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Newcomers' Priorities in Portfolio Selection: A Shannon Entropy Approach

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ABSTRACT

Having a good stock portfolio, which is one of the most important factors in making money in the stock market, requires the correct choice of criteria. This issue for new stock traders in the Tehran Stock Exchange (TSE) who do more than 50 percent of daily transactions in this market, due to their lack of sufficient experience, seems thoroughly essential. As a result, newcomers who were trading in the Tehran Stock Exchange in 2020 have been invited to participate in this study. After identifying the most influential variables in portfolio selection via the Delphi method, these factors have been ranked based on Shannon's Entropy Approach. The results show that Familiarity, Net Profit Ratio, and Stock Price are respectively the main priorities of new entrants in choosing the stock portfolio. Besides, risk-related variables have generally the least importance in stock portfolio selection from the perspective of new entrants.

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1. Introduction

To make more money, an unrivaled volume of people has joined the Tehran Stock Exchange in recent months, as the largest financial market in Iran. However, earning profit in this complex market requires that newcomers have a logical plan, and subsequently have a reliable stock portfolio. As a result, the issue of portfolio selection will be raised. Generally, the goal of portfolio selection is that investors fulfill their long-term targets by allocating their wealth to a set of assets (Li et al., 2015), but everyone does it by different methods and criteria.

So far, a host number of studies have been conducted to recognize, assess and rank these criteria by diverse methods from Traditional Finance to Artificial Intelligence (Li and Hoi, 2012). However, there are some problems in using their results in TSE. One of these problems is that the overwhelming majority of these studies have chiefly focused on only quantitative variables like financial considerations, and the importance of other variables has not been properly tested. Furthermore, for assessing the impact of these factors, experienced investors had been usually employed, while newcomer investors have taken the lion's share of TSE. Another outstanding point that should be noticed is that there is a subtle difference between the economic atmosphere in developed countries and developing countries like Iran. There is no doubt, where the epic proportion of people living under the poverty line, the criteria for spending money is in marked contrast to where people enjoy a stable economy and can earn or make money somewhat easier than the latter ones. And finally, when an investor has to consider an extended range of criteria to choose the best ones from them, the problem will become a Multiple-Criteria Decision-Making (MCDM), and solving it should be used of its related tools (Kou et al., 2016), no other methods.

To bridge the mentioned gaps and find the proper responses to the research questions, which are as follows;

1. Among the known criteria which ones are used by newcomers?
2. Moreover, which one is the most important?

First, only investors have been invited to participate in this study who have recently started their activities in TSE and whose average income is less than $68 per month. In addition, this research has considered qualitative variables related to the companies as well as risk and profitability variables (quantitative variables) to identify, evaluate and rank the factors influencing the portfolio selection of new entrants. Besides, Entropy Method has been chosen, as one of the well-known tools of the MCDM approach, since;

1. It can be used in any process of weight determination
2. It can be used when there is plenty of criteria to assess portfolios
3. It can be used in assessing the non-linear relationship between variables
4. It can be used in the unbiased estimation of network performance

To attain this paper's aims, the rest of it is organized into four sections. In Section 2, the related literature has been added. Next, Section 3 has outlined the research method, and then in Section 4, the findings of this study have been presented and discussed. Finally, Section 5 has provided a conclusion and directions for future research.

2. Literature Review

This section has been allocated to prior research on portfolio selection.

2.1 Portfolio Selection

Portfolio selection aims to find the best combination of securities from a large number of available options to maximize the expected return and minimize the risk. In 1952, Markowitz formulated Mean-Variance Portfolio Optimization (MVPO) to address the portfolio-selection problem. He defined risk as the variance of the expected returns. Nonetheless, there were several limitations and drawbacks to applying MPVO in the real world. These are:

1. Markowitz assumed that there is a normal distribution of the return, while in the real world; asset returns are typically not normally distributed.
2. MVPO assigned a high weight to high-risk assets leading to a solution with limited diversification.
3. This theory has a weighty reliance on past performance, while never can it guarantees future results.
4. Besides, it is sensitive to investors' views, as a small change in the expected return could create a significant difference in the optimal solution (Mercurio, Wu, & Xie, 2020).
5. In this theory, there is an assumption that investors could buy and sell all securities of any of the sizes but there are the minimum order sizes in some of them that contrast with the initial assumption.
6. MVPO has been criticized by economists working on behavioral economics, even though it is practiced widely all over the world.

