

# Explain a model for measuring the tone of financial statements using a multi-criteria decision model with a fuzzy approach

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## Abstract

Despite the existence of financial reporting rules and requirements, including corporate governance, sustainability and social responsibility in companies, the complexity of financial reporting is still a controversial issue in the financial field and no comprehensive indicator has been provided so far. Although in previous studies, several indicators have been used to measure the readability of financial reporting, but in this study, by considering different indicators, using a mathematical method, a comprehensive indicator for measuring the readability of financial reporting has been presented. Also, to test and measure the efficiency of the designed model, data related to 152 companies during the years 2016 to 2019 have been used by mixed method. For this purpose, a questionnaire was prepared and distributed among experts to ask the experts about the weight and importance of the criteria for measuring the readability of the company's financial reporting. Indigenous model of financial reporting based on companies listed on the Tehran Stock Exchange was presented. Also, in order to measure the relationships of the hidden variable, which in this study is the readability of financial reporting, confirmatory factor analysis was used with its measurement items; the obtained results show that the proposed model is a good indicator for the readability of financial reporting and has less skewness than individual criteria.

*Keywords:* Financial Reporting Readability, Comprehensive Financial Reporting Readability Index, Multi-Criteria Decision Making Model, Mixed Method.

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## 1. Introduction

Recent research on the tone of financial reporting has focused on the implications of the characteristics of information disclosure, and the results show that the tone (readability) of financial reports

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influences market pricing, analyst behavior, profitability and cost of capital [5, 7, 17, 20]. Some other researchers also believe that the tone of companies' financial reports can reduce the cost of agency through disclosure of company information [30]. On the other hand, Khani Masoumehabadi and Rajab Dori [18] believe that the tone (readability) of financial reports through transparency and greater readability of information will control bold tax policies. According to the findings of Habib and Hassan [12], which indicate that although financial reports are very important in protecting the interests of stakeholders, but the readability and understanding of these reports is usually of particular complexity. This has prompted the International Financial Reporting Association to study the annual reports while improving their readability. The result of these reviews was the passage of legislation entitled "Simple English" [10] and the Disclosure Framework Project [11] with the aim of making disclosures of financial statements more effective, comprehensible and useful. Because the readability of financial statements has important economic consequences, it is important to identify the factors that affect it [4, 23]. Given that the company's business strategy reflects how the company competes in the company's own market, so the company's strategies can affect the company's business performance as well as the motivation of its managers to disclose information [3]. Company life cycle theory states that the stages of recognizing business development occur due to changes in the strategy, structures, decision-making methods, and organizational status of companies [2]. Therefore, according to this theory, it can be a basis for experimental research in the direction of qualitative determinants of disclosure of textual information in companies and how these qualitative characteristics will be different with changing company strategies. For example, Bakarich et al [2] found in a study that the level of complexity of financial statements also changes over the life cycle of a company. On the other hand, Bonsall et al [4] and Loughran and McDonald [23] using the Dickinson [6] life cycle showed that companies in the stage of birth, growth and decline have less complex words and less legibility. In general, these results indicate that at any stage of the company's life cycle, the tone and emotion of disclosure of text reports can also change.

According to life cycle theory, companies have successive predictable stages of development from birth to decline, and their strategies, structures, and activities correspond to their stages of development. Companies are divided into three categories based on life cycle: growing, mature companies and declining companies. Based on resource theory, Dynamic Axis, Helfat and Petraf [14] stated that the resources, capacities and characteristics of the company change over time and these changes lead to the formation of different stages of the company's life cycle. According to Lim et al [21] and Habib and Hassan [12], companies with more stable and cost-effective strategies that do not pay much attention to the issue of innovation (defense companies) are less exposed to operational complexity and environmental uncertainty. This in turn reduces the complexity of disclosure and reduces the tendency to hide information. Accordingly, the financial statements of aggressive companies are expected to be less readable than similar reports of defense companies. Other researchers such as Hendricks et al [15], Huang et al [16] and Martikainen et al [25] and Faff et al [8] focused on management level factors that affect the tone of financial statements and found that life cycle The company determines the important policies of the companies even after the control of the CEO and the characteristics of the board of directors, and their findings show that the disclosure of information also changes during the life cycle of the company. However, in most domestic studies, this issue has been ignored and there is a gap in the accounting and financial reporting literature for research on this subject, which is the motivation for this research. Therefore, the motivation of this research is to develop a theoretical literature related to the tone of financial reporting in the life cycle of the company and the role of information time in improving it. Finally, using a multi-criteria decision model to present a new model of financial reporting tone in listed companies Tehran Stock Exchange.

