

# Ranking Stock Exchange Development of the Selected Countries Using TOPSIS Method

# Saeedeh Ketabi<sup>1</sup>, Saeed Fathi<sup>1</sup>, Bagher Asgarnezhad Nouri<sup>1</sup>, Sharif Shekarchizadeh Esfahani<sup>2</sup>

<sup>1</sup> Department of Management, University of Isfahan, Daneshgah Street, Isfahan 81746-73441, Iran <sup>2</sup>School of Management, University of Texas at Dallas, 800 West Campbell Rd. Richardson, TX 75082, U.S.A.

# ABSTRACT

Capital markets are one of the most important economic sectors of each country. Attaining desirable economic growth and development is not possible without the existence of efficient financial institutions and appropriate data of financial resources. In this regard, efficient financial systems could lead to better allocation of resources, increasing economic growth by reduction of transaction costs and information acquisition and analysis. Thus, given to such important and vital role of the stock exchange in achieving economic growth, it appears that more researches should be performed concerning stock exchange development. The purpose of this research is to rank stock exchange development level of forty countries including twenty developed and twenty developing countries by means of TOPSIS method during 2004-2008. Research literature indicated that the most complete system to measure the level of stock exchange development consists of three criteria of depth, width and sophistication. Hence, these three criteria are considered as indices of stock exchange development using TOPSIS method. Results of data analysis illustrated that Iran has averaged ranks of 25, 36 and 15, respectively, based on depth, width and sophistication indices during the research time period. Finally, given a combination of all the countries' indices, total rank of Iran's stock exchange development during the research time period was an average of 26.

**KEYWORDS:** stock exchange, stock exchange depth, stock exchange width, stock exchange sophistication, TOPSIS method

## **1- INTRODUCTION**

Scientific research demonstrates that financial markets can play an important role in economic growth of countries [1]. Efficient financial system transfers capital from savers to borrowers and directs resources towards productive and profitable investment projects. The more the investment productivity is, the higher the economic growth rate will be. Therefore, development of a financial sector is one of the major factors to obtain instant and continuous economic growth [2]. The critical role of the financial section is that efficient financial section plays an important role in enhancing financial resources, encouraging foreign investors to invest in the country, and optimizing resource allocation mechanism.

The major indices of the financial development including the financial depth and the portion of the credits given to the private section indicate the concept of financial development and its functions very well. According to the previous studies, financial development concept has different aspects which rather than the monetary and banking aspect has other aspects and characteristics such as the freedom of the financial section, regulation, technology advances, competition level etc. The financial structure of a country consists of different markets and institutions, and some limit indices cannot consider the whole required aspects for its development [15].

Three features of depth, width and sophistication comprise the most comprehensive measurement system of stock exchange development. The depth feature refers to the size and liquidity of the stock exchange. Size of the market has positive correlation with the ability for mobilization of capital and risk variation. A deeper secondary market provides this possibility for countries to increase capital by decreasing the productivity intended by investors and encountering with lower expense [1, 3, 4]. Width means market variety in terms of participation of small and large companies, all kinds of companies from various sectors of the industry and foreign investors. Width decreases risk of the entire market, encourages extensive ownership, which enhances capital by itself and enables smaller companies to have access to the capital that is not in the market in the absence of larger companies. Finally, sophistication refers to management and market administration. As there are more firms in the market, average expense of complex transaction costs is decreased, and companies and investors will show more sensitivity in the market to perform transactions. Also, sophistication is a function of (debt) payment methods, rules and regulations of the stock market, tax and other transaction costs and market efficiency [5].

Nowadays, people agree that the existence of an efficient financial system is necessary for the economic development, and stock exchange, as an important sector of financial system, has a significant role in economic

<sup>\*</sup>Corresponding Author: Sharif Shekarchizadeh Esfahani, School of Management, University of Texas at Dallas Tel: +1 972 6038599 E-mail: sharif\_shekarchi@yahoo.com

development. Therefore, measuring and ranking the development of the stock exchange of the different developed and developing countries have become very important [14]. Given these descriptions, the objective of the present survey is to rank development degree of the stock exchange in forty countries including twenty developed countries and twenty developing countries (such as Iran) based on three indices of depth, width and sophistication during the time period 2004-2008 using TOPSIS method. Thus, main objective of the survey is:

1- Determining total rank of development level of Iran's stock exchange among the selected countries Given to the main objective, the secondary objectives are:

- 1-1 Determining total rank of the development level of Iran's stock exchange based on depth index among the selected countries
- 1-2 Determining total rank of the development level of Iran's stock exchange based on width index among the selected countries
- 1-3 Determining total rank of the development level of Iran's stock exchange based on sophistication index among the selected countries

Results of this ranking will help determine the conditions of Iran's stock exchange in terms of three indices of width, depth and sophistication with regard to countries with the highest rank of stock exchange development. In other words, research results will specify that probable strengths and weaknesses of Iran's stock exchange are related to which index (i.e. width, depth and sophistication). As a result, by focusing on major reasons for underdevelopment of Iran's stock exchange development, it is possible to eliminate such developmental obstacles and provide the possible positive developmental factors of the stock exchange in the shortest possible time.