The mentioned reasons prepared the ground for other researchers to put their all to tackle these flaws through various approaches. Some of them have extended MVPO to address real-world problems, and some of them have brought up their methods like Interior-Point Models, Artificial Intelligence, and Regression Analysis. MCDM is another powerful approach to address the weakness of MVPO applied in the present study.

2.2 Portfolio Selection Criteria

There is a wide range of criteria to take into consideration in portfolio selection, though it may be a world difference between managers, researchers, and investors' opinions. Yet, the majority of studies have chiefly focused on some of the specific criteria (income and risk), regardless of the society which is under examination. Expected Value (EV) can be seen, for instance, in Markowitz's (1952) and Tobin's studies (1958). In 1998, 10 criteria were categorized into 4 groups and used in portfolio selection by Squyres, namely; sales, earnings per share, book value per share, return on equity, profit margin, price to income, price to book value, cash flow to debt and equity to assets. Gold and Lebowitz (1999) considered the price-to-sale ratio, the size of the firm, the volume of trade, and the earnings growth rate as the main factors in selecting the portfolio. Suvitsakdanont (2000) designed a questionnaire to identify and compare American investors' and Thai investors' perceptions by using the 35 decision factors.

Hurson and Ricci-Xella (2002) have applied return, common risk, and residual risk to portfolio selection in their study. Abdelaziz et al. (2007) studied the Tunisian stock exchange market. They used Multi-objective programming techniques such as Goal Programming (GP) and Compromise Programming (CP) to choose the best portfolio. In addition, they simultaneously considered objectives such as rate of return, liquidity, and risk.

Tiryaki and Ahlatcioglu (2009) combined the Fuzzy Analytic Hierarchy Process (AHP) with the portfolio selection problem. According to their study, the most crucial factors in selecting a portfolio on the Istanbul Stock Exchange (ISE) are economic factors, political factors, technology, profitability, and the size of firms respectively. Kheradyar et al. (2011) assessed the impact of three financial ratios include Dividend Yield (DY), Earnings Yield (EY), and Book-to-Market Ratio (B/M) on the Malaysia stock exchange. They apply Generalized Least Squares (GLS), and the results of their investigation revealed a positive correlation between dividend yield and book-to-market ratio with stock return. In the following year, Janani et al. determined the score of the effective criteria on portfolio selection through the TOPSIS algorithm. Their findings depicted that systematic risk, the volume of trade, and the price-to-earnings ratio have a significant impact on selecting a share in TSE.

Liu and Zhang (2017) examined the effect of investors' different decision behaviors on portfolio selection in a fuzzy environment. Transaction cost and minimum transaction lots were features that were considered in this study. To analyze TSE, Fattahi et al. (2019), used Data Envelopment Analysis Methods, Backing Vector Machines, and Clustering Algorithms. Accounting criteria, value-based criteria, and financial criteria, as well as risk and return, had been used as inputs of the portfolio model. Mercurio et al. (2020) utilized the Return-Entropy Portfolio Optimization (REPO) instead of MVPO. They had an opinion that the weaknesses of the latter approach could not be seen in the former one, and the efficiency of REOP is overwhelmingly higher than MVPO.

Elfadil et al. (2021) applied an Adaptive Neuro-Fuzzy Model (ANF) on 58 firms from both the Abu Dhabi Securities Exchange and the Dubai Financial Market to assess the performance of four financial considerations on the stock price of the firms. The result of their study has shown that return on equity (ROE) and earnings per share (EPS) are the most influential factors on the stock price of the firms (Elfadil et al., 2021). To maximize investors' perceived utility, Gong et al. (2021) have applied of Fuzzy Approach. They stated that return on equity, earnings per share, current ratio, price/earnings ratio, and price/book ratio are the most important factors for controlling the preferences regarding all portfolio objectives (Gong et al., 2021).

3. Methodological Framework

According to Figure 1, there are five steps to fulfill the aims of this study.