## 2. Theoretical foundations and review of existing literature

Companies' annual financial reports have always been one of the most important sources of information for decision-making by capital market participants (such as shareholders, creditors and financial analysts), capital market regulators and other stakeholders [13]. Therefore, the readability of financial reporting is an important feature of textual information and has been extensively studied in various fields [24]. The value of the information contained in the text of financial statements with a high level of readability is comprehensible to users. Therefore, companies should refrain from publishing complex, lengthy, or redundant reports aimed at helping state-owned companies improve their acceptance of disclosed information and helping investors better understand corporate financial statement information [1, 24]. The value of the information contained in the text of financial statements with a high level of readability is comprehensible to users. At the same time, complex and ambiguous information that is considered relevant to meet the needs of users should not be removed from the company's financial statements on the pretext that it is difficult for some users to understand; rather, such information should be presented as simply as possible [30].

Given the importance of textual disclosure of information, managers have a strategic incentive to manage the content and style of these disclosures and influence user perception and company performance. In fact, Lee (2008) finds it harder and longer to read the annual reports of poorly performing companies; This is because managers are concerned about raising capital and its impact on the market due to their poor performance, and therefore, may deliberately decide to make financial reports more illegible in order to obscure and complicate their poor performance. Lou et al [24] also showed that less readable financial statements lead to more profit management. Accounting research in this area shows that the readability of financial reporting can affect the information quality of financial statements; Thus, poor readability of financial reporting can increase the organization's problems such as earnings management, poor earnings stability, risk of stock price falls, investor response to the stock market [18, 24]. Measuring the readability of financial statements is one of the research areas of reading studies that seeks to find the probability of success of the reader in reading and understanding a writing and in this regard, examines the factors affecting the success of reading and comprehension of the text [19]. According to research, the quality of information published by companies consists of two parts: the quality of information disclosure and the quality of earnings. Also, increasing corporate governance mechanisms can be effective in reducing the opportunistic behaviors of managers and lead to an increase in the quality of reporting the company's financial statements and ultimately increase the cost of representation. Therefore, companies that use higher corporate governance mechanisms also have high quality financial statements and readability of financial reports.

## 3. Research background

Hassan and Habib [12] in a study examined the readability of financial reporting, company disclosure, liquidity and dividend policy. Their research findings show that companies with less disclosure pay less cash dividends and buy fewer shares. Hassan et al [13] in a study examined the financial reporting readability, corporate governance and financial performance of companies listed on the Qatar Stock Exchange using a structured sample, including 120 years - observations on the Qatar Stock Exchange from 2014 to 2016. Their research findings show that companies with financial reporting readability are more profitable and have lower agency costs, which indicates that there is no "ambiguity" in the company's annual financial statements. In a study, Luo et al [24] examined the relationship between financial reporting readability and agency costs using a sample of 19,221 company-years from 2001 to 2015 in listed companies on the China Stock Exchange. Their results

show that companies with higher financial reporting readability have lower agency costs. Hassan [13] examined the relationship between management ability and financial reporting readability for a sample of 5,574 years of observation in the US capital market. In this study, three fugue, flash-kinkid and text length indices were used to measure the readability of financial reporting.