### 2- Theoretical Framework of Research

### 2-1 Indices of Stock Exchange Development

Stock exchange development is described through three indices of width, depth and sophistication [5]:

# 2-1-1 Depth

The feature depth refers to the size and liquidity of the stock exchange. Depth signs of the market could be measured by various kinds of indices including market capital, traded value, flow ratio and number of incorporated or listed companies in the stock exchange [5]:

**Market Capital:** Market capital is the entire value of all incorporated or accepted stock in the market that is calculated through multiplying the price of total types of stock by number of issued stocks and sold stock.

**Traded Value:** Traded value is equal to sum of purchasing or selling value of stocks in the stock exchange. It is the liquidity index of market and supplements the first index because market could be large but inactive.

**Flow Ratio:** Flow ratio is equal to total value of stock transactions of the market divided by the market capital. It supplements the first two indices because a small market with high liquidity will have a large flow ratio, but its transactions value ratio will be small [1, 3].

**Number of Companies Listed in the Stock Exchange**: The number of companies listed in the stock exchange remains relatively fixed during the time (what time?). However, a greater number of companies listed in the stock exchange of a country with regard to other countries shows greater development.

# 2-1-2 Width

Width is market variety in terms of participation of large and small companies, all types of companies from various sectors of the industry and foreign companies [5]. Measuring some dimensions of market width is difficult, and information is rarely collected and reported. The applicable indices are [5]:

**Ten Firm Market Concentration Ratios:** The ten firm market concentration ratios are a percentage of total capital of the market that is calculated for ten superior firms in the market.

Average Size of Companies Listed in the Stock Exchange: By average size of companies listed in the stock exchange, we mean a part of the total market capital that belongs to the intended company.

**Sectorial Composition:** Sectorial composition is a percentage of total market capital that is calculated for companies in each sector of the economy. Risk variation will be possible in a stock exchange in which stock is distributed uniformly among all sectors.

# 2-1-3 Sophistication (Institutional Quality)

Sophistication refers to market management and administration and is a function of (debt) payment methods, rules and regulations of the stock exchange, tax and other transaction costs and market efficiency [5]. Quantification of market sophistication is difficult, but some of market sophistication indices are [5]:

**Global Competitiveness:** In the global competitiveness report that is published annually by the World Economic Forum, sophistication of financial markets is measured as one of the global competitiveness indices and encompasses eight indices including ease of access to loans, financing through local equity markets, venture capital availability, restriction on capital flows, strength of investor protection, soundness of banks, regulation of securities exchanges and legal rights index. Unfortunately, Iran has not been studied in terms of the indices in this report.

Heritage Foundation: Heritage Foundation is a research-educational institution that was established in Washington D.C. in 1973 and publishes an economic freedom index in cooperation with *Wall Street Journal* 

annually. The Economic Freedom Index consists of ten secondary indices including business policy, government intervention, foreign investment, price and wage, rules and regulations, tax, monetary policy, banking, ownership rights and black economy. Each of these ten indices is divided into some partial indices and the total grade of each country is the average of ten scores gained by the country.

**The World Bank:** During recent years, the World Bank has intended to introduce a new index by merging findings of various international institutions. This research project was conducted in the World Bank by researchers including Kaufmann and Kraay. They began their work by proposing the hypothesis that institutions could be effective in the growth and development of a country whose sovereignty is executed from their channel. Kauffmann, et al. called these customs and institutions "governance" and studied its different dimensions by introducing six new indices. Governance includes three major elements:

- 1- Process of selecting the government, supervising the government's performance and substituting performance by another government
- 2- Capacity and ability of the government to compile and execute rational and proper policies

3- Degree of citizen and government attention to the norms which regulate economic and social relations They organized governance indices in six groups: political instability, citizens' freedom to express views and audit ability of statesmen, majesty of law, quality of rules, and efficiency of the government and corruption control.

### 2-2 TOPSIS method

Hwang and Yoon represented TOPSIS method in 1981. In this method m alternatives are evaluated by n attributes, and each problem could be regarded as a geometric system including m points in an n-dimensional space. Solving a problem through TOPSIS method contains six steps as below [6, 7, 8]:

1- Convert matrix D into an un-scaled matrix using the Euclidean norm.

$$r_{ij} = \frac{r_{ij}}{\left(\sum_{i=1}^{m} r_{ij}\right)^{1/2}}, (j = 1, 2, ..., n)$$

The obtained matrix is called N<sub>D</sub>.

