literature confirms that business reporting is costly and its improvement requires considering costs and resulting advantages. Like other reports, forward-looking information disclosure specialized committees examine the disclosure costs. On the other hand, these committees give high priority to this issue and believe that the disclosure of forward-looking information should be strengthened to improve the relationship of various groups of stakeholders (Kent and Ung, 2003, 274).

Literature Review

In a research work entitled "When are firms sued for qualitative disclosures? implications of the safe harbor for forward-looking statements", Richard, John, and Kent (2020) argued that the use of positive and negative statements in forward-looking disclosure is directly related to the firm's litigation level, and the business entity will be safe against further litigation by using positive terms in the disclosure of forward-looking information.

In a study entitled "The determinants of forward-looking information disclosure in annual reports of Lebanese commercial banks", Rasha Mahboub (2019) stated that characteristics such as the firm size and financial leverage are inversely correlated with the forward-looking information disclosure level in Lebanese banks. In contrast, profitability and liquidity, and capital costs affect the disclosure of forward-looking information. They also found that forward-looking information disclosure reduces information asymmetry by stockholders.

In a study entitled "Do forward-looking narratives affect investors' valuation of UK FTSE all-shares firms" Hassanein, Zalata, and Hussainey (2019) came to this conclusion that forward-looking information disclosure has no impact on the value of high-performance firms, whereas positive assessment of investors increases the value of low-performance firms. They also found that firms audited by large auditing institutions are more credible.

Kwame and Mensah (2017) compared the relationship of corporate governance, corruption and forward-looking information disclosure. They evaluated the relationship of forward-looking information disclosure and pressure level among south African countries and found that countries with a lower corruption level provide more forward-looking information. They also found the impact of corporate governance on the improvement of forward-looking information disclosure.

Julia, Tursten, and Kamran (2017) studied uncertainty about qualitative attributes of forward-looking information disclosure. They aimed to qualitative and quantitative analyze forward-looking information disclosure before and after the financial crisis at the information disclosure level. According to their findings, in economic crises, the quality of information on the firm future decreases while an increase in the volume of such information.

In his research work entitled "The determinants of forward-looking information disclosure", Alkhatib (2014) found profitability as the most important determinant of forward-looking information disclosure. He also found that profitable firms tend to forward-looking information disclosure. Moreover, the size of the auditing institution and the total assets significantly affect forward-looking information disclosure in large industries.

In a study entitled "the effect of firm features on forward-looking information disclosure", Kilic and Uyar (2012) reviewed reports presented by firms and came to this conclusion that the disclosure level in Turkish firms is not high and most firms tend to disclose good information, and the percentage of bad information disclosed by Turkish firms is very low. Moreover, they found the considerable impact of the firm size and auditing institution size on the forward-looking information disclosure.

O'Sullivan, Percy, and Stewart (2008) studied the relationship of corporate governance attributes and forward-looking information disclosure in Australian firms. Examining the level of information disclosure in companies listed on the Australian Stock Exchange,

they found that firms with high-quality reporting and disclosure contain forward-looking information. According to their results, forward-looking information disclosure is not affected by corporate governance.

Morovatti, Akhgar and Amini (2019) investigated the relationship of auditing committee specialty and forward-looking information disclosure with an emphasis on the role of auditing quality in companies listed on Tehran Stock Exchange. Their findings showed a significant positive relationship between auditing committee specialty and forward-looking information disclosure. The probable impact of auditing quality on the auditing committee specialty and forward-looking financial information disclosure was also confirmed.

Kazemi and Abdi (2016) conducted a study entitled "The ability to understand, forward-looking information disclosure, and management analysis and description". They emphasized forward-looking information disclosure along with backward-looking information, and argued that the analysis of firm status by managers increases the quality of information.

In a study entitled "Risk disclosure in annual reports of firms and involved factors", Namazi and Ebrahimi (2016) examined attributes of risks disclosed in annual reports of companies listed on Tehran Stock Exchange. Their results showed that there is greater willingness for disclosing backward-looking information than forward-looking information by firms. The companies listed on TSE also tend to disclose qualitative information more than quantitative information, and eventually disclose more risk resources as compared to risk management.

