DETERMINATION OF PROFITABILITY PERFORMANCES OF INDUSTRIAL SECTORS BY MEANS OF TOPSIS METHOD: APPLICATION OF TURKEY

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Abstract
        Stock exchanges are accepted the most important instruments for the regional economies. The main reason for this is that stock exchanges provide capital to spread to the base and, also, enable the resource need of the investment platforms, whose functionality is registered, to be able to be satisfied. Stock exchanges are formed due to forming supply- demand balance on a certain asset and to managing the commercial activities. In this study the profitability performance exhibited by 39 industrial sectors that are being processed in Stock Exchange Istanbul (BİST), in Turkey, in respect with the first half of the year 2014, was examined on the sectorial basis in the framework of the criteria determined, compared to the same period of the last year. Handling the Variation of Net Sale Incomes, compared to the same period of the previous year; FAVÖK (profit, before the interest, tax, depreciation) Variation; Variation of the Essential Activity Profit; Variation of Net Profit, compared to the same period of the   previous   year; 2004/06 Equity Profitability, Variation Value of Equity Profitability in the periods of 2013/06-and 2014//06 as the criteria used in the study,   they were analyzed   by   the method of TOPSIS, among   the   methods of multi criteria decision making. As a result, it was seen that the main metal industry showed the best performance in terms of profitability

Keywords: Sectorial   Performance, TOPSIS

Introduction

Along with globalization, with the increase of competition between business enterprises, the careful use of the existing resources and that the business enterprises can efficiently and effectively sustain their activities have gained importance in this process. On this point, there is a need for the analysis of efficiency and effectiveness that is a managerial instrument in the use of resource (Oruç, 2008:1). Today, the final aim of business enterprises in terms of the scholarship finance is to raise the market value of firm to the top level. At the same way, the desire of investor and shareholder is to increase their gains. The most important elements in reaching this final aim are to make profit and to be able to manage the risk that will be endured in reaching the profitability aimed, The level of profitability and risk determine the market value of firm. Balancing between risk and profitability, providing an optimal change is important. In this context, examining the effect of the managerial decisions related to business enterprises on the profitability has importance (Karadeniz and İskenderoğlu, 2011:65-66).

On condition that the markets are fully effective , for all real markets and financial markets, if the investment elements are considered, the aim of an investor is to obtain a "profit" that is a positive difference between the return that will be obtained after investment and market return. The element enabling the opinion of investment to realize is evaluated as profit. As a result the first aim of investor is to obtain profit (Demirel and Hepkorucu, 2014:3). Between the sectors that are processed in stock exchange markets, in performance analysis the method of multi criteria making demission can be applied and an evaluation about the general situation of stock exchanges can be made.

Methods of Multi Criteria Making Decision (MMCMD), with evaluating the decision criterion more than one, is the method providing to make a selection between alternatives mad to put in order these alternatives (Timor, 2010:16). In the problem of multi criteria making decision, the methods such as Analytical Hierarchical Process (AHP), Analytical Network Process (ANP), ELECTRE, TOPSIS, VIKOR, and SAW take place in the literature as solution methods (Erginel, et al., 2010:82). In this study, of the methods of multi criteria TOPSIS method is used and this method is frequently used one in determining, putting in order, or in the studies of performance evaluation: Some of these studies are presented in the following Table 1.

Tablo1. Some studies, where TOPSIS method is used.

Some studies, where TOPSIS method is used	Project Evaluation	Mahmoodzadeh et al.,(2007:135-140).
	Location Selection for Foreign Capital Investment	Karimi et al. (2010:196-207).
	Evaluation of Service Quality	Pal and Choudhury (2009:115-133).
	Evaluation of Financial Performance	Wang and Lee, (2010:38-52), Akyüz et al, (2011:73-92), Türkmen and Çağıl, (2012:59-78), Uygurtürk and Korkmaz, (2012:95-115), Şamiloğlu et al., (2013: 263-280), Aytekin and Sakarya, (2013:30-47), Ömürbek and Kınay, (2013:343-363), Wu, Lin and Tsai, (2008:255-263).
	Selection of Digital Camera	Pawar and Verma, (2013:51-53).
	Selection of Supplier	Önder and Dağ, (2013:56-74).
	Selection of Scholar	Abalı et al, (2012:259-272).
	Selection of Personnel	Shih, Shyur and Lee, (2007:801-8013), Supçiller and Çarpaz, (2011:1-22).