2- Obtain weighted un-scaled matrix.

$$V = N_D * W_{n*n}$$

Where V is weighted un-scaled matrix and W is a diagonal matrix from the obtained weights for attributes.

3- Determine positive ideal solution 
$$(A_i^+)$$
 and negative ideal solution  $(A_i^-)$   
 $A^+ = \left\{ \left( \max Vij \mid j \in J_1 \right), \left( \min Vij \mid j \in J_2 \right) \mid i = 1, 2, ..., n \right\}$   
 $A^- = \left\{ \left( \min Vij \mid j \in J_1 \right), \left( \max Vij \mid j \in J_2 \right) \mid i = 1, 2, ..., m \right\}$ 

$$A_{i}^{+} = \{V_{1}^{+}, V_{2}^{+}, \dots, V_{n}^{+}\}$$
$$A_{i}^{-} = \{V_{1}^{-}, V_{2}^{-}, \dots, V_{n}^{-}\}$$

4- Obtain the Euclidean of each  $A_i$  from the negative alternative idea solution and the positive alternative as:

$$d_{i}^{+} = \left\{ \sum_{i=1}^{n} (V_{ij} - V_{j}^{+})^{2} \right\}^{1/2}, (i = 1, 2, ..., m)$$

5- Relative closeness of  $A_i$  to the ideal solution is calculated as followings.

$$C_{i} = \frac{d_{i}}{(d_{i} + d_{i})}, (i = 1, 2, ..., n)$$

If  $A_i = A_i^+$ , then  $d_i^+ = 0$  and  $c_i = 1$  and if  $A = A_i^-$ , then  $d_i^- = 0$  and  $c_i = 0$ . Therefore, amount of C<sub>i</sub> will be closer to one for any alternative A<sub>i</sub> that is closer to the ideal solution.

6- Ranking alternatives is done in this step and it is possible to rank the existing alternatives based on the highest importance according to descending order.

#### Ketabi et al., 2012

#### 2- LITERATURE REVIEW

Studying research literature reveals that no survey has been conducted to rank stock exchanges of various countries in terms of developmental degree and based on the three indices of depth, width and sophistication at external or internal levels. However, some surveys will be reported here summarily in which financial multiattribute and multi-purpose decision making methods in the financial ground have been used such as the stock exchange with various objectives. The report of the World Economic Forum (2011) regarding the countries financial development indices in year 2011 shows that U.S.A., England, Germany, Japan, and Canada have the highest and Philippine, Vietnam, Nigeria, Ukraine, and Venezuela have the lowest rank among 52 selected countries respectively. According the results of this report, it can be mentioned that there is a professional modern financial system in developed countries which encourage investment and make the exchange of the products easier through identifying useful business opportunities, studying the performance of the managers, and diversifying the risk.

Wang (2008) evaluated financial performance of Taiwanese Airlines by FUZZY-TOPSIS method. After exploiting financial ratios from financial statements, he classified them in several clusters using grey relations analysis. Then, he selected an index as the decision-making attribute from each cluster and applied multi-attribute decision making method to evaluate financial performance and ranking companies. Creane et al., have studied the financial development indices of different countries and came to conclusion that the development index is very high in Bahrain; high in Lebanon, Jordan, Kuwait, U.A.E, Saudi Arabia, and Pakistan; Medium in Oman, Qatar, Tunes, Morocco, and Egypt; low in Sudan, Yemen, Mauritania, and Algeria,; and very low in Iran, Syria, and Libya. Miller (2002) is one of the researchers of stock market development, but is the only researcher who has referred to depth, width and sophistication as dimensions of stock market development and has just examined the impact of governmental companies' privatization on these three dimensions among effective macro-economic variables in stock market development. By forming the ARMA model from three dimensions of the stock market development in Brazil, Argentina and Chile and using the Perron test, he showed that market capital would have an unexpected ascending trend by increasing privatization activity in these countries including share issue privatization.

Danesh Shakib and Fazli (2010) represented a modern combinatory model to rank active companies in cement industry that were listed in the stock exchange. In this model, AHP and TOPSIS techniques were used. According to financial data of the period 2002-2008, it has been specified that Fars Cement Company has the highest rank in terms of financial performance.

Pakdin Amiri et al., (2010) prioritized effective financial factors on the price index in the Tehran Stock Exchange. Results demonstrate that the ratio of price to income, historical trend of stock price, income per share and return level of properties have the highest impact on the stock price index, respectively.

# 3-1 Type of Research

# **3- RESEARCH METHODOLOGY**

The present survey is considered as applied and developmental research in terms of objective and is categorized among the experimental researches based on the manner of data collection [5].