Forward-looking information disclosure checklist

A checklist is used as a measurement tool in the disclosure literature. To measure the forward-looking information disclosure index, an appropriate checklist should be first prepared, and the components of information in the checklist must be determined. Finally, the score of each item should be determined to calculate the forward-looking information disclosure index. Standards are used as the measurement tool in the compulsory disclosure, whereas a researcher-made measurement tool prepared according to theoretical foundations and recommendations of professional entities is used in the discretionary disclosure of forward-looking information. According to Hassan *et al*. (2006), there are two approaches for weighting and prioritizing factors and indices. In the first approach known as the lack of weighting, all factors and components have the same weight. In contrast, the weighting approach is based on this assumption that the significance of items differs for different users, and a different weight is considered for each of factors and indices because of variable significance of these factors over time under different conditions. Hence, the weighting of information disclosure indices in Iran will improve the quality of information. After studying theoretical foundations and analyzing interviews, the main and sub-categories of forward-looking information disclosure were developed based on the grounded theory in three stages of open coding, axial coding, and selective coding. Considering the factors for the disclosure of forward-looking information (Fotoohi *et al.*, 2020, accepted manuscript), the main and sub-categories of this model were used for preparing the rated checklist. Accordingly, the main question can be formulated: What are preferences and priorities of indicators of forward-looking information in the fuzzy analytical hierarchy process (fuzzy AHP)?

Research Methodology

This is an applied study in terms of objective, and a descriptive study in terms of methodology. This study aims at describing conditions or phenomena under investigation. According to Sekaran (2006), descriptive studies may be conducted solely for further investigation of the present conditions or helping the decision-making process. In other words, this study aims to rank various criteria and sub-criteria of forward-looking information disclosure to prepare an applied measurement tool for decision-making by various stakeholders. There are different methods for weighting and ranking among multicriteria decision-making methods. Among existing methods, the analytical hierarchy process (AHP) was used in this study. AHP is one of the renowned multicriteria decision-making approaches focused on obtaining relative weights of factors (Turfi *et al.*, 2010). In comparison with other multicriteria decision-making methods, AHP is extensively used in solving most multicriteria decision-making problems successfully. This process facilitates decision-making in complicated problems. Notably, constant and crisp numbers are used in the classic AHP. However, most

practical decisions are made under uncertainty, and fuzzy numbers under uncertainty are used in the fuzzy AHP for solving different problems. This is a powerful decision-making tool with results close to reality. The AHP reflects well how experts think (Zadeh, 1965). This analysis is performed based on information collected from experts' opinions. To this end, a list of indices introduced in the forward-looking information disclosure model was first prepared. To determine its preference and significance, a 48-component questionnaire was designed according to AHP and sent to experts. The population consisted of 7 experts of the capital market, and financial and accounting experts selected by judgmental purposive sampling because of the limited size of the existing sample. In other words, in the judgmental or theoretical sampling, part of the community is selected based on the judgment and opinion of the researcher. The sample is selected by this method to have attributes of the real community as much as possible. Individuals selected by the researcher have many information and a deep understanding of the study subject.

Three general criteria including predicting and analyzing managers, future objectives and strategies, and future financial and nonfinancial information were used for weighting and ranking forward-looking information disclosure indices. Multiple sub-criteria considered for each of these criteria as listed in Table 1.

Table 1: Criteria and sub-criteria of forward-looking information disclosure

AICPA (1994), FASB (2000), Celik (2006), Aljifri (2007), Walker (2011), Uyar (2012), Liu (2015), Bravo (2016), Kwame (2017), Kılıç (2018), Mousa (2018), Elamir (2018)			
Symbol	**Indices and components**		**Main categories**
A1	Expressing and discussing opinions of managers on the future performance and situation of the firm	1	Predicting and analyzing managers
A2	The firm forecasts regarding the nature and terms of future contracts	2	
A3	Management analysis of the firm vision among industries and competitors	3	
A4	Predicting the stock price and future profitability by the manager	4	
A5	The manager's interpretation of the future performance and continuity	5	
A6	Information provided by the manager regarding the compliance of strategies and the main activity	6	
A7	The management viewpoint regarding advantages and threats facing the firm	7	
A8	Management's forecast of the effect of ten risks, opportunities, and changes on the future operation	8	
A9	The manager's interpretation of the future liquidity of the firm	9	
A10	Management's forecast of the future status of development of production lines, products, and technology	10	
A11	Management plans for starting and exiting various investment projects	11	
B1	Expressing future short-term and long-term objectives and strategies by the manager	12	Future objectives and strategies
B2	Explaining required measures for each of objectives and projects	13	
B3	Explaining future strategies and methods for marketing and selling products	14	
B4	Explaining applied strategies for supplying raw materials in probable financial crises	15	
B5	Expressing objectives and explaining future measures for attracting customers in domestic and international markets	16	
B6	Expressing and explaining future funding plans to increase the firm capital in the financial reports	17	
B7	Explaining strategies taken by the firm to deal with ten risks and opportunities facing the company	18	
B8	Introducing details of measures for future business plans	19	
B9	Explaining objectives and future measures taken by the firm to increase profitability and firm value	20	
B10	Explaining measures required to achieve and employ future technologies at different levels	21	
B11	Explaining future effective measures regarding intellectual capital and human resources	22	
B12	Explaining measures regarding after-sale services and customer satisfaction in coming years	23	
B13	Explaining future plans for cost management	24	
B14	Explaining future measures of R&D and laboratory units	25	
B15	Explaining future measures regarding the use of internal control systems and strategies to improve the effectiveness	26	
B16	Future strategies of the firms to receive receivable and paying debts	27	