In Iran, a lot of research has been done on the readability of financial statements, which is discussed below. Mohseni and Rahnamai Rudposhti [28] in a study examined the financial performance and functions of text tone management in financial reporting from 2007 to 2014. The results of their findings show that there is a significant negative relationship between writing tone management and the future financial performance of the company. Therefore, managers use text-driven management with strategic motivation to cover the poor future performance of the company. Norouzi et al [30] in a study designed a model and evaluated the adjusting role of management ability on the relationship between financial reporting readability and agency costs using a sample of 116 companies listed on the Tehran Stock Exchange during the years 2012 to 2017. Research findings indicate that the readability of financial reporting reduces the cost of representing the company. In addition, the results show that the ability to manage moderates and weakens the negative relationship between financial reporting readability and corporate representation costs. Norouzi et al [30] in a study examined the modeling of the moderating role of corporate governance on the relationship between financial reporting readability and agency costs. The statistical sample of the present study consists of 696 years - listed companies of Tehran Stock Exchange during the years 2012 to 2017. After ensuring an acceptable fit of the measurement and structural models of the research, the research findings indicate that the readability of financial reporting reduces the cost of representing the company. In addition, the results show that corporate governance exacerbates the negative relationship between financial reporting readability and corporate representation costs. Khani Masoumehabadi and Rajab Dori [17] in their study entitled the relationship between illegibility of financial reports and bold tax policy using a system of simultaneous equations showed that there is a two-way and significant relationship between readability of financial reports and bold tax policy.

A review of domestic and foreign studies shows that several indicators have been used in these studies as indicators for measuring the readability of financial reporting. Given the above, it is obvious that in each country according to the social and economic environment of that country, the amount of intensity and weakness of these factors are different; Therefore, examining whether we can have a comprehensive index of financial reporting readability of Iranian companies is controversial and this study seeks to combine these factors to provide a comprehensive indicator to measure the financial readability of financial reporting according to the Iranian situation. Providing this index can help investors and others to have a better understanding of the company for investment, management, planning, etc., and determine their reliance on company information.

### *3.1. Research method, population and statistical sample*

The method of the present study is applied in terms of purpose and descriptive in terms of data collection method. In terms of data type, it is a qualitative and quantitative research, and in terms of data analysis method, it is a research mixed with method. In one part of the research, the qualitative method is used and in the other part, the quantitative method is used. Due to the novelty of the research topic, this study seeks to examine issues such as reviewing and explaining the criteria affecting the readability of companies' financial reporting and then explaining the proposed comprehensive index to measure the readability of the company's financial reporting:

Therefore, in this research, an attempt is made to provide appropriate answers to the following questions:

1. What are the criteria for calculating the readability of companies' financial reporting?

2. How is the proposed new model for calculating the comprehensive readability index of financial reporting explained?

The statistical population of the present study includes all public joint stock companies listed on the Tehran Stock Exchange and the time frame of the research is 4 years during the period 2016 to 2019 and the statistical samples are selected based on the following conditions:

1. Have been listed on the Tehran Stock Exchange until the end of March 2017.
2. In order to increase comparability, their fiscal year should end at the end of March and they should not have changed their activity or fiscal year during the desired periods.
3. Not be part of investment companies and financial intermediaries.
4. Unavailability of information required by companies.

Table (2): Steps and how to select data of sample companies

Description	Number of companies	
Companies whose listing date on the stock exchange is before 2016		546
Companies that are not listed on the stock exchange.	258	
They are not part of investment companies and financial intermediaries.	35	
Companies for which the required information is not available.	101	
Total number of companies removed.		(394)
The final sample size of the research		152

The final sample of the research after applying the above conditions included 152 companies. There are several criteria for measuring the readability of financial reporting in the market. Here's how we can provide a comprehensive indicator for measuring the readability of financial reporting:

1. Study of literature and background of domestic and foreign researches the subject of research and identification of criteria for measuring the readability of the company's financial reporting that have been used in previous researches and selection of these criteria according to the readability of financial reporting of Iranian companies.
2. Preparing a questionnaire to interview experts about the weight and importance of the criteria for assessing the readability of the company's financial reporting using one of the methods of multi-criteria decision-making model and its distribution among experts.
3. Compilation of a questionnaire distributed among experts and determining the weight of each of the criteria affecting the readability of the company's financial reporting by Shannon entropy method.
4. Collect the data needed to measure each of the criteria affecting the readability of the company's financial reporting through databases and measure the criteria affecting the readability of financial reporting and standardize them.
5. Explain the model for measuring the comprehensive readability index of companies' financial reporting using the criteria affecting it and their weight as a combination.

To answer the first research question, what are the criteria for calculating the readability of companies' financial reporting? By studying the research literature and the local conditions of the country,



Table (3). Demographic Research

Variable	Subvariable	Number	Percentage
Gender	Man	32	89%
	Female	4	11%
Age	Between 30 and 40 years	8	22%
	Between 40 and 50 years	21	58%
	More than 50 years	7	20%
Education level	PhD student	6	17%
	PhD	30	83%

the data of this research to explain the readability of companies’ financial reporting include six factors: text length index, flash index, Gunning Fog index, McLaughlin index, Fry index and Power index, Sumner and Curl. Internal and external past these factors have been used to calculate the readability of companies’ financial reporting. The required financial data of the research model have been extracted from the new Rahavard software and the official website of the Exchange Organization. Expert opinions were used to weigh the mentioned factors in calculating the readability index of financial reporting. Thus, electronic questionnaires containing 6 questions, each of which included a criterion used in the model, were sent to 36 professional and academic experts, including faculty members, managers and analysts of investment companies and brokerages that were available, and in relation to the weight of six factors. They were interviewed for financial readability. Then all the questionnaires sent to the experts were collected and the weights of the factors were determined using the Shannon entropy technique described in the next section. It should be noted that Cronbach’s alpha coefficient of the above questionnaire was equal to 0.783, which indicates its reliability and good validity.

Steps of implementing entropy technique: To measure the weight and share of each of the above six factors, the following basic steps are necessary:

Step 1: The decision matrix of the indicators is determined. Step 2: The data obtained from the decision matrix are normalized for analysis. Step 3: Determine the value of  $E_j$  at the entropy of the characteristic  $j$ . Step 4: With the help of  $E_j$ , the value of  $d_i$  is calculated for each property. Step 5: The weight of the dimensions, criteria and variables  $w_j$  is obtained as the characteristic of  $j$ . According to the above steps, the demographic statistics of the experts and the weights determined are as follows:

Table (4). The degree of entropy based on the readability components of financial reporting

Effective factors	Index of total text length	Flash Index	Gunning Fog Index	McLaughlin Index	Fry Index	Power, Sumner and Curl index
$E_j$	0.973	0.982	0.987	0.953	0.966	0.980
$d_j = 1 - E_j$	0.027	0.018	0.013	0.047	0.034	0.02
$W_j$	0.128	0.139	0.148	0.118	0.159	0.097

Table (4) divides the readability of financial reporting indicators based on the most influential index and using a two-stage clustering algorithm. In such a way that a set of data is automatically divided into different indicators based on the concept of distance without adding the point of view of experts, and then during the TOPSIS process, all indicators are weighted simultaneously. After determining the weight of the factors affecting the readability of the company’s financial reporting, the answer to the second research question, which is to provide a comprehensive model for measuring the readability of the company’s financial reporting, is given in the next section.