## **3-2 Statistical Population and Statistical Sample**

Statistical population of the survey includes reported stock exchange development indices information of countries for the years 2004-2008. Given the data limitations related to stock exchange development (depth, width and sophistication), twenty developed countries and twenty developing countries such as Iran are considered for the statistical population. Developed countries include America (New York Stock Exchange), Canada, Australia, New Zealand, Singapore, Japan, Greece, Spain, Italy, Hungary, Germany, Ireland, South Africa, England, France, Norway, Switzerland, Sweden, Poland and Austria. Developing countries include Brazil, Argentina, Colombia, Peru, Mexico, Chile, Malaysia, Sri Lanka, Hong Kong, Indonesia, South Korea, India, Philippines, China, Taiwan, Thailand, Egypt, Turkey, Saudi Arabia and Iran.

## **3-3 Time Period of the Survey**

Time period of survey is 2004-2008 and in annual form. Considering this time period causes specification of changes of countries' rank in terms of development indices during the five intended years.

#### **3-4 Data Collection Method**

The required data for research literature and background was obtained by studying books, articles and papers of other researchers and by searching the internet. Also, stock exchange development data in depth and width dimensions were exploited from global federation of stocks websites, and in sophistication dimension data are related to capital transfer freedom. Freedom of activities of the financial sector was exploited from the Heritage Foundation website. Data of government efficiency and corruption control was obtained through World Bank annual reports.

#### **3-5 Research Variables**

As previously mentioned, major variables of this survey are three general criteria of stock market development measurement, i.e., depth, width and sophistication. Market depth is measured with three criteria of market capital, traded value and number of companies listed in the stock exchange [5]. To calculate market capital, first market capital of the last day of each month is determined and then annual market capital is obtained by simple average of data related to the intended twelve months. In order to measure traded value, total number of the traded stock in each transaction day of the stock exchange is multiplied by ruling price of stocks and aggregated sum of obtained amounts is considered as traded value. Number of companies listed in the stock exchange is determined using companies' dates of entry and exit from the stock exchange. Market width is calculated by two criteria of average number of accepted companies is determined by dividing total capital of the market by number of accepted companies (i.e., simple average of companies' market capital). In order to measure the Ten Firm Market Concentration Ratio, first, ten companies that have the highest capital of market are determined, and then the amount obtained by dividing the sum of market capital of these ten companies by total market capital is considered. Sophistication index combines total indices of the government efficiency, judgments and the existing mental perceptions with regard to the following cases:

- 1- quality of providing social services
- 2- quality of bureaucracy
- 3- competency of agents
- 4- public services independence from political pressures

Corruption control index is related to the third element of governance, i.e., government and citizen attention degree to the norms that regulate economical and social relations. This index measures mentality of the individuals and other beneficiary groups (entrepreneurs and foreign investors) with regard to the corruption phenomenon in the country. According to Kauffmann and Kraay, the definition of corruption is using public power and possibilities for personal interests. Two parties participate in occurrence of corruption. On one side is a citizen or a private company (corruption applicant) and on the other side is a governmental agent (corruption factor). Corruption often occurs in cases where the applicant and factor of corruption evade attention and respect against enacted rules to regulate relationships. This indicates failure of the governments in the third element of governance [12].

# **4-DATA ANALYSIS**

As previously mentioned, since the main purpose of this survey is to rank the degree of stock exchange development of forty developed and developing countries based on three indices of depth, width and sophistication during the period 2004-2008, width and sophistication indices have a similar importance in stock exchange development. An equal weight is allocated to each one in calculations based on TOPSIS method. The same procedure will be observed for secondary indices to measure depth, width and sophistication. In the data analysis section, the selected countries are ranked based on each of the three indices during the intended five years, and then total ranking degree of stock exchange development of the selected countries is conducted by considering such indices.

Therefore, the selected countries are ranked based on depth index. Results are represented in Table 1:

Table 1- Ranking Stock Exchange Development of Countries in the Statistical Population based on the
Depth Index during 2004-2008

- Year	2004	2005	2006	2007	2008
Rank		2000	2000	_007	2000
1	U.S.A	U.S.A	U.S.A	U.S.A	U.S.A
2	England	England	England	England	Japan
3	Japan	Japan	Japan	Japan	England
4	Canada	Canada	Canada	Canada	Canada
5	Spain	Spain	Spain	Spain	Spain
6	France	France	France	France	France
7	Australia	Australia	Australia	China	Australia
8	Germany	South Korea	South Korea	Australia	South Korea
9	Hong Kong	Germany	Germany	South Korea	Hong Kong
10	India	Hong Kong	Hong Kong	Hong Kong	Germany
11	Malaysia	India	India	Germany	China
12	China	Malaysia	Malaysia	India	India
13	Taiwan	China	China	Malaysia	Malaysia
14	South Korea	Italy	Switzerland	Italy	Switzerland
15	Egypt	Switzerland	Italy	Switzerland	Taiwan
16	Switzerland	Taiwan	Taiwan	Taiwan	Singapore
17	Italy	Egypt	Singapore	Singapore	Brazil
18	Singapore	Singapore	Egypt	Brazil	Italy
19	South Africa	Saudi Arabia	South Africa	South Africa	South Africa