Topsis Method

TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) is one of multi criteria making decision. In the method, the problem of multi aimed making decision that has alternatives in the number of "m" and criteria in number of "n" can be shown with the points m in the space of n-dimensions Hwang and Yoon (1981) formed TOPSIS Method according to the thought of the shortest distance of the solution alternative to the positive ideal and the furthest distance to the negative ideal solution (Öktür, 2008:55). The application of TOPSIS method includes   a solution process consisting of 6 phases and   its phases are as follows   (Yoon and Hwang, 1995:40-41; Ünal, 2008:65; Demireli, 2010:105) .

1st Step: Forming   the Decision Matrix (A)

In the lines of decision matrix,   the decision points, whose advantages are wanted to be put in order, take place, while   in its columns,   the evaluation criteria that will be used in making decision. Decision   matrix is as follows:

$$A_{ij} = \begin{bmatrix} a_{11} & a_{12} & ... & a_{1n} \\ a_{21} & a_{22} & ... & a_{2n} \\ . & & & . \\ . & & & . \\ . & & & . \\ a_{m1} & a_{m2} & ... & a_{mn} \end{bmatrix}$$

2nd Step: Normalizing (R) the Decision Matrix

Normalized decision matrix, utilizing the elements of matrix A and using the following formula, is calculated.

$$r_{ij} = \frac{a_{ij}}{\sqrt{\sum_{k=1}^{m} a_{kj}^2}} \quad i=1\ldots,m; \ J=1,\ldots,n$$

$$R_{ij} = \begin{bmatrix} r_{11} & r_{12} & ... & r_{1n} \\ r_{21} & r_{22} & ... & r_{2n} \\ . & & & . \\ . & & & . \\ . & & & . \\ r_{m1} & r_{m2} & ... & r_{mn} \end{bmatrix}$$

3rd Step: Forming the Weighted Decision Matrix (W)

In this step, the elements of normalized decision matrix are weighted in the direction of importance to the criteria.

In the direction of importance given to the criteria, the value of weight (w_i)

are determined ($\sum_{i=1}^{n} w_i = 1$).

After determining the weights, the elements in each column of matrix R are multiplied by the relevant value w_i and matrix V is formed. Matrix V is shown as follows.

$$v_{ij}=w_j.r_{ij}, \quad i=1,\ldots.,m; \quad j=1,\ldots,,n$$

$$V_{ij} = \begin{bmatrix} w_1 r_{11} & w_2 r_{12} & ... & w_n r_{1n} \\ w_1 r_{21} & w_2 r_{22} & ... & w_n r_{2n} \\ . & & & . \\ . & & & . \\ . & & & . \\ w_1 r_{m1} & w_2 r_{m2} & ... & w_n r_{mn} \end{bmatrix}$$

4th Step: Forming the idea (A*) l and negative ideal (A-) solutions

While ideal solution consists of the best performance values of   the weighted normalized   decision matrix, negative ideal solution consists of the worst values.

Finding   the ideal solution set is shown in the following equation.

Set   that   will   be   calculated   from   the   equation

$$A^* = \left\{ (\max_i v_{ij} \,\big|\, j \in J), (\min_i v_{ij} \,\big|\, j \in J^{'} \right\}$$ can   be   shown

as $A^* = \left\{ v_1^*, v_2^*, \ldots, v_n^* \right\}$.

Finding   the negative ideal solution set is shown in the following equation.

Set   that   will   be   calculate   from   the   equation

$$A^- = \left\{ (\min_i v_{ij} \,\big|\, j \in J), (\max_i v_{ij} \,\big|\, j \in J^{'} \right\}$$ can   be   shown   as

$$A^- = \left\{ v_1^-, v_2^-, \ldots, v_n^- \right\}$$

5th Step: A Calculation of Distinction Criteria

For calculating the distinction criteria, Euclidian Distance Approach is utilized. The distance of   each alternative to the ideal solution is:

$$S_i^* = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^*)^2}$$ i=1,.….,m.

In similar way, each alternative to the negative ideal solution is:

$$S_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2}$$ i=1,.….,m.

6th Step: Calculation of the relative closeness to the ideal solution

Calculation of the closeness (C_i^*) of decision points   to the ideal solution is shown in the following formula:

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^*}$$ i=1,…,m.

The criterion used is the share of negative distinction criterion in the overall distinction criterion. Here, that the value C_i^* takes place   in   the range of $O \leq C_i^* \leq 1$ and $C_i^* = 1$ indicates that the relevant alternative   is present on the positive ideal solution point of the alternative related to $C_i^* = 0$.

Evaluation Of Profitability Performance Of The Industrial Sectors That Are Processed In Stock Exchange Istanbul (BIST) By Means Of Topsis Method

In this section of the study examining the performance exhibited by 39 industrial sectors that are being in the Stock Exchange Istanbul, Turkey, in respect with the first half of the year 2014 in the framework of the criteria determined according to the same period of the last   period on the sectorial basis,   the analysis of   profitability performances will be carried out by TOPSIS method.