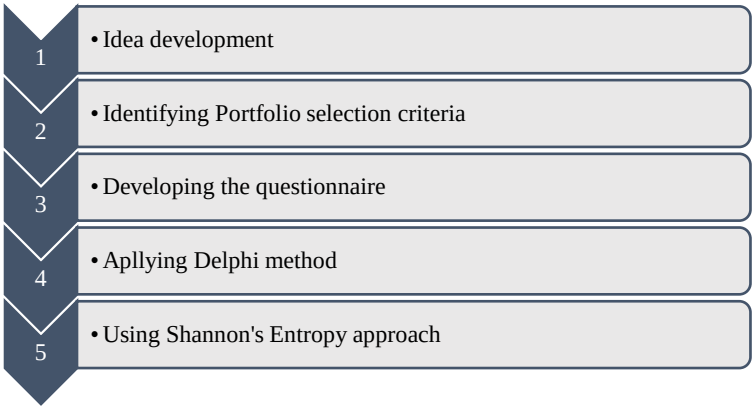

Figure 1. Conceptual Framework
Source: Research findings.

3.1 Idea Development

In the first step, large-scale research has been done to collect requisite information about the portfolio selection problem. Having synthesized sources and sifted information, the gap between the prior studies has been recognized, and a new idea was brought up.

3.2 Portfolio Selection Criteria

In the next step, it seemed to be necessary to determine the effective effectual criteria. Hence, all collected sources have been read carefully, and 31 variables have been found. They can be seen in Table 1. Since this number of variables might be enticed participants to answer the questions carelessly, so some of them were excluded by statistical analysis (one hundred participants were randomly selected for this stage). The results of these tests are summarized in Table 1.

Table 1. The Recognized Variables in the Literature Review and Their Statistical Analysis

NO.	Criteria	Cronbach's Alpha	Pearson Correlation Coefficient	t	Sig.
1	Cash Dividend (CD)	0.61	0.346*	1.18	0.117
2	Correlation (C)	0.64	0.268	-	-
3	Company Asset (CA)	0.77	0.573**	8.59	0.004
4	Currency Risk (CR)	0.61	0.670**	5.21	0.034
5	Dividend Shares (DS)	0.80	0.365*	1.25	0.136
6	Earnings Per Share (EPS)	0.85	0.758**	12.53	0.000
7	Familiarity (FY)	0.87	0.749**	13.02	0.000
8	Financial Risk (FR)	0.65	0.567**	2.47	0.039
9	Fair Value (FV)	0.59	0.009907	-	-
10	Interest Coverage Ratio (ICR)	0.69	0.474*	3.84	0.041
11	Inflationary Risk (IR)	0.72	0.351*	2.90	0.038
12	Interest Rate Risk (IRR)	0.62	0.791*	2.07	0.047
13	Long Term Debt to Equity Ratio(LER)	0.66	0.152	-	-
14	Liquidity Risk (LR)	0.70	0.402**	2.15	0.035
15	Management System (MS)	0.86	0.667*	4.97	0.022
16	Market Capitalization (MC)	0.74	0.316*	1.83	0.086
17	Net Profit Ratio (NPR)	0.79	0.829**	8.97	0.000
18	Net Profit Margin (NPM)	0.74	0.242*	1.98	0.058
19	Price-to-Earnings Ratio (PER)	0.81	0.855*	10.05	0.000
20	Price-to-Book Ratio (PBR)	0.80	0.690**	6.88	0.001
21	Pay-Out Ratio (POR)	0.52	-	-	-
22	Revenue Growth Rate (RGR)	0.75	0.534**	5.76	0.002

NO.	Criteria	Cronbach's Alpha	Pearson Correlation Coefficient	t	Sig.
23	Return on equity (ROE)	0.63	0.048	-	-
24	Return on Assets (ROA)	0.74	0.782*	6.31	0.002
25	Sales Growth (SG)	0.80	0.501**	1.87	0.153
26	Sector Growth (SG1)	0.73	0.226*	1.73	0.171
27	Stock Price (SP)	0.82	0.847**	13.52	0.000
28	Stock Turnover (ST)	0.76	0.379**	3.64	0.032
29	Sustainable Growth Rate (SGR)	0.77	0.679**	5.45	0.025
30	Volatility (V)	0.69	0.519*	1.39	0.203
31	Workforce (W)	0.72	0.311	-	-
R-squared		0.817	Adj. R-squared		0.746
F-statistic		41.746	Prob (F-statistic)		0.000

Source: Research findings.