AICPA (1994), FASB (2000), Celik (2006), Aljifri (2007), Walker (2011), Uyar (2012), Liu (2015), Bravo (2016), Kwame (2017), Kılıç (2018), Mousa (2018), Elamir (2018)			
Symbol	**Indices and components**		**Main categories**
C1	Presenting financial information in the form of financial ratios	28	Future financial and nonfinancial information
C2	Qualitative and quantitative information on assets and probable future debts	29	
C3	The disclosure of qualitative and quantitative information related to probable future lawsuits	30	
C4	Identifying the probable impacts of financial and political crises on the future status of the firm	31	
C5	Identifying the qualitative and quantitative impacts of increased cost of raw materials in the future on the firm status	32	
C6	Identifying the qualitative and quantitative impacts of poor quality of raw materials in the future	33	
C7	The possible effect of relationship with dependent individuals on the future status of the firm	34	
C8	Identifying the qualitative and quantitative impacts of future international constraints for selling the firm products	35	
C9	The disclosure of financial and nonfinancial impact of extended demand and supply of products	36	
C10	Identifying financial and nonfinancial impacts of plans for future tax exemption and crimes	37	
C11	Identifying financial and nonfinancial impacts of limited access to raw materials in future	38	
C12	Calculating financial and nonfinancial impacts of possible changes in the exchange rate	39	
C13	Calculating qualitative and quantitative impacts of future insurance plans of the firm	40	
C14	Identifying qualitative and quantitative impacts of future changes in the after-sale plans	41	
C15	Quantitative and qualitative information regarding future plans for production optimization, quality control, and reduced production time	42	
C16	Financial and nonfinancial impacts of plans with and without value added in future	43	
C17	Financial and nonfinancial impacts of future plans for waste reduction	44	
C18	Quantitative and qualitative impacts of risks and opportunities facing the firms on the firm status and performance	45	
C19	Calculating qualitative and quantitative impacts of employing the future internal control system and its effectiveness	46	
C20	Qualitative and quantitative impacts of future activities of social responsibility and living	47	
C21	Comparing the actual performance (numerical and graphical) of the firm with the predetermined plans and opportunities	48	

Fuzzy analytical hierarchy process (Fuzzy AHP)

The hierarchy analysis provides a framework for simplifying the decision-making process in complicated problems, and place components in a hierarchy structure by decomposing them into smaller parts. Numerical values are assigned to mental judgments depending on the significance of each variable to specify the significance order of variables with the highest significance. It eventually provides decision-makers with a suitable pattern to achieve the solution. Extensive efforts were made in 1980s and 1990s to extend this technique, and various methods were proposed to solve decision-making problems. The fuzzy AHP was used among these methods. Moreover, fuzzy and hierarchy concepts are combined in the software R. It is easier for decision-makers to present verbal judgments rather than definitive responses. This shows the great importance of the use of fuzzy concepts in decisions given the possibility of creating a range of values for views (Azar and Rajabzadeh, 2014).

The decision tree is first designed based on the objectives, criteria, and sub-criteria for analyses in this section. In the next step, the fuzzy equivalents of values obtained from surveys are considered according to Table 2. The triangular fuzzy method is used for fuzzification of values.