In the study 2014/6 Sectorial Performance Report of Gedik Yatırım Menkul Değerler A.Ş (Erdinç and Gürcan, 2014:1) was used as resource and data were drawn from the report. The data related to the sectors were calculated   in the computer media by using Microsoft Office Excel 2007. The alternatives(sectors) to be   evaluated are   Metal Main Industry, Investment Partnership, Automotive Side Industry, Furniture, Cement, Building-Material, Textile, Paper,   Chemistry, Informatics, Durable Consumption, Food, Enterprise Capital, Glass, Stationery, Transportation – Logistics,   Electrician Material,   Dye, Marketing,   Technology, Oil, Fertilizer, Immovable Investment Partnership (GMYO), Retail Trade, Packing, Intermediary Firms, Mining, Telecom, Public Works – Building, Energy, Aeronautical, Drinks, Automotive, Medicine – Health, Holding, Service, Leather, Tourism, Hotel, and Journalism.

While a future oriented evaluation is made, the most important criterion is that how many profits the country will obtain in the future. The criteria considered in this study are direct turnover or profitability -oriented. Except for these criteria, the ratios such as activity ratios, cost rations, and turnover rate could be used as criterion. But, ultimately, it is important whether these ratios increase the profitability of company or not. Because receivables turnover rate (ADH) of a firm, whose stock turnover rate (SDH) rises, falls most, if its profitability decreases, using SDH and ADH will not be meaningful . Indeed, while a future oriented evaluation is made, the most important criterion is that how many   profits the company will create in the future (Erdinç and Gürcan, 2014:1). In view of this, in the study the criteria determined in performance   evaluation   of   industrial sectors   have   focused   on profitability ratio. The criteria used in practice are Variation of Net Sale Incomes compared to the same period of the previous period, FAVÖK (Profit before interest and depreciation)Variation, Variation of Main Activity Profit, Variation of Net Profit compared to the same period of the previous period, 2014/06 Equity Profitability, and variation between equity profitability in the periods of 2013/06 and 2014/06. In the 2014/6 sectorial performance report of Gedik Yatırım Menkul Değerler A.Ş., since ordering of each sector is made in the direction of profitability criteria determined, criterion weights were equally taken.

Using the matrix obtained in the report in TOPSIS method, the industrial sector showing   the best profitability performance that is processed in BIST   was attempted to be determined. Decision matrix was formed in terms of the values made by Gedik Yatırım Menkul Değerler A.Ş. and 39 sectors had in terms of each criterion (Table 2).

Table 2. Ordering Values of Industrial Sectors in Terms of Each Criteria

	Order of Net Sale Variation	Order of FAVÖK variation	Order of EFK Variation	Order of Net Profit Variation	Equity Profitability (2014/06)	Order of Equity Profitability Variation
MAIN METAL INDUSTRY	6	4	5	1	22	7
INVESTMENT PARTNERSHIP	17	1	4	3	20	11
AUTOMOTIVE SIDE INDUSTRY	15	8	8	13	8	9
FURNITURE	3	5	3	16	35	2
CEMENT	10	6	7	20	5	17
BUILDING MATERIAL	26	17	16	6	2	1
TEXTILE	13	3	2	5	30	16
PAPER	29	2	1	9	29	3
CHEMISTRY	11	12	12	18	6	18
INFORMATICS	12	16	18	12	10	12
DURABLE CONSUMPTION	16	11	10	14	16	15
FOOD	21	18	19	4	17	5
ENTERPRISE CAPITAL	23	20	20	2	18	4
GLASS	5	10	6	19	26	23
STATIONERY	1	7	11	34	1	37
TRANSPORTATION – LOGISTIC	31	23	14	15	3	6
ELECTRICAL MATERIAL	4	9	9	22	33	28
PAINT	20	27	29	7	12	10
MARKETING	7	14	17	26	23	25
TECHNOLOGY	19	22	24	17	11	19
OIL	18	35	33	11	9	8
FERTILIZER	28	26	25	8	14	13
GMYO	27	30	26	10	13	14
RETAIL TRADE	14	21	23	24	25	22
PACKING	9	25	13	28	27	27
INTERMEDIARY FIRMS	38	13	15	25	21	24
MINING	33	15	22	30	15	32
TELECOM	34	24	27	29	7	31
PUBLIC WORKS – BUILDING	32	28	28	23	19	26
ENERGY	8	34	35	27	39	21
AERONAUTICAL	2	32	36	32	32	30
DRINKS	22	19	21	36	28	39
AUTOMOTIVE	36	31	31	31	4	36
MEDICINE ,HEALTH	25	29	30	33	31	29
HOLDING	24	33	32	35	24	35
SERVICE	39	39	39	21	37	20