Notes: ** & *. Correlation is significant at the 0.05 level and 0.1 level (2-tailed) respectively.

To evaluate the properties of measurement scales and the items composing the scales, Cronbach's Alpha Analysis is used (Salimi Rostami & Jafari Samimi, 2020). According to this test, Pay-Out Ratio and Fair Value are not reliable, so they are deleted from the research. Besides, the result of the Pearson Correlation Coefficient has shown that the variables; Correlation, Fair Value, Long Term Debt to Equity Ratio, Return on Equity, and Workforce, have not a significant relationship at 0. One level with the dependent variable of the study. Therefore, they are, like the former variables, removed from the research.

The next test for identifying entry variables is the t-test. As can be seen, the coefficient of determination (R-squared) in the studied model is equal to 0.817. It means that 81% of the changes in the dependent variable are influenced by the independent variables of the model, and the rest of the changes are related to other factors. Moreover, the value of F in the studied model is equal to 41.746. This value indicates that the regression model describes most of the dependent variable changes, and therefore, the result of the t-test can be reliable. According to this test, Cash Dividends, Dividend Shares, Net Profit Margin, Sales Growth, Sector Growth, and Volatility should be removed from the research. As a result, the study continues with the remaining 18 variables.

3.3 Developing the Questionnaire

In this study, a questionnaire has been designed according to the 5-Likert scale, and it has been filled out by 256 newcomers. In this questionnaire, the numbers 1, 2, 3, 4, and 5 demonstrate the importance of factors from participants' opinions. The degree of their impact is shown in Table 2.

Table 2. The Importance of Questionnaire Options

1	2	3	4	5
Unimportant	Slightly Important	Moderately Important.	Important	Very Important

Source: Research findings.

3.4 Applying Delphi Method

After identifying influential factors, it is time to sift them, since the research aims to determine the most important factors affecting portfolio selection. Therefore, in this stage, Delphi Method has been applied. Figure 2 shows the steps taken to recognize the main factors.

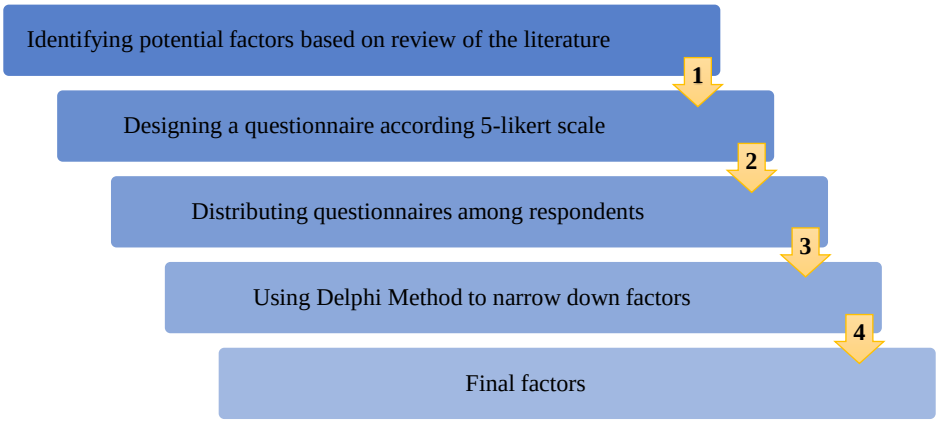

Figure 2. The Stages of Distinguishing the Influential Variables
Source: Research findings.

Delphi Method's main purpose is to "obtain the most reliable consensus of a group of people… by a series of intensive questionnaires interspersed with controlled opinion feedback" (Dalkey & Helmer, 1963). This technique is a repetitive process, and first aims to get a wide range of opinions from the group of people (newcomers in this study). The results of the first round of questions, when summarised, prepare the ground for the second round of questions. Results obtained from the second round of questions feed into the third and final round. Table 3 shows the stages of the Delphi Method for determining final factors.