#### 4. Proposed model for measuring the readability of financial reporting

In this research, a balanced composite index has been used to measure the readability of financial reporting based on the basic model presented. To present the proposed model in this study, it is first necessary to consider three basic assumptions. First, to calculate the readability of financial reporting, it has accepted the principle of collectibility, ie the readability of financial reporting is equal to the sum of the factors affecting it. In other words, the factors come together with a rule and determine the readability of financial reporting. In addition, the effect of each of these factors on the readability of financial reporting is proportional to their coefficient or weight, which was calculated in the previous section (proportionality property). Third, we assume that the extent to which each factor affects the readability of financial reporting is normalized. This is done because a significant floor or ceiling is set to calculate the readability of financial reporting. Based on the above explanations and the proposed assumptions, the following proposed model is presented to calculate the readability of financial reporting.

$$\text{Model 1. } FRR_{it} = \sum_{s \in S} W_{s \ it} \frac{P_{s \ it}}{\max_{1 \leq i \leq N} \{P_{s \ it}\}} + \sum_{k \in K} W_{k \ it} \frac{\max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ it}}{\max_{1 \leq i \leq N} \{\max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ it}\}}$$

In this model:  $FRR_{it}$  is the readability index of Company  $i$  in the year  $t$ ;  $N$  number of companies;  $S$  is an index set of factors that are directly related to the readability of financial reporting;  $K$  is an index set of factors that are inversely related to the readability of financial reporting;  $W_{j \ it}$  weight of factor  $j$  of company  $i$  in year  $t$  and  $P_{j \ it}$  value of factor  $j$  of company  $i$  in year  $t$ .

It is clear that if  $M$  is the total number of factors affecting the readability of financial reporting then  $M = |S| + |K|$  Where  $|S|$  displays the number of elements in the set  $S$  and  $|K|$  displays the number of elements in the  $K$  set.

**Theorem 4.1.** *If we have for two companies with indexes  $a$  and  $b$  such that  $P_{s \ at} \leq P_{s \ bt}$ , for all  $s \in S$  and  $P_{k \ at} \leq P_{k \ bt}$ , for all  $k \in K$ . Then,  $FRR_{at} \leq FRR_{bt}$ .*

**Proof .** To prove the theorem, it is obvious that if  $P_{s \ at} \leq P_{s \ bt}$ . Then,  $\frac{P_{s \ bt}}{\max_{1 \leq i \leq N} \{P_{s \ it}\}} = \frac{P_{s \ at}}{\max_{1 \leq i \leq N} \{P_{s \ it}\}}$ . On the other hand, if  $P_{k \ at} \leq P_{k \ bt}$ .

$$\text{Then, } \max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ at} = \max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ bt}$$

$$\text{Therefore; } \frac{\max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ bt}}{\max_{1 \leq i \leq N} \{\max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ it}\}} = \frac{\max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ at}}{\max_{1 \leq i \leq N} \{\max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ it}\}}.$$

And since  $W_{j \ at} \geq 0$ ,  $FRR_{at} \leq FRR_{bt}$ .  $\square$

**Theorem 4.2.** *For a company with index  $a$ , we also have:*

$$0 \leq FRR_{at} \leq 1$$

**Proof .** We obviously have  $FRR_{at} \geq 0$  to prove another inequality:

$$P_{s \ at} \leq \max_{1 \leq i \leq N} \{P_{s \ it}\} \quad \forall s \in S$$

And thus,  $\frac{P_{s \ at}}{\max_{1 \leq i \leq N} \{P_{s \ it}\}} \leq 1$ . On the other hand

$$\max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ at} \leq \max_{1 \leq i \leq N} \left\{ \max_{1 \leq i \leq N} \{P_{k \ it}\} - P_{k \ it} \right\}$$

Then,

$$\frac{\max_{1 \leq i \leq N} \{P_{k it}\} - P_{k at}}{\max_{1 \leq i \leq N} \{\max_{1 \leq i \leq N} \{P_{k it}\} - P_{k it}\}} \leq 1$$

