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Research Article

EVALUATION OF FINANCIAL EFFICIENCIES OF CEMENT COMPANIES ACCEPTED IN TEHRAN STOCK EXCHANGE THROUGH ELECTER AND SAW METHOD

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ABSTRACT
Industrial complexes are evaluated by different criteria. Some of these criteria are financial ones, which financial ratios are the most common among them. Usually, performance of an organization in a period is reflected by information of financial statements such as balance sheet and income statement in the frame of different financial ratios. On the other hand, investors and beneficiaries require being aware of different performance dimensions of companies, specially their financial dimensions. This research evaluates financial efficiencies of cement companies accepted in Tehran Stock Exchange by multi-index decision methods such as SAW and Electer from 2007 to 2011. The assumptions were tested by Wil coxon and Friedman Test. The results show that there is not a significant difference between SAW and Electer methods for evaluation of financial efficiencies of cement companies. Also, efficient and inefficient companies were separately ranked by SAW and Electer methods for 2007 to 2011. Finally, the most efficient companies were indicated by Average Method in each year for 5 years. This indicated that Electer method had the highest rank average and SAW method had the lowest rank average for 5 years. Also, Behbahan Cement Co. was the most efficient and Bojnurd Cement Co. was the most inefficient companies by financial efficiency among the cement companies accepted in Tehran Stock Exchange.

Keywords: *Electer, Financial Efficiency, Multi-criterion Decision Methods, SAW*

INTRODUCTION
Industrial complexes are evaluated by different criteria. Some of these criteria are financial ones, which financial ratios are the most common among them. Usually, performance of an organization in a period is reflected by information of financial statements such as balance sheet and profit & loss statement in the frame of different financial ratios. These ratios express financial situation of an organization from different dimensions, provide useful information for beneficiaries, and reflect organization performance in different aspects. However, for an organization, these ratios do not move in a distinct direction and many times, improvement of a ratio may decrease another ratio. Thus, total performance of competitors may not be evaluated without considering these ratios simultaneously.
On the other hand, investors and beneficiaries require being aware of different performance dimensions of companies, specially their financial dimensions. Since different indices are used to demonstrate financial dimensions of companies, investors usually cannot include all of these indices in their investment decisions. Therefore, usage of methods to integrate different indices and to reflect a transparent image of the situation cannot be denied.
Making decisions in personal and business life has a determinant place. This subject is dominant encountering problematic conditions and numerous criteria. Performance and reliability of managers are indicated by the decisions they make, because these decisions determine the future of their organizations. The importance of decision-making has developed various techniques for its improvement and precision (Zanjirchi, 2011). Since efficiency is evaluated by different techniques, related mathematical models have found special importance. Mathematical functions are required in parametric methods to estimate dependent variables by independent variables (Zare'ian, 2009).
In this regard, "multi-criterion decision-making model" was introduced as an efficient tool to make suitable decisions. So "multi-index decision-making model" has been one of the most common growing

method in the recent years. The basis of this method is finding the best fitted solution that is evaluated by different quantitative and qualitative indices (Mohammadi, 2010).

Recently, financial performance has been widely used as an index to determine performances of managers of companies (Ching *et al*., 2012). However, regarding to the progressive increment of need to energy and limitations of fossil resources, all industries should act more intelligently toward energy consumption to meet the growing demand. Active cement companies are not excluded from this rule, because they consume considerable amounts of raw materials and fuel to produce cement. Globalization trend and jointing Iran to WTO and removal of governmental subsides requires finding solutions for efficient use of resources and energy and increment of production productivity and quality in cement industry. Anyway, by increment of knowledge of beneficiaries, managers must respond the situation. Then, the goal of this paper is creation of a deep view to select and optimally use of fuel and energy, raw materials, and human force in cement industry. Obviously, discussions are necessary between statesmen, scholars, cement experts, and stockholders.

Proper evaluation of companies of each industry can reflect situations of companies than their rivals and can indicate internal pros and cons and external threats and opportunities. Company evaluation plays an important role in industry.

Introducing noble companies dominate their positions in a competitive environment according to different indices or variables. This is useful because weak companies understand their distance with the best companies and compile suitable strategies to pace with them. On the other hand, noble companies find their places and consolidate their nobility.

Capital formation is the most important progress factor in capital market and is one of the sources of capital supply. Generally, these items increase competition in market and in turn, cause development of society.