Table 3. The Stages of the Delphi Method

The Initial Stage	**Reviewing the pertinent literature and extracting influential factors**
1st Round	Designing and distributing questionnaires The questions are answered by participants Collating and summarising the responses Analyzing responses Identifying and eliminating ineffective variables
2nd Round	Designing and distributing new questionnaires The questions are answered by participants Collating and summarising the new responses Analyzing responses Identifying and eliminating ineffective variables
The Initial Stage	**Reviewing the pertinent literature and extracting influential factors**
3rd Round	Designing and distributing new questionnaires The new questions are answered by participants Collating and summarising the responses Analyzing responses Identifying and eliminating ineffective variables
Final Round	The remaining variables enter the next stage as effective variables

Source: Dalkey and Helmer, 1963.

3.5 Using Shannon's Entropy Approach

Having determined the most important factors via Delphi Method, it is time to calculate the weight and rank of these factors. As mentioned before, this stage of the study will be done by Shannon's Entropy Method.

3.5.1 Shannon's Entropy (Information Theory)

The concept of Information Entropy was first brought up by Shannon in 1948 to solve communication problems (Shannon, 1948). His theory quickly grew and gained credence among other researchers, especially economists. Simonelli believed that Shannon's Entropy is more useful in making a portfolio than variance or other deviation measures. In the portfolio selection problem, Shannon's Entropy is not only able to diversify the allocation of various assets but also can meet the requirements of investors (Simonelli, 2005). Therefore, it can be concluded that Information Entropy is an ideal measure for the evaluations of different decision-making processes (Wang and Yu, 2011). Information Entropy is defined as:

$$H(X) = -\sum_{i=1}^{n} P(x_i) Log P(x_i) \quad (1)$$

X is a discrete random variable with possible outcomes: $x_1, x_2, ..., x_n$, which occur with probability $P(x_1), P(x_2), ..., P(x_n)$. Information Entropy has 5 interesting features consisting (Zheng et al., 2000):

1. Information Entropy possesses the property of probability and System Entropy equals the sum of every state of entropy
2. H(X) will be maximally provided that all the outcomes are equally likely.
3. System Entropy is non-negative because of $P(xi) \geq 0$.
4. Should A and B be two independent events, and the Information Entropy of A and B are E(A) and E(B) respectively, then the joint Information Entropy of a compound event is as follows:

$$E(A,B) = E(A) + E(B) \quad (2)$$

5. An event with probability zero does not have any impact on Information Entropy:

$$H_{n+1}(p_1, p_2, ..., p_n, 0) = H_n(p_1, p_2, ..., p_n) \quad (3)$$

3.5.2 Stages of Information Entropy Method

Suppose there are M projects, and N criteria to evaluate these projects. To apply of Information Entropy Method, a Decision Matrix[1] should be prepared which has M rows and N columns. It can be obtained as:

$$X = [x_{ij}]_{m \times n} \quad (i = 1, 2, \ldots, m; j = 1, 2, \ldots, n) \quad (4)$$

Each element is either a single numerical value or a single grade. Besides, each element, for instance x_{ij}, represents the performance of project i on criterion j. After providing the decision matrix, the method is performed in the following steps:

1. A decision matrix is a list of values in rows and columns permitting an analyst to analyse, identify, and rate the performance of relationships between sets of values and information

3.5.2.1 Standardize the Decision Matrix

To eliminate the influence of different dimensions, the decision matrix should be standardized. To calculate the standardized value of each element (r_{ij}), first, the value of each column which is a sum of the value of all its elements is calculated. Then the value of each element divides into this amount. It can be formulated as:

$$r_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} X_{ij}} \tag{5}$$

3.5.2.2 Calculate Information Entropy

Information Entropy value of the j^{th} criterion is as follows:

$$E_j = -h \sum_{i=1}^{m} r_{ij} Ln r_{ij} \tag{6}$$

where h = $\frac{1}{\ln m}$, $0 \le E_j \le 1$

The information utility value of the j^{th} criterion D_j can be computed by E_j.

$$D_j = 1 - E_j \tag{7}$$

when $E_j = 1$ it indicates all projects have the same performance towards the j^{th} criterion. Consequently, this criterion can be deleted since it could not transmit any information to the decision-makers, or in other words, this criterion makes no difference between projects, so it is useless.