Table 2: Verbal expressions used for fuzzification of values

Vocal expression	Fuzzy value
Equal importance	(1, 1, 1)
Moderate importance	(2, 3, 4)
High importance	(4, 5, 6)
Very high importance	(6, 7, 8)
Quite importance	(8, 9, 10)

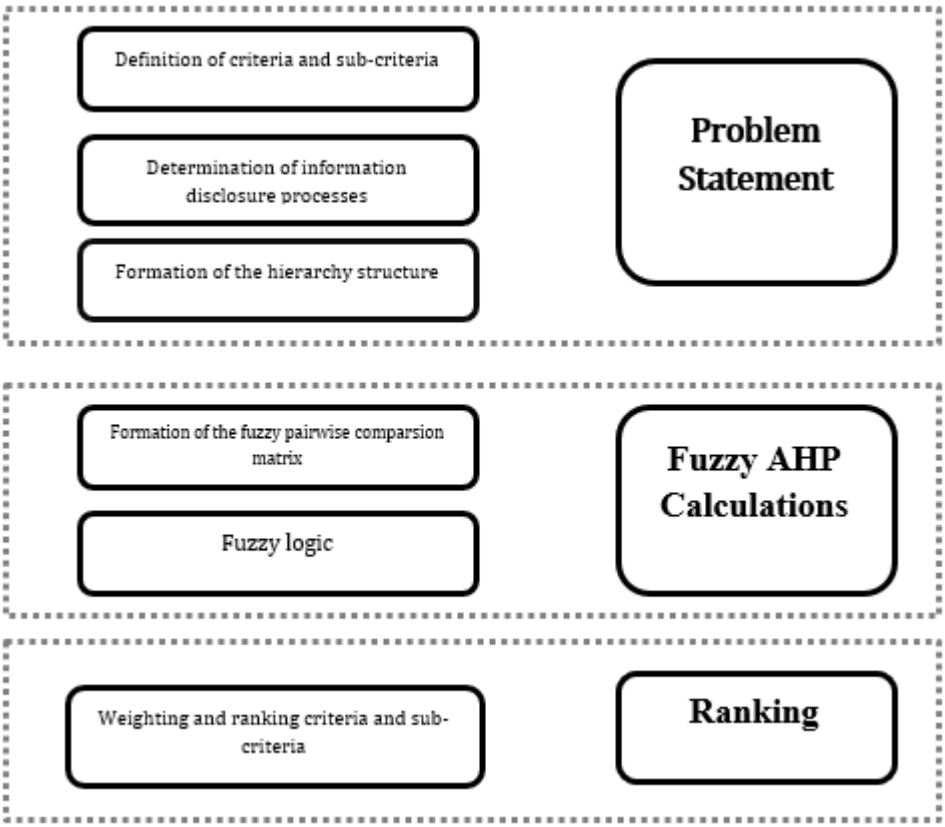

Figure 1: The model for selecting the ranking method

The various steps of the fuzzy AHP proposed by Chang (1996) and related equations are discussed. In the matrix for the expert opinions, the entries $\tilde{a}_{ij} = (l_{ij}, m_{ij}, u_{ij})$ are triangular fuzzy values. The main diagonal of the matrix equals (1, 1, 1).

$$\tilde{A} = \begin{bmatrix} 1 & \tilde{a}_{12} & \dots & \tilde{a}_{1n} \\ \tilde{a}_{21} & 1 & \dots & \tilde{a}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{a}_{n1} & \tilde{a}_{n2} & 1 & \end{bmatrix} \quad (1)$$

In the next step, for each row of the pairwise comparison matrix, which is a triangular fuzzy value, s_i is calculated as follows:

(2)
$$s_i = \sum_{j=1}^{m} M_{gi}^{j} \otimes [\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j}]^{-1}$$

where i and j respectively represent the row and column numbers, and M_{gi}^{j} are triangular fuzzy numbers in the pairwise comparison matrices. The values defined in this equation are calculated as follows:

(3)
$$\sum_{j=1}^{m} M_{gi}^{j} = (\sum_{j=1}^{m} l_j, \sum_{j=1}^{m} m_j, \sum_{j=1}^{m} u_j)$$
$$\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j} = (\sum_{i=1}^{n} l_i, \sum_{i=1}^{n} m_i, \sum_{i=1}^{n} u_i)$$

$$[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j}]^{-1} = (\frac{1}{\sum_{i=1}^{n} l_i}, \frac{1}{\sum_{i=1}^{n} m_i}, \frac{1}{\sum_{i=1}^{n} u_i})$$

The relative significance of s_i values is then evaluated. In general, if $M_1 = (l_1, m_1, u_1)$ and $M_2 = (l_2, m_2, u_2)$ are two triangular fuzzy numbers, the order of magnitude of M_1 relative to M_2 in the pairwise comparison matrix is defined as follows:

$$V(M_2 \geq M_1) = hgt(M_1 \cap M_2) = \mu_{M_2}(d) = \begin{cases} 1 & if \quad m_2 \geq m_1 \\ 0 & if \quad l_1 \geq u_2 \\ \frac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)} & otherwise \end{cases} \quad (4)$$