20	Thailand	Thailand	Saudi Arabia	Thailand	Thailand
21	Brazil	South Africa	Thailand	Egypt	Poland
22	Iran	Brazil	Brazil	Mexico	Mexico
23	Saudi Arabia	Iran	Mexico	Indonesia	Indonesia
24	Greece	Mexico	Indonesia	Poland	Egypt
25	Mexico	Indonesia	Turkey	Turkey	Iran
26	Indonesia	Turkey	Iran	Saudi Arabia	Turkey
27	Turkey	Greece	Greece	Norway	Norway
28	Chile	Norway	Norway	Iran	Greece
29	Sri Lanka	Chile	Poland	Greece	Arabia Saudi
30	Philippines	Poland	Chile	Chile	Chile
31	Poland	Sri Lanka	Philippines	Philippines	Philippines
32	Peru	Philippines	Sri Lanka	Sri Lanka	Peru
33	Norway	Peru	Peru	Peru	Sri Lanka
34	New Zealand	New Zealand	Zealand New	New Zealand	New Zealand
35	Slovenia	Austria	Austria	Austria	Austria
36	Austria	Slovenia	Ireland .S	Ireland .S	Colombia
37	Ireland .S	Ireland .S	Argentina	Argentina	Argentina
38	Argentina	Argentina	Slovenia	Colombia	Ireland .S
39	Colombia	Colombia	Colombia	Slovenia	Slovenia
40	Hungary	Hungary	Hungary	Hungary	Hungary

As Table 1 illustrates, America, England and Japan are ranked first to the third based on depth index during the years 2004-2007. In 2008, the first to third ranks are related to America, Japan and England, respectively. Also, Hungary ranks last each year. Iran's rank is equal to 22, 23, 26, 28 and 25 during the period 2004-2008, respectively.

Iran had no considerable change during the intended period, and only a relative drop exists. Averagely, it has the rank 25 among the selected forty countries based on depth index.

In the following, ranking of the selected countries is accomplished based on width index. Results are represented in Table 2:

Year	2004	2005	2006	2007	2008
Rank					
1	U.S.A	Saudi Arabia	U.S.A	U.S.A	U.S.A
2	Saudi Arabia	U.S.A	Arabia Saudi	Saudi Arabia	Switzerland
3	Italy	Italy	Switzerland	China	Saudi Arabia
4	Switzerland	Switzerland	Italy	Switzerland	Italy
5	Ireland .S	Ireland .S	Ireland .S	Italy	China
6	France	Hungary	France	Brazil	France
7	Hungary	France	Hungary	France	Brazil
8	Germany	Austria	Austria	Ireland .S	Germany
9	Japan	Argentina	Brazil	Hungary	Colombia
10	Norway	Japan	Germany	Austria	Hungary
11	Argentina	Norway	Mexico	Germany	Ireland .S
12	Austria	Germany	Japan	Norway	Japan
13	South Africa	Africa South	Argentina	Hong Kong	Hong Kong
14	Mexico	Brazil	South Africa	Colombia	Mexico
15	Poland	Mexico	Norway	Mexico	South Africa
16	England	Poland	Hong Kong	South Africa	Argentina
17	Hong Kong	Colombia	Slovenia	Slovenia	Austria
18	Brazil	Hong Kong	China	Argentina	Norway
19	Philippines	Slovenia	Colombia	Greece	Slovenia
20	Greece	Peru	Greece	Japan	Peru
21	Egypt	Greece	Peru	Turkey	Turkey
22	Slovenia	Philippines	England	Peru	Greece
23	South Korea	New Zealand	Poland	Chile	England
24	Zealand New	England	New Zealand	Poland	Poland
25	Indonesia	Turkey	Philippines	England	New Zealand
26	Turkey	Egypt	Chile	Sri Lanka	Chile
27	Colombia	Indonesia	Indonesia	India	Philippines
28	Peru	Chile	Sri Lanka	Philippines	Indonesia
29	Chile	Sri Lanka	Turkey	Indonesia	Egypt
30	Singapore	Thailand	Egypt	Egypt	Thailand
31	Taiwan	Taiwan	Taiwan	Thailand	Taiwan
32	Spain	Spain	Spain	New Zealand	Australia

 

 Table 2- Ranking Stock Exchange Development of Countries in the Statistical Population Based on Width Index during 2004-2008

33	Australia	South Korea	Thailand	Taiwan	Singapore
34	Thailand	Singapore	India	Iran	Spain
35	India	India	Singapore	Australia	Iran
36	Sri Lanka	Australia	South Korea	Spain	Sri Lanka
37	Iran	Malaysia	Australia	Singapore	India
38	Malaysia	Iran	Iran	Malaysia	Malaysia
39	China	China	Malaysia	South Korea	South Korea
40	Canada	Canada	Canada	Canada	Canada

As Table 2 illustrates, America, Saudi Arabia, Italy, Switzerland and China are in the first to the third ranks with some changes based on width index so that Saudi Arabia has the first rank in 2005, and America has this rank in four other years. Also, Canada is in the last in each year. Iran ranks 37, 38, 38, 34 and 35 during the period 2004-2008, respectively.