3.5.2.3 Evaluate the Weight of Criteria

To assess the weight of each criterion, the information utility value of them is used as can be seen in the following formulate;

$$W_j = \frac{D_j}{\sum_{j=1}^{m} D_j} \tag{8}$$

3.5.2.4 Calculate the Evaluation Value of Each Project

To compute the evaluation value of each project, first, the below formulate is applied to calculate the evaluation value of each element;

$$f_{ij} = W_j \times r_{ij} \tag{9}$$

the evaluation value of i^{th} the project can be gauged as follows;

$$F_i = \sum_{j=1}^{n} f_{ij} \tag{10}$$

i^{th} the project is the best, should its evaluation value is the largest one.

4. Results and Discussion

The results of the two methods have briefly been presented in this section.

4.1 Results of the Delphi Method

As mentioned in the previous section, the first stage of research is to identify the factors affecting the participants in the study, which is done by the Delphi Method in three

steps. The results of the Delphi stages have been summarized in Tables 4, 5, and 6. In this method, when the average score of a variable is less than the median, in this study 3, it shows that the variable has a negligible impact. As a result, the variable is susceptible to deletion. As can be seen from Table 4, three variables in the first stage of the Delphi Method have been evaluated as ineffective factors by the participants in this study. Therefore, they have been excluded from the study. These variables are Stock Turnover, Sustainable Growth Rate, and Price-to-Book Ratio. There are several facts behind these choices.

First, from a new entrants' perspective, a company's revenue is much more important than the whole of the products it produces and sells. This view may be originated from the economic atmosphere of the country, in which people prefer to be brokers instead of producers. Its reason is that its income is much higher. Second, the reputation of a company is much more important than the current state of the company for this group of investors. They believe that these companies will be able to solve their problems in a short time, and their current ups and downs will be temporary. Third, they rely more on their ability to estimate corporate profit growth than on market expectations of corporate profitability. Finally, it is necessary to note that they have not put aside any of the existing risks in the first step.

Table 4. The Results of the First Phase of the Delphi Method

Stock Price 3.866	**Familiarity** 3.846	**Earnings Per Share** 3.830	**Net Profit Ratio** 3.618	**Currency Risk** 3.609	**Price-to-Earnings Ratio** 3.571
Company Asset 3.521	**Revenue Growth Rate** 3.513	**Return on Assets** 3.467	**Financial Risk** 3.456	**Inflationary Risk** 3.429	**Liquidity Risk** 3.402
Interest Coverage Ratio 3.336	**Management System** 3.283	**Interest Rate Risk** 3.097	**Stock Turnover** 2.827	**Sustainable Growth Rate** 2.777	**Price-to-Book Ratio** 2.684

Source: Research findings.

As can be seen from Table 5, in the second phase of the Delphi Model implementation, two other variables, namely; Management System and Interest Coverage Ratio, have been removed from the model. These omissions show that corporate revenue levels are important for newcomers, not how they achieve these levels. In addition, they have not shown much concern about the company's debts and the way of repaying them. The reason for this lack of care can be due to two things. First, the government highly supports laws on producers, and second, the short-term investment horizon of most newcomers to the Tehran Stock Exchange.

Table 5. The Results of the Second Phase of the Delphi Method

Familiarity 3.889	**Earnings Per Share** 3.833	**Stock Price** 3.803	**Currency Risk** 3.795	**Company Asset** 3.741	**Net Profit Ratio** 3.693
Inflationary Risk 3.689	**Revenue Growth Rate** 3.678	**Price-to-Earnings Ratio** 3.671	**Financial Risk** 3.658	**Return on Assets** 3.655	**Liquidity Risk** 3.610
Interest Rate Risk 3.344	**Management System** 2.970	**Interest Coverage Ratio** 2.673	**Stock Turnover** -	**Sustainable Growth Rate** -	**Price-to-Book Ratio** -

Source: Research findings.

Finally, in the third and final stage of this model, the Interest Rate Risk variable has also been removed by the decision of the participants. It indicates that Interest Rate Risk has been put under the shadow of the other types of risks since the rate of exchange changes, inflation, etc. has always been much higher than the rate of interest changes in recent years. In practice, interest rate changes have been negligible compared to the mentioned changes in recent years. Therefore, its importance has been overlooked.