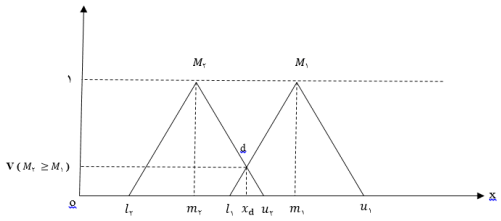

Figure 2: Degree of possibility

The order of magnitude of a triangular fuzzy number relative to other *k* numbers is obtained as follows:

(5)

$$V(M \geq M_1, M_2, \dots, M_k) = V[M \geq M_1 \; and \; M \geq M_2 \dots \; and \; M \geq M_k] = Min \, V(M \geq M_i) \;, \; i = 1,2, \dots, k$$

Equation (6) is used for weighting criteria and sub-criteria.

(6)

$$\acute{d}(A_i) = Min \, V(S_i \geq S_k) \;\; k = 1, \dots, n \;\; , i \neq k$$

The weight vector for the criteria is defined as follows:

(7)

$$\acute{W} = (\acute{d}(A_1), \acute{d}(A_2), \dots, \acute{d}(A_n))^T$$

The final weight vector is obtained by defuzzification and normalization of W values.

Results

According to relations and procedures defined in this study, effective indices and the importance coefficients for various criteria and sub-criteria are calculated and listed in the following Tables.

Table 3 lists the weights calculated for sub-criteria along with fuzzy weights, defuzzified weights, normalized defuzzified weights and rank of each sub-criterion. According to ranks obtained for sub-criteria of "predicting and analyzing managers" which with a weight of 0.724 are ranked in the first category in terms of level of importance and are as follow:

The most important factor with a weight of 1.000 is "forecasts of the firm about the nature and terms of future contracts". With a slight weight difference in the weight "prediction of stock cost and future profitability by the manager" and "the management's interpretation of future liquidity of the firm" rank the next places , respectively 0.818 and 0.734.

Management's forecast of the effect of ten risks, opportunities, and changes on the future operation, the management view regarding advantages and threats facing the firm, and management analysis of the firm vision among industries respectively fits into the next places with the weights of 0.540, 0.412 and 0.344. The "manager's interpretation of the future performance and continuity" and "management's forecast of the future status of development of production lines, products, and technology" with the same importance and the weights of 0.258 and 0.206 have a relatively lower impact on the information disclosure. Information provided by the manager regarding the compliance of strategies and the main activity, management plans for starting and exiting various investment projects, and expressing and explaining viewpoints of managers regarding future status and performance of the firm with the weights of 0.176,0.160,0.140 have the lowest impact on the information disclosure.

Table 4 lists the weights calculated for sub-criteria along with fuzzy weights, defuzzified weights, normalized defuzzified weights and rank of each sub-criterion. A total of 21 factors were evaluated in the "future objectives and strategies" category. This category with a weight of 0.526 gets the third rank among three indexes of information disclosure. Among these factors, "explaining strategies taken by the firm to deal with ten risks and opportunities facing the company" ranks first with a higher weight equal to 1.000, than other factors. The second factor recognized in this area is "explaining objectives and future measures taken by the firm to increase profitability and firm value" with a weight equal to 0.505. Moreover, "explaining future strategies and methods for marketing and selling products" shows a relative effectiveness considering the calculated weight of 0.358. Explaining "future plans for cost management", "explaining measures regarding after-sale services and customer satisfaction in coming years", and "explaining future effective measures regarding intellectual capital and human resources" with lower

importance weights of 0.193, 0.112, 0.101 rank other places in this regard. Despite the very lower importance weights of other factors, "explaining measures required to achieve and employ future technologies at different levels" with the weight of 0.091, "explaining future measures regarding the use of internal control systems and strategies to improve the effectiveness", "introducing details of measures for future business plans" with a weight of 0.724, "future strategies of the firms to receive receivable and paying debts" with finding the weight of 0.046 and the other factor with the weight of 0.028 labeled as , "expressing and explaining future funding plans to increase the firm capital in the financial reports" fit into the next priority. The next two factors respectively with the weights of 0.029 and 0.018 are "expressing objectives and explaining future measures for attracting customers in domestic and international markets", "explaining applied strategies for supplying raw materials in probable financial crises" are ranked in the next levels. Moreover, the factor of "explaining future measures of R&D and laboratory units" receiving the weight of 0.007 and "expressing future short-term and long-term objectives and strategies by the manager", and "explaining required measures for each of objectives and projects" with the weights of 0.006 and 0.004 respectively fit into the last rank in this category.