And thus,

$$\begin{aligned} FRR_{at} &= \sum_{s \in S} W_{s at} \frac{P_{s at}}{\max_{1 \leq i \leq N} \{P_{s it}\}} + \sum_{k \in K} W_{k at} \frac{\max_{1 \leq i \leq N} \{P_{k it}\} - P_{k at}}{\max_{1 \leq i \leq N} \{\max_{1 \leq i \leq N} \{P_{k it}\} - P_{k it}\}} \\ &\leq \sum_{s \in S} W_{s at} + \sum_{k \in K} W_{k at} \\ &= 1. \end{aligned}$$

Therefore,  $FRR_{at} \leq 1$ .  $\square$

Notes: Theorem 4.1 shows that the readability of financial reporting is uniform, that is, for each company with sequential factors, the readability of financial reporting is arranged according to the order of factors. This property justifies the comparability of the two companies based on the readability factors of financial reporting. Theorem 4.2 also shows that the readability of financial reporting resulting from the proposed research model is limited and therefore reliable for evaluating a corporate community.

## 5. Financial reporting legibility indicators

A) Total text length: The first readability index of financial reporting is the total text length index, which is calculated as follows: (First index).

(Number of text words)  $\ln =$  text length index

B) Flash: The second readability index of financial reporting is the flash index, which is calculated as follows: This method was provided by Rudolph Flash to determine the level of simplicity or difficulty and coefficient of simplicity of financial reporting texts. This formula is based on two linguistic factors, namely the average length of the sentence and the number of syllables. The process and steps of evaluating and determining the level of readability, ie the degree of simplicity of the content are as follows: First, randomly select three samples of one hundred words from the beginning, middle, and end of the text of the board of directors' reports; then, determine the length of the words by counting the number of syllables (syllables) in the selected words. In the third step, counting the number of sentences in the first hundred, second, third and fourth hundred words and determining the average length of sentences by dividing the number of words by the number of complete sentences in each text is one hundred words, and then calculating the average word length and average length The average sentence of three texts is one hundred words and the coefficient of the average length of words (number of syllables) in a fixed number is 0.846; Then, the product of the multiplication of paragraph 6 is subtracted from the fixed number 206/835. For localization and validity in Persian, suggest the fixed number 262/835 and multiplying the average sentence length by 1.015, the seventh step, subtracting the product of the remainder of the calculation in paragraph 7. At the end, we put the obtained number in the table to determine the difficulty or simplicity of the arrow and determine the degree of simplicity or difficulty of the text (second indicator).

C) Fry: The third indicator of the method of determining the legibility of financial reporting is the Fry index, which can be calculated as follows: The shorter the sentence, the greater the readability. In this method, three samples of one hundred words are selected and by counting the number of sentences and syllables, the average number of sentences and the average number of syllables in the text are determined. From the intersection of these values in a two-dimensional diagram, one



dimension of which is the average number of sentences and the other dimension is the average number of syllables, the readability level is extracted in proportion to the text.

D) Gunning Fogg: The fourth indicator of the method of determining the level of readability is the Gunning Fogg index, which will be measured as follows: This method was designed by Robert Gunning Fogg (1951) with the aim of assessing and determining the readability of the contents of board reports; In other words, the main purpose of this method is to evaluate and determine the level of texts. The process and method of determining the level of readability of writings in the Gunning Fogg method is as follows (fourth indicator): first stage; Select a sample of one hundred words from the beginning, a sample of one hundred words from the middle and a sample of one hundred words from the end of the text randomly and then count the complete number of sentences of each sample according to three methods (;, and? And! And; ); The third step is to determine the average sentence length by dividing the number of words by the number of complete sentences in each sample of one hundred words; The fourth step is to count the number of three-syllable words and more than three syllables in each one-hundred-word text. For the validity of this method in Persian, it is suggested that difficult words in Persian be calculated with 4 syllable words and more and then, add the number of difficult words with the average number of words in the sentences. Sixth step, multiplying the sum of the number of difficult and average words in sentences with a fixed number of 0.4 and performing the calculations of paragraphs 4, 5, 6 for two examples of another hundred words and at the end; Calculate the average of the results of all three samples by adding and dividing by the number. The number obtained from the above operation in the eighth paragraph indicates the level of readability of the contents of the texts or writings.