As mentioned in Table 2, Iran's rank has seen a relative improvement based on the width index: it ranked 38 in the first year and rose to 35 in the last year. On average, Iran ranks 36 among the selected forty countries based on width index.

Ranking the selected countries is accomplished based on the sophistication index in the next step. Results are represented in Table 3:

Table 3- Ranking of Stock Exchange Development of Countries in the Statistical Population Based on t	the
Sophistication Index during 2004-2008	

Year	2004	2005	2006	2007	2008
Rank					
1	Germany	Germany	Germany	Germany	Germany
2	Chile	Chile	Chile	Chile	Chile
3	South Korea	South Korea	South Korea	Malaysia	Malaysia
4	Norway	Norway	Peru	South Africa	South Africa
5	Peru	Peru	South Africa	Peru	Peru
6	South Africa	South Africa	Malaysia	South Korea	U.S.A
7	Malaysia	Malaysia	Brazil	Japan	South Korea
8	Brazil	Brazil	Argentina	Mexico	Japan
9	Argentina	Argentina	Colombia	U.S.A	Norway
10	Colombia	Colombia	Mexico	Norway	Mexico
11	Mexico	Mexico	U.S.A	Iran	Slovenia
12	U.S.A	U.S.A	Philippines	Argentina	Iran
13	Philippines	Philippines	Japan	Greece	Argentina
14	Japan	China	Norway	Spain	Colombia
15	Greece	Japan	Switzerland	Ireland .S	Hong Kong
16	Ireland .S	Greece	Iran	Slovenia	Greece
17	Switzerland	Switzerland	Singapore	Brazil	Italy
18	Iran	Iran	Ireland .S	Colombia	Ireland .S
19	Singapore	Singapore	England	England	Switzerland
20	Australia	Ireland .S	Hong Kong	Hong Kong	Brazil
21	Hong Kong	England	Taiwan	Singapore	England
22	England	Hong Kong	Spain	Switzerland	Singapore
23	Spain	Spain	Italy	Taiwan	Taiwan
24	India	Italy	Slovenia	Italy	Spain
25	Thailand	Turkey	India	India	India
26	Italy	Slovenia	Greece	Philippines	Philippines
27	Egypt	Thailand	France	China	China
28	Turkey	New Zealand	China	Egypt	Thailand
29	Slovenia	Australia	Thailand	Turkey	Egypt
30	China	Canada	Egypt	Australia	Turkey
31	New Zealand	Taiwan	Turkey	Canada	Australia
32	Canada	France	Australia	France	Canada
33	France	India	New Zealand	Sri Lanka	France
34	Taiwan	Sri Lanka	Canada	Thailand	Hungary
35	Sri Lanka	Egypt	Hungary	New Zealand	Sri Lanka
36	Indonesia	Indonesia	Sri Lanka	Hungary	New Zealand
37	Hungary	Hungary	Indonesia	Indonesia	Indonesia
38	Saudi Arabia				
39	Austria	Austria	Austria	Austria	Austria
40	Poland	Poland	Poland	Poland	Poland

As Table 3 illustrates, Germany, Chile and South Korea ranked first to third during the first three years, and Germany, Chile and Malaysia ranked first to the third during the last two years based on sophistication index. Also, Poland is in the last rank during each year. Iran ranked 18, 18, 16, 11 and 12 during the period 2004-2008, respectively.

Finally, after ranking the selected countries based on each of the three indices, i.e., depth, width and sophistication, the total ranking of stock exchange development of the selected countries and their changes during 2004-2008 are conducted in the last step by considering the above three indices. Results are shown in Table 4.