Table 3: The importance coefficient and effect of sub-criteria in Predicting and analyzing managers

Factor	Sub-criterion sign	Fuzzy weight of sub-criteria	Defuzzified weight of sub-criteria	Normalized weight	Rank
Predicting and analyzing managers	A1	(0.038,0.028,0.022)	0.029	0.140	11
	A2	(0.188,0.21,0.229)	0.209	1.000	1
	A3	(0.076,0.072,0.068)	0.072	0.344	6
	A4	(0.154,0.171,0.187)	0.171	0.818	2
	A5	(0.058,0.054,0.051)	0.054	0.258	7
	A6	(0.043,0.036,0.031)	0.037	0.176	9
	A7	(0.089,0.086,0.083)	0.086	0.412	5
	A8	(0.113,0.113,0.112)	0.113	0.540	4
	A9	(0.151,0.154,0.153)	0.154	0.734	3
	A10	(0.049,0.043,0.037)	0.043	0.206	8
	A11	(0.04,0.033,0.028)	0.033	0.160	10

Table 4: The importance coefficient and effect of sub-criteria in Future objectives and strategies

Factor	Sub-criterion sign	Fuzzy weight of sub-criteria	Defuzzified weight of sub-criteria	Normalized weight	Rank
Future objectives and strategies	B1	(0.002,0.002,0.001)	0.002	0.004	16
	B2	(0.003,0.002,0.001)	0.002	0.006	15
	B3	(0.139,0.139,0.14)	0.139	0.358	3
	B4	(0.006,0.005,0.003)	0.005	0.012	13
	B5	(0.009,0.007,0.005)	0.007	0.018	12
	B6	(0.01,0.007,0.006)	0.008	0.020	11
	B7	(0.357,0.39,0.416)	0.389	1.000	1
	B8	(0.022,0.017,0.013)	0.018	0.046	9
	B9	(0.191,0.197,0.2)	0.197	0.505	2
	B10	(0.041,0.035,0.03)	0.035	0.091	7
	B11	(0.049,0.043,0.038)	0.044	0.112	5
	B12	(0.042,0.039,0.037)	0.039	0.101	6
	B13	(0.076,0.075,0.074)	0.075	0.193	4
	B14	(0.004,0.002,0.002)	0.003	0.007	14
	B15	(0.035,0.028,0.023)	0.029	0.074	8
	B16	(0.014,0.011,0.009)	0.011	0.028	10

Table 5: The importance coefficient and effect of sub-criteria in Future financial and nonfinancial information

Factor	Sub-criterion sign	Fuzzy weight of sub-criteria	Defuzzified weight of sub-criteria	Normalized weight	Rank
Future financial and nonfinancial information	C1	(0.038,0.029,0.021)	0.029	0.422	20
	C2	(0.043,0.031,0.021)	0.032	0.452	19
	C3	(0.032,0.023,0.017)	0.024	0.346	21
	C4	(0.038,0.033,0.027)	0.033	0.466	18
	C5	(0.06,0.049,0.039)	0.049	0.708	11
	C6	(0.064,0.057,0.049)	0.057	0.818	4
	C7	(0.048,0.044,0.039)	0.044	0.628	15
	C8	(0.056,0.05,0.043)	0.050	0.713	10
	C9	(0.056,0.051,0.046)	0.051	0.730	9
	C10	(0.064,0.06,0.054)	0.060	0.855	2
	C11	(0.043,0.043,0.043)	0.043	0.613	16
	C12	(0.041,0.041,0.04)	0.041	0.587	17
	C13	(0.057,0.054,0.05)	0.054	0.772	6
	C14	(0.045,0.049,0.051)	0.049	0.697	13
	C15	(0.051,0.057,0.061)	0.057	0.813	5
	C16	(0.053,0.059,0.063)	0.059	0.840	3
	C17	(0.039,0.049,0.06)	0.049	0.706	12
	C18	(0.057,0.07,0.082)	0.070	1.000	1
	C19	(0.041,0.052,0.065)	0.053	0.753	8
	C20	(0.035,0.047,0.062)	0.048	0.687	14
	C21	(0.04,0.052,0.066)	0.053	0.754	7