E) McLaughlin: The fifth method of measuring the readability of financial reporting is the McLaughlin method, which will be measured as follows. The process and evaluation steps of determining the readability level of this method are as follows: (Fifth indicator). First, ten consecutive complete sentences are selected at the beginning, ten consecutive complete sentences in the middle, and ten consecutive complete sentences at the end of a text. Given that the complete sentence is a set of words ending in a period (.), A question mark (?) Or an exclamation mark (!) And a period (;). Then, in this example, 30 sentences of all difficult words with three syllables and more are counted. For Persian language, words of 4 syllables and more are considered difficult. In the third step, the sum of the number of difficult words (four syllables and more) is obtained and then its square root is calculated. If this number does not give a perfect root, we must take the number closest to it that has a full root and add the number 3 to the obtained root.

F) Power, Sumner, and Curl: The sixth method of measuring readability is the Power, Sumner, Curl index, which is measured by the following method: (Sixth index). First, select three samples of one hundred words from the beginning, middle, and end sections of the text of the board of directors' reports at random and count the number of sentences in the text of the first, second, and third hundred words. Then, determine the average length of sentences by dividing the number of words by the number of sentences in each text and counting the number of syllables (floods) in a hundred words and calculating their average.

Since the use of each of these indicators alone may interfere with measuring the readability of the company's financial reporting, in the present study, to measure the readability of the company's financial reporting, a balanced composite index is used for each company. The use of this comprehensive index reduces the skewness resulting from the individual application of each of the financial reporting readability indicators and provides a more accurate benchmark for testing.

### 6. The final model for measuring the readability index of financial reporting

According to the above explanations, the final model for measuring the readability index of financial reporting is as follows:

$$FRR - Index_{it} = 0.031 P_1 + 0.046 P_2 + 0.208 P_3 + 0.127 P_4 + 0.012 P_5 + 0.059 P_6$$

In this model,  $P_i$  is the standardized factor for calculating the readability indicators of financial reporting.

### 7. Descriptive statistics

To provide an overview of the important features of the variables used to measure the readability of corporate financial reporting in Table (5), some of the concepts of descriptive statistics of these variables, including the number of observations, average, minimum and maximum observations and standard deviation are presented. As can be seen, in response to the first question of the research, the average readability index of Fog financial reporting is -18.512 and the average readability index of financial reporting is 8.365 and the average readability index of flash financial reporting is -5.657. This suggests that corporate executives have used both light and hard texts in board reports. The average fugue index indicates that the text of the sample companies is not complex for users. Also, according to the text length index, according to its measurement criteria, it represents easy texts in the text of board reports. Since according to the McLaughlin index the minimum value is -13.714; therefore, among the texts studied in the sample companies, there are appropriate texts.

Variable	mean	median	Min	Max	Std.V	Obs
Index of total text length	-8.365	-8.291	-8.971	-8.114	1.642	608
Flash Index	-5.657	-5.314	-4.108	-4.108	1.519	608
Gunning Fog Index	-18.512	-18.482	-24.06	-16.15	2.022	608
McLaughlin Index	-15.668	-15.538	-19.63	-13.71	2.633	608
Fry Index	-6.882	-6.710	-8.993	-4.507	1.714	608
Power, Sumner and Curl index	-7.933	-7.306	-9.515	-5.327	1.916	608

Table (5). Descriptive statistics of research variables

### 8. Validation of the measurement model

After determining the conceptual model of research and data collection, the most important stage of modeling is the validation of the measurement model. The validity of a model is examined using the goodness-of-fit criteria. Figure 1 and Table (6) show the modified model for measuring the readability of financial reporting and its related fit indicators, respectively.