Table 6. The Results of the Third Phase of the Delphi Method

Familiarity 3.906	**Stock Price** 3.843	**Earnings Per Share** 3.636	**Currency Risk** 3.562	**Price-to-Earnings Ratio** 3.519	**Net Profit Ratio** 3.515
Company Asset 3.496	**Revenue Growth Rate** 3.476	**Inflationary Risk** 3.445	**Return on Assets** 3.429	**Financial Risk** 3.421	**Liquidity Risk** 3.402
~~**Interest Rate Risk**~~ 2.554	~~**Management System**~~ -	~~**Interest Coverage Ratio**~~ -	~~**Stock Turnover**~~ -	~~**Sustainable Growth Rate**~~ -	~~**Price-to-Book Ratio**~~ -

Source: Research findings.

Having removed the less important variables, the remaining variables will enter the second stage of research, Shannon Entropy Approach, for ranking. Moreover, to better understand the model and the results, the remaining variables have been divided into three groups. Figure 3 provides an overview of this division.

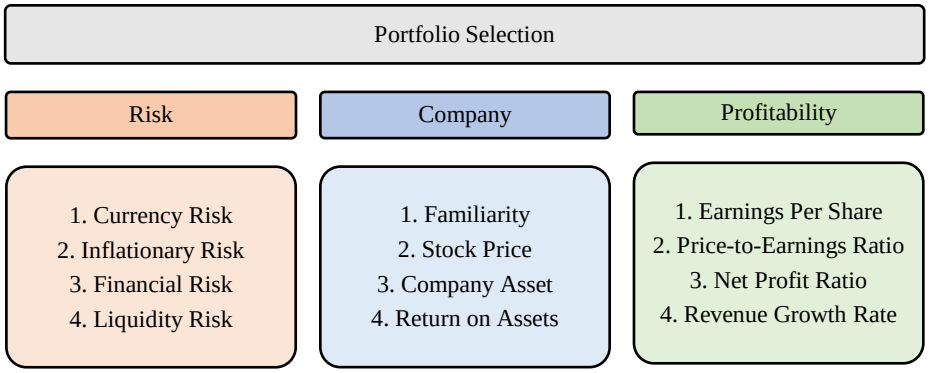

Figure 3. The Remaining Variables from the Delphi Method
Source: Research findings.

4.2 Results of Shannon's Entropy Approach

Having identified and eliminated the insignificant factors in the previous stage, the Delphi Method, it is time to determine which of the remaining items is more important for newcomers. Therefore, the answers obtained from the last stage of the Delphi Method have been employed to form the Decision Matrix and consequent stages. The result of Shannon's Entropy Approach is summarized in Table 7.

Table 7. The Results of Shannon's Entropy Approach

Variable	Weight	Score	Rank
Currency Risk	0.083309	2.210258	8
Inflationary Risk	0.083291	2.209775	9
Financial Risk	0.083290	2.209741	10
Liquidity Risk	0.083209	2.207590	12
Familiarity	0.083475	2.214665	1

Variable	Weight	Score	Rank
Stock Price	0.083370	2.211864	3
Company Asset	0.083369	2.211852	4
Return on Assets	0.083325	2.210669	7
Earnings Per Share	0.083358	2.211542	5
Price-to-Earnings Ratio	0.083345	2.211205	6
Net Profit Ratio	0.083393	2.212468	2
Revenue Growth Rate	0.083266	2.209099	11

Source: Research findings.

As can be seen from Table 7, among the first three priorities of newcomers, there are two sub-variables of the company variable. Familiarity with a score of 2.214665 is the most important variable in portfolio selection from the perspective of new entrants. It indicates that newcomers due to lack of sufficient experience may suffer from Familiarity Bias at the beginning of their work in the Tehran Stock Exchange. After Familiarity, a Net Profit Ratio with a score of 2.212468 is known as the second priority in the portfolio selection by this group of people. It means that when these people are faced with two familiar shares, they will choose the one having a higher net profit.