The next category listed in table 5 with the weight of 0.212 "financial and nonfinancial future information" fits into the second category of the information disclosure checklist.in this category there are a large number of important sub-criteria with high weights regarding future financial and nonfinancial information. The most important factor with the weight of 1.000 is "Quantitative and qualitative impacts of risks and opportunities facing the firms on the firm status and performance". Identifying financial and nonfinancial impacts of plans for future tax exemption and crimes, financial and nonfinancial impacts of plans with and without value added in future, identifying the qualitative and quantitative impacts of poor quality of raw materials in the future, and quantitative and qualitative information regarding future plans for production optimization, quality control, and reduced production time rank the next places respectively with a relatively weight difference of 0.855, 0.840, 0.818, 0.813. Following the above mentioned factors, three other factors with the weights of 0.772, 0.754,0.753 "Calculating qualitative and quantitative impacts of future insurance plans of the firm", "comparing the actual performance of the firm with the predetermined plans and opportunities, and calculating qualitative and quantitative impacts of employing the future internal control system and its effectiveness with the same importance rank the next places. Identifying the qualitative and quantitative impacts of increased cost of raw materials in the future on the firm status and financial and nonfinancial impacts of future plans for waste reduction has a slight difference with a weight of 0.728 and 0.726 in the importance coefficient which fit in the next places. Identifying qualitative and quantitative impacts of future changes in the after-sale plans, qualitative and quantitative impacts of future activities of social responsibility and living, the possible effect of relationship with dependent individuals on the future status of the firm and identifying financial and nonfinancial impacts of limited access to raw materials in future have weights of 0.697, 0.687, 0.628, 0.613 holding relatively the same value and rank the next places with the relatively same importance weight. Other sub-criteria are largely different in terms of importance weight. Calculating financial and nonfinancial impacts of possible changes in the exchange rate is the other factor with the weight of

0.587 that ranks the same place. Identifying the probable impacts of financial and political crises on the future status of the firm, qualitative and quantitative information on assets and probable future debts, presenting financial information in the form of financial ratios" respectively with the weights of 0.466, 0.452, and 0.422 are fitted in next categories. Finally the disclosure of qualitative and quantitative information related to probable future lawsuits with the weight of 0.346 shows the lowest importance coefficients.

The following table 6 is the final ranking of forward-looking information disclosure criteria.

According to the results in Table 6 and experts' opinions, the most important criterion in the forward-looking information disclosure with a weight of 0.724 is "predicting and analyzing managers". Future financial and nonfinancial information with a weight of 0.212 rank the next place. Factors related to future objectives and strategies show the least importance in forward-looking information disclosure. Following is the figure (3) representing the findings of final weight with different criteria.

Table 6: The importance coefficient and effect of main factors

Factor	Fuzzy weight of sub-criteria	Defuzzified weight of sub-criteria	Normalized weight	Rank
Predicting and analyzing managers	(0.758,0.726,0.683)	0.724	1.000	1
Future objectives and strategies	(0.061,0.064,0.07)	0.065	0.090	3
Future financial and nonfinancial information	(0.18,0.21,0.247)	0.212	0.293	2

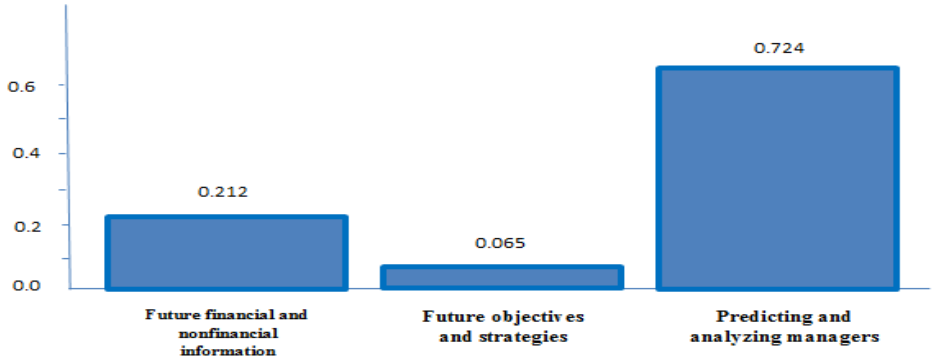

Figure 3: representing the findings of final weight

Discussion and Conclusion

Information disclosure becomes more complicated making decisions on information disclosure regarding the future status of the firm more difficult for managers. In line with the growth and development of the capital market in emerging economics such as Iran, there is a significant demand for information disclosure by the business entity. This has emerged in a new field of discretionary disclosure called forward-looking information disclosure. However, there are great challenges in the absence of suitable reporting infrastructure. Given the importance of forward-looking information disclosure, this study identified preferences and ranked factors and its components. Efforts were made to propose an effective measurement tool. To provide a weighted checklist for preparation of forward-looking information by firms and its analysis by investors, these factors were divided into three general categories of "predicting and analyzing managers", "future objectives and strategies", and "future financial and nonfinancial information". A fuzzy-based decision-making model was proposed for ranking different sub-criteria. According to the results, "predicting and analyzing managers" ranked first, and "future objectives and