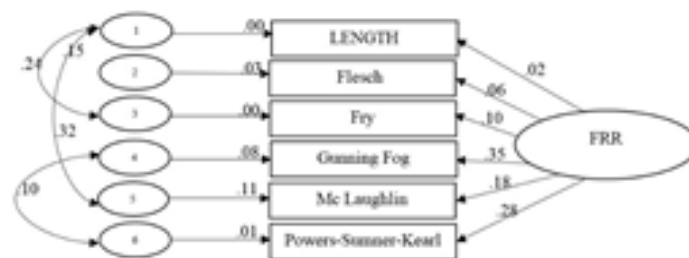


Figure 1). Modified financial reporting readability measurement model

## 9. Results of the proposed model

After checking the validity of the model in the previous section, according to the collected data for each of the financial reporting readability indicators and the calculated weight of each of these components using entropy technique, Tables (7) and (8) are descriptive statistics and measurement results, respectively. The readability of financial reporting of some companies listed on the Tehran Stock Exchange is shown as an example using the model presented in this study. According to Table (7), which shows the results of the Native Reading Model of Financial Reporting for companies listed on the Tehran Stock Exchange, the average obtained indicates that most of the texts of the Board of Directors' report are acceptable. Therefore, it can be said that the tone of financial reporting in companies listed on the Tehran Stock Exchange has an acceptable level and is understandable to users.

Variable	mean	median	Min	Max	Std.V	Obs
Readability of financial reporting	-11.714	-11.308	-14.524	-1.746	-0.225	608

Table (6). Descriptive statistics of financial reporting readability index.

## 10. Conclusion

Companies' annual financial reports have always been one of the most important sources of information for decision-making by capital market participants, capital market regulators and other stakeholders [13]. Therefore, the readability of financial reporting is considered as an important feature of textual information and has been extensively studied in various fields [25]. The value of the information contained in the text of financial statements with a high level of readability is comprehensible to users. From a theoretical point of view, disclosure of financial statement information such as corporate annual reports is a very important bridge between management and shareholders in joint stock companies due to the separation of ownership from management. Minority shareholders and overseas investors can examine the company's financial condition, financial performance and cash flows through the company's annual reports, and based on this, they can assess the company's growth prospects and competence. Accounting research in this area shows that the readability of financial reporting can affect the quality of financial statement information. Among the most widely used financial reporting readability indicators according to various studies such as Ertugrul et al [7] Indicators such as Fog index, full text length, flash index, Mc Laffin index, Fry index And Power, Sumner and Curl index. In this research, according to the first question of the research, the indicators for calculating the readability of companies' financial reporting were determined using content analysis method, and then for a new proposed model for calculating the comprehensive index of financial reporting readability according to the second question. Topsis weighting method was used and finally a native model of financial reporting legibility was presented. The result obtained based on the questions raised in the present study in accordance with the local model of readability of reporting for companies listed on the Tehran Stock Exchange shows that most companies use comprehensible texts for their financial reporting. Therefore, providing a comprehensive indicator for measuring the readability of financial reporting, in addition to introducing new tools for ranking the Tehran Stock Exchange to measure the readability of companies' financial reporting can help investors choose the right portfolio, which can ultimately reduce the cost of representation and market dynamics. And reduce information asymmetry. Therefore, providing a comprehensive index of financial reporting readability makes managers more self-reliant and provide reports with high transparency of the company's readability reports.

Financial research, and especially research that seeks to explain a comprehensive index, has several obstacles and limitations. In this study, there were these limitations that, for example, to

collect some unpublished data in the reports of the company's board of directors due to the illegibility of the texts, led to the elimination of companies and caused problems in the research process. Also, although explanations were given at various stages of the research regarding the selection of financial reporting readability indicators, the lack of a clear theory makes it difficult to evaluate the choices made. In general, there is no comprehensive theory on the choice of financial reporting legibility indicators; and this field is very limited and there are few theoretical and empirical foundations in its literature.

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