	Year 2004	2005	2006	2007	2008
Rnak					
1	U.S.A	U.S.A	U.S.A	U.S.A	U.S.A
2	Englan	d Saudi Arabia	Germany	Germany	Japan
3	Japan	Japan	Japan	Japan	Germany
4	Germar	iy Germany	South Korea	South Africa	South Africa
5	Saudi Ara	abia England	England	Malaysia	Malaysia
6	South Ko	orea South Korea	South Africa	England	Chile
7	Norwa	y South Africa	Malaysia	Chile	Switzerland
8	South Af	rica Norway	Peru	China	England
9	Malays	ia Malaysia	Chile	South Korea	South Korea
10	Peru	Peru	France	France	Spain
11	Chile	Chile	Switzerland	Spain	Canada
12	Italy	Canada	Canada	Canada	France
13	Spain	Spain	Saudi Arabia	Saudi Arabia	Norway
14	France	e France	Spain	Peru	Peru
15	Canad	a Switzerland	Italy	Switzerland	China
16	Switzerla	and Italy	Brazil	Brazil	Italy
17	Ireland	.S Argentina	Ireland .S	Italy	Hong Kong
18	Argenti	na Ireland .S	Mexico	Hong Kong	Saudi Arabia
19	Brazil	Brazil	Norway	Norway	Brazil
20	Mexic	o Mexico	Argentina	Mexico	Mexico
21	Greece	e Colombia	Colombia	Ireland .S	Australia
22	Philippii	nes Greece	Hong Kong	Australia	Slovenia
23	Austral	ia Philippines	Australia	Iran	Colombia
24	Hungar	y Hungary	Philippines	Hungary	Ireland .S
25	Hong Ko	ong China	Hungary	Austria	Iran
26	Colomb	ia Australia	Austria	Colombia	Hungary
27	Iran	Kong Hong	Iran	India	India
28	Austri	a Iran	China	Slovenia	Argentina
29	Egypt	Austria	India	Greece	Greece
30	India	India	Slovenia	Argentina	Austria
31	Polano	d Poland	Greece	Taiwan	Taiwan
32	Taiwai	n Slovenia	Taiwan	Turkey	Singapore
33	China	Egypt	Egypt	Singapore	Turkey
34	Singapo	re Turkey	Singapore	Egypt	Poland
35	Sloven	ia New Zealand	Poland	Philippines	Thailand
36	Turke	y Taiwan	Turkey	Poland	Philippines
37	Indones	ia Singapore	New Zealand	Thailand	Egypt
38	Thailar	nd Thailand	Indonesia	Sri Lanka	New Zealand
39	New Zeal	and Indonesia	Thailand	Indonesia	Indonesia
40	Sri Lan	ka Sri Lanka	Sri Lanka	New Zealand	Sri Lanka

Table 4- Total Ranking of Stock Exchange	Development of	<b>Countries in</b>	the Statistical I	Population of	during
	2004-2008				

As observed in Table 4, America, Germany, Japan, England and Saudi Arabia ranked first to the third due to some changes in terms of development degree during the intended period and were in the first rank during each year. Also, Sri Lanka and New Zealand are in the last rank during each year. Iran ranks respectively 27, 28, 27, 23 and 25 during 2004-2008.

Generally Iran's rank has witnessed no considerable change during the intended period and has had a slight improvement. On average, it has the ranks26 among the selected forty countries based on development degree of the country.

# 5- DISCUSSION AND CONCLUSION

One of the factors that could play a basic role toward obtaining instant and continual economic growth is financial sector development. Therefore, conducting more research about stock exchange development seems necessary, given the important and vital role of the stock exchange in achieving economic growth. With this regard, by using TOPSIS method, the present survey lists the ranking of the development degree of the stock exchange of forty countries, which include twenty developed countries and twenty developing countries based on the three indices of depth, width and sophistication during 2004-2008.

The obtained results of data analysis show that America holds the first rank, and Hungary holds the last rank in terms of the depth index during the research time period. America has the first and Canada has the last rank in terms of the width index, and Germany has the first and Poland has the last rank in terms of the sophistication index. Similarly, considering the three intended indices and total ranking degree of stock exchange development, America has the first rank and Sri Lanka has the last rank during the research time period. Also, Iran has averaged ranks of 25, 36 and 15 based on depth, width and sophistication indices during the research time period. Finally, the total rank of degree of stock exchange development of Iran during the research time period, based on the combination of the three indices, is 26. Considering this rank among forty developed and developing countries, we can say that Iran's stock exchange has no suitable conditions in terms of degree of development.

Given these results, it is recommended that all related institutions, such as stock exchange organizations, private organizations; Ministry of Commerce, etc., provide necessary conditions for development of the Tehran Stock Exchange more than ever. Moreover, as previously mentioned, it is possible to identify strengths and weaknesses of the stock exchange by ranking the selected countries based on depth, width and sophistication indices. Therefore, based on the ranks of 25, 36 and 15 of the Tehran Stock Exchange in terms of depth, width and sophistication indices, we can claim that the Tehran Stock Exchange is in a relatively appropriate condition in terms of the sophistication index. The major reason relates to enacting and executing necessary rules for more efficient activity of the Tehran Stock Exchange. However, it is not at a favorable rank based on the both depth, and especially the width, indices. Hence, it is recommended that the related institutions set their priority on increasing width and depth of the Tehran Stock Exchange regarding the previous recommendation concerning the attempt of institutions responsible for providing the ground for more development of the Tehran Stock Exchange. On one hand, strategy to increase the depth of the stock exchange is to follow Principle 44 of the Iran's Constitution regarding execution of privatization policies and representation of shares of governmental companies in the stock exchange. On the other hand, it is the attempt toward appropriate cultivation of motivating people to invest their money and savings in companies listed in the stock exchange. It is obvious that mass media are responsible for appropriate cultivation in the society. Executing the above strategies helps increase the number of accepted companies, market capital and traded value. Finally, in order to increase market width, and along with entrance of new companies into the market, it must be ensured that these companies are active in various industries. Adherence to such a policy prevents market power from being monopolized by several special companies; thus market power would be dispersed among companies with different activities, an event that is not observed in the Tehran Stock Exchange under present conditions. Current market power is concentrated on some powerful telecommunications companies and other companies such as Iran Khodro, Saipa, Sadra, etc.