strategies", and "future financial and nonfinancial information" ranked the next places. The importance of analysis by managers and provision of key information related to future events and plans of the firm increase the knowledge of investors on the firm vision. Investors are aware of the importance of this category of information and use it as an accredited information source in their decisions. The firm objectives and strategies, financial and nonfinancial information, and identifying financial impacts of this class of information are also of great importance. The importance and priority of sub-criteria in these three categories are as follows: "The firm forecasts on the nature and terms of future contracts" showed the highest importance than other components in the "predicting and analyzing managers" category. Qualitative and quantitative impacts of risks and opportunities on the firm status and performance were identified as the most important factor in the "future financial and nonfinancial information" category. Explaining the firm strategies to deal with ten risk and opportunities facing the firm showed the highest importance coefficient in the "future objectives and strategies" category. These sub-criteria were identified by experts as indices affecting decisions of users. Forward-looking information in all these three categories are among the indices affecting the vision on the future status of business entities. Presenting this category of information in the form of a measurement tool may improve reporting and efficiency of the capital market.

According to the literature and theoretical foundations, classification of dimensions in this study is consistent with the results of AICIP (1994) and FASB (2000). Furthermore, the indices presented in this study have been presented and emphasized in various studies (Celik, 2006; Arabi *et al.*, 2018; Gehand and Mousa, 2018). According to the results, professional institutions are expected to pay special attention to this new class of discretionary information disclosure and define applied objectives in this regard. Accordingly, professional institutions such as Tehran Stock Exchange and Auditing Organizations are recommended to conduct extensive studies in this field to use the results of this study and future research works in developing standards and guidelines for forward-looking information disclosure. By presenting an applied checklist of dimensions and components of forward-looking information disclosure from theoretical foundations and interviews with financial experts in the capital market, challenges facing the firms for preparation of forward-looking information can be resolved. Moreover, managers of business entities in large industrial firms are recommended to establish specialized committees for the preparation of information disclosure. To increase awareness and solve problems, it is suggested to hold conferences with the help of professional institutions. It is also recommended to obligate financial staff and specialized reporting committees to participate in specialized courses on information disclosure held by Tehran Stock Exchange. Using the results of this study, future studies may attempt to validate the checklist in companies listed on TSE according to the type of industry. By matching indices of the checklist and future information disclosed by firms, efforts should be made to resolve probable weaknesses and improve the checklist over time. Some factors affecting the behavior of firms and the level of forward-looking information disclosure were investigated in this study. Therefore, the effect of factors such as various organizational attributes, information related to the board of directors and institutional stockholders, motivations for capital cost, information asymmetry, perceptions and motivations of mangers, and eventually the effect of cost-benefit principle on the forward-looking information disclosure in business entities can be evaluated in future studies. Considering theoretical foundations developed in this study, Ph.D. students may attempt to design and validate subsections of forward-looking information disclosure including the risk model for forward-looking information and a model for key managers' forecasts of the future of business entities. Taking into account special conditions and various sanctions against Iran, future financial and nonfinancial factors affecting the performance of exporting- and importing-oriented firms can be identified and evaluated. More extensive studies with further details can be conducted on the effect of inflation, different risk factors facing firms including changes in the exchange rate, challenges regarding supplying raw materials from abroad, marketing problems, and sale of products in international markets. Given the recent global crisis in relation to tail events occurring with a low probability and significant effects on the economic situation of countries, firms are recommended to present the

financial and nonfinancial results and related plans for dealing with this crisis. Coronavirus and the likelihood of cyberwarfare between countries are among the recent factors in this regard. Evaluating the economies of developed and developing countries, the financial market, and business entities around the world and thereby bankruptcies of large companies and industries such as the tourism and transportation industries indicates the need for extensive studies in this field. Moreover, the destructive effects of financial crises on the future status of firms should be considered by financial and economic scholars around the world including Iran because of its significant impact on decisions of users. The main limitation facing this study was the lack of a large community of forward-looking information experts in the Iranian capital market leading to a decrease in the number of experts.

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