LEATHER	30	37	37	37	34	34
TOURISM –HOTEL	35	38	34	38	36	38
JOURNALISM	37	36	38	39	38	33

With the decision matrix obtained, first of all, normalization process was carried out and, following it, since criterion weights are equally taken, because it will nıt change the matrix value, the next step of TOPSIS method, with forming   the solutions of Ideal (A*) and Negative Ideal (Aˉ), the Closeness Value (C_i^*) according to   the Ideal Solution given below was obtained.

Table 3. The closeness values (C_i^*) according to the ideal solution and their ordering

INDUSTRIAL SECTORS	(C_I^*)	ORDERING	INDUSTRIAL SECTORS	(C_I^*)	ORDERING
MAIN METAL INDUSTRY	0,77464	1	**FERTILIZER**	0,52267	21
AUTOMOTIVE SIDE INDUSTRY	0,75142	2	**OIL**	0,51962	22
INVESTMENT PARTNERSHIP	0,73462	3	**GMYO**	0,50000	23
CEMENT	0,71660	4	**PACKING**	0,46595	24
BUILDING MATERIAL	0,67941	5	**RETAIL TRADE**	0,46190	25
CHEMISTRY	0,67861	6	**INTERMEDIARY FIRMS**	0,44086	26
INFORMATICS	0,67136	7	**MINING**	0,39857	27
TEXTILE	0,67071	8	**TELECOM**	0,38567	28
FURNITURE	0,66741	9	**AERONAUTICS**	0,36290	29
DURABLE CONSUMPTION	0,66384	10	**ENERGY**	0,35592	30
PAPER	0,64078	11	**PUBLIC WORKS-BUILDING**	0,34991	31
FOOD	0,63830	12	**AUTOMOTIVE**	0,34529	32
ENTERPRISE CAPITAL	0,62019	13	**DRINKS**	0,33355	33
GLASS	0,61329	14	**MEDICINE-HEALTH**	0,25531	34
TRANSPORTATION L-LOGISTICS	0,59713	15	**SERVICE**	0,24721	35
STATIONERY	0,57789	16	**HOLDING**	0,24551	36
DYE	0,55486	17	**LEATHER**	0,12579	37
ELECTRICAL MATERIAL	0,54960	18	**TOURISM-HOTEL**	0,07718	38
TECHNOLOGY	0,53351	19	**JOURNALISM**	0,07514	39
PAZARLAMA	0,53114	20			

When regarding to the ordering made by Gedik Yatırım Menkul Değerler A.Ş according to each criterion, the sectors attracting attention with their positive performances are summarized   as follows (Erdinç and Gürcan, 2014:4)

- When the table is examined it is generally seen that the building and building related sectors (Cement, Building Materials, Main Metal Industry, and Glass) exhibited better performance
- Paper sector is in the position of the best sector according to ordering of the variation of Main Activity Profit

- Investment Partnership Sector is in the position of   the best sector according to FAVÖK Variation.
- Stationery sector is in the position of the best sector according to ordering of Net Sale Value,   and in the position of sector having the highest equity profitability in respect with the period of 2014/06

The sectors   attracting attention with their negative performances are summarized   as follows (Erdinç and Gürcan, 2014:5)

- It is seen that holdings, in which a number of companies take place and which are active in many areas, could not exhibit a good performance in the first half of the year compared to the same period of the last year.
- In the medicine- health sector, the negative effect of arrangements related to the prices is continuing to be seen.
- It is seen that the slowing observed in automotive sector and reflected on the financial   results.
- The weak performance Energy Sector, one of   the most determinative sectors,   showed   attracts   attention.

When the application results of TOPSIS method are regarded to, it is seen that Main Metal Industry takes place in the first order with the index value of   0.77464 it had and, journalism sector in the last order with index value of 0,.07514

Conclusion

When regarding to the results of TOPSIS method, Main Metal Industry   took place in   the first   order   with   the index, whose profitability performance is the highest. When it is generally   examined, it is seen that building and building related sectors (cement, building) exhibited   good   performance.   Again, in the same way, Investment Partnership and Automotive Side Industry are also among the sectors exhibiting high profitability performance. On the other hand, it is   seen that holdings, holdings, in which a number of companies take place and which are in active in many area could not a good performance in the first half of the year compared to the same period of the last year. In the same   way,   automotive sector and energy sector,   one of   the most determinative sectors,   showed   a weak   performance in   the period considered.

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