It is recommended for future researchers to rank stock exchanges of the selected countries by using other multi-attribute decision-making methods like SAW, AHP, ELECTRE, etc. and compare the results with the results of this survey. Also, it is recommended for future researchers to determine effective factors on stock exchange development, such as economical, political and social factors, by studying research literature and identifying effective mechanisms of the intended factors on development of the Tehran Stock Exchange. Subsequently, appropriate strategies will be represented develop stock exchange.

# REFERENCES

- 1. Levin R., 2004. Finance and Growth: Theory and Evidence. NBER Working Paper 10766. Cambridge: National Bureau of Economic Research.
- 2. Khataee M., 2008. Development of Financial Markets and Economic Growth. Research Institute for Monetary and Banking of Central Bank of the Islamic Republic of Iran.
- 3. Demirgüç-Kunt. A., and R. Levine, 2001. Financial Structures and Economic Growth: a Cross- Country Comparison of Banks, Markets, and Development. Cambridge: MIT Press.
- 4. Pagano M., 1993. Financial Markets and Growth: an overview. European Economic Review, 37: 613–622.
- 5. Miller Robert M., 2002. The Impact of Privatization on Stock Market Development. Department of economics, University of Illinois at urban-Champaign.
- 6. Azar A., A. Rajabzadeh, 2008, Applied Decision Making (MADM Approach), Negahe Danesh Publishers, Tehran.
- 7. Malekzadeh Gh., 2008. Evaluating and ranking the Technology Levels of Selected Industrial Branches of Khorasan Prvince by Means of the TPSIS Method. Science and Development Journal, 15(2) PP: 133-150.
- Srdjevici, B. et al, 2004, An Object Multi-Criteria Evaluation of Water Management Scenarios. Water Resources Management Journal, 18: 35-54.
- 9. DaneshShakib M., S.Fazli, 2009. Ranking Cement Companies of the Tehran Stock Exchange by Means of AHP-TOPSIS Method. Management Landscape, 32: 109-129.
- 10. PakdinAmiri M., M. Pakdin Amiri Mojtaba, A. Pakdin Amiri, 2009. Prioritizing the financial factors influencing the price index of the Tehran Stock Exchange by Means of the TPSIS Method Financial Research, 10(26):61-67.

- 11. Bazargan A., Z. Sarmad, and E. Hejazi, 2006, Research Methods at Behavioral Science. Agah Publishers, Tehran.
- 12. Bromand Sh., 2009. Economical Safety in Iran and some selected countries (Comparative Study). Economic Studies Department of Islamic Consultative Assembly Research Center.
- 13. International Monetary Fund, 2002. Global Financial Stability Report: MKT Development and issues. IMF, Washington D.C.
- Garcia Valeriano, F., L. Liu, 1999. Macroeconomic Determinants of Stock Market Development. Journal of Applied Economies, 2: 29-59.
- 15. Creane, S., R. Goyal, A. M. Mobarak, and R. Sab, 2004. Evaluating Financial Sector Development in the Middle East and North Africa: New Methodology and Some New Results, International Monetary Fund.
- Creane, S. et al, 2004. Financial Sector Development in the Middle East and North Africa, IMF, Washington D.C. International Monetary Fund, pp: 26-48.
- 17. World Economic Forum, 2011. The Financial Development Report.
- Boubakri N., O.Hamza, 2007. The Dynamics of Privatization, the Legal Environment and Stock Market Development. International Review of Financial Analysis, 16: 304-331.
- 19. Butsa, y., 2008. Stock Markets Development in Eastern Europe. Evidence from Poland, Hungary, Russia and Ukraine. Central European University, Department of Economics, pp: 1-41
- 20. Chinn. M., 2007. Price-Based Measurement of Financial Globalization: a Cross-Country Study of Interest Rate Parity. Pacific Economic Review, 12 (4): 419-44
- 21. Ramos, S., 2009. Competition and Stock Market Development "The European Journal of Finance, 15 (2): 231-247.