The next priority for newcomers is Stock Price. This variable has received a score of 2.211864 in this study. Hence, it is the third priority of these people. It shows that under equal circumstances between two shares, newcomers choose a stock that has a lower price. In this test, it is found that the majority of newcomers would pick the first option if they had three following options;

A: Buying 1000 shares of a company with a total value of 1 million Tomans (10 million Rials)

B: Buying 100 shares of a company with a total value of 1 million Tomans (10 million Rials)

C: Buying 10 shares of a company with a total value of 1 million Tomans (10 million Rials)

As can be seen from Figure 4, a shade more than 60% of respondents have stated that their choice is the first option, while almost one-third of them have preferred choosing another two options. Generally, from the newcomers' point of view, the cheaper, and the more profitable.

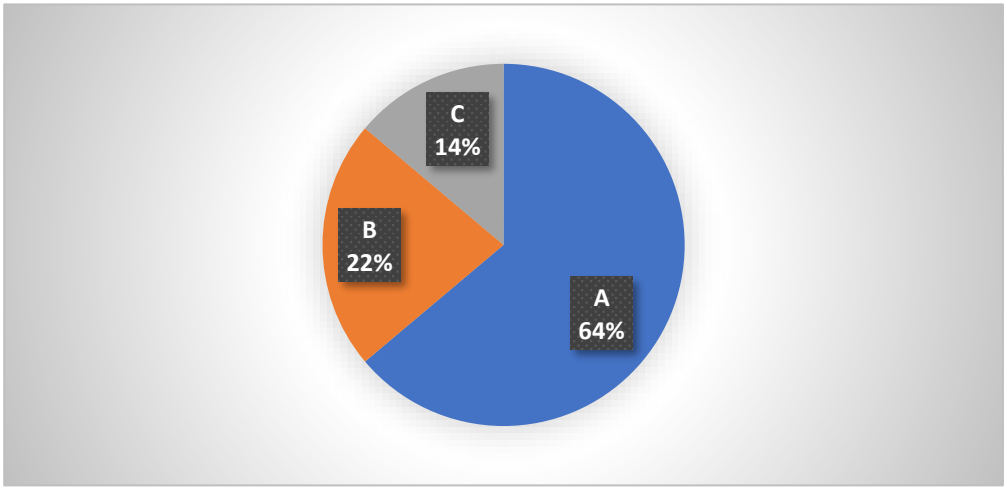

Figure 4. Newcomers' Preferences in Choosing Three Shares with Different Prices
Source: Research findings.

On the other hand, among the last three priorities, two sub-variables of Risk can be observed. Financial Risk and Liquidity Risk with a score of 2.209741 and 2.207590 are ranked 10th and 12th in this study, respectively. As can also be seen from Table 8, among the three main research variables, Risk is less important for newcomers. In other words, their tendency to take risks may be higher than their tendency to avoid risks.

Table 8. The Rank of the Three Main Research Variables

Variable	Weight	Score	Rank
Risk	0.083275	2.209341	3
Company	0.083385	2.212263	1
Profitability	0.08334	2.211079	2

Source: Research findings.

In summary, company-related factors have the highest priority in stock portfolio selection, while risk-related factors have relatively less important than the other two variables.

5. Conclusion

Stock markets are considered to be one of the best places to earn money, which is faced with an enormous influx of newcomers every year. However, to make a satisfactory income in this financial market, it is necessary to choose the right portfolio and consequently choose the proper criteria.

Hence, Delphi and Shannon's entropy methods have been employed in this study to identify influential criteria in the first stage and rank these criteria in the second stage. The results of the first stage of the research have shown that twelve of the studied variables are very important in selecting the stock portfolio from the newcomers' perspective.

Moreover, the results of Shannon's entropy method have revealed that company-related variables such as Familiarity and Company Assets are known as key factors in selecting the portfolio which is similar to the results of Shen et al. (2016) and Kamwaro (2013), while risk-related factors such as Liquidity Risk and Financial Risk are less important than other variables, which is a contrast to the findings of Hacioglu et al. (2013) and Zhai & Ba (2017). Also, this study has demonstrated that newcomers have a remarkable tendency to buy stocks having a lower relative price.

In future research, other MCDM methods can be used for portfolio selection and the results can be compared with the results of this study. Besides, the psychological effect of the stock price on new stock traders can also be investigated, and study why they have such a great tendency to buy stocks at relatively low prices. Finally, it can be studied whether less attention to risk-related variables is due to the risk aversion of new entrants in the stock market or another source.

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