Financial information is an important factor for decision-making. The more complex the decisions and uncertainties, the harder the decision-making process. In this regard, financial statements help recognition of key relations and investors use them for evaluation of investment decisions and for determination of priorities. In this situation, we sense lack of methods and criteria for evaluation of companies, helping investors in Tehran Stock Exchange, and helping the accepted companies in Tehran Stock Exchange to increase their efficiencies.

There are different indices to measure performance of an organization, which "efficiency" is their most common. Performance of each organization must be measures, so selection of a "performance evaluation system" is very essential. A performance evaluation system is so vital that its absence is synonym with organizational disease. Without measurement, there will be no basis for evaluation, and what cannot be evaluated cannot be administered well. Therefore, a scientific pattern must be used for performance evaluation of cement companies. Since efficiency of an economic unit shows its capability to transform inputs to outputs, then efficiency is an important index for measurement of performance of organizations and shows their proper movement in their paths.

Review of Literature

Ching *et al*., (2012) studied financial efficiency of semi-conductor industry in Taiwan by multi-criterion method and harmonic average method. In this paper, they used 5 steps for evaluation of financial efficiency. These steps are: data equalization, data analysis, weighting variables by harmonic average method, efficiency evaluation, and ranking. They found that results of financial evaluation can provide useful information for managers and stockholders.

Sevastianov *et al*., (2009) used financial ratios of companies to classify and rank stocks of a complex of active companies in bio-technology field. In this research, at first they ranked stocks by one index, and then they showed that real performance could not be shown by only one index. Thus, they ranked stocks baskets of these companies by considering a set of financial ratios.

Sharma (2007) studied the effect of liberalization on performance productivity in cement industry of India for 1989-2005. In this research, they used DivisiTornquist Index to create total productivity growth index and partial productivity indices for four factors of production, capital, human force, and materials and

energy. The results showed that cement industry of India had a rapid descending path by the indices. Comparison of results of partial productivity and total productivity showed that cement industry of India had not used the inputs efficiently.

Fayyazi *et al*., (2010) in a paper titled "Multi-criterion method to select stocks in Tehran Stock Exchange by financial variables", used financial ratios for profitability of companies as data. They compared 54 companies for 3 years from 2006 to 2008 and found that the Electer-Try method by financial ratios of companies can be used to select optimum stocks and optimum companies for investment in bourse.

Ranking by evaluation criteria conduced evaluation of the most important activities of each organization in the related fields to recognize its performance by two-way questionnaires. They found that there was a positive correlation between two Topsis and Vikor ranking methods, which showed reliability of responses of these two parallel methods.

The main goal of this research is evaluation of financial efficiencies of cement companies and their comparison by electer and saw method in Tehran Stock Exchange. Generally, the goals of this research can be classified as follows:

- Measurement of financial efficiencies of cement companies by SAW method.
- Measurement of financial efficiencies of cement companies by Electer method.
- Comparison of SAW, Electer methods for better evaluation of financial efficiency.

Research Question

We are going to find answer of the following question:

Is there a significant difference between SAW and Electer methods to evaluate financial efficiencies of cement companies?

To answer the question, we study the following assumption:

There is a significant difference between SAW and Electer methods for evaluation of financial efficiencies of cement companies.

MATERIALS AND METHODS

Methodology

Scientific researchers can be divided into to test and descriptive categories by data gathering method. This research is a descriptive one and in an applied one by goal. SAW and Electer methods were used in this research to determine financial efficiency.

Data Collection and Analysis

Necessary data for this research was gathered from Tadbiparda Software and information software's of Tehran Stock Exchange. Then Excel and other softwares were used to analyze data.

Test of Assumption

Wil-Coxon Test was used to examine the assumption. Wil coxon Test is a statistic to measure mean rank. Therefore, each assumption is tested by Wil coxon, p-value, and SPSS software.

Subjects

This research studies financial efficiency of cement companies accepted in Tehran Stock Exchange by electer and saw methods.

Time Schedule of Research

This research was continued from the start of 2007 to the end of 2011.

Models of Research

SAW Model

Simple Aggregate Weight (SAW) is one of the simplest multi-index decision methods. This method can be used by calculation of weights of indices.

SAW Model Steps

Step 1: Conversion of qualitative index into quantitative index. To do this, bipolar distance scale can be used.

Step 2: The quantitative decision matrix must be descaled linearly. The result is shown as a descaled matrix.

Step 3: To calculate weights of indices. Now Shanon Entropy Method is used.
Step 4: We must multiply the descaled matrix by weights of indices. The results are shown as a column matrix.
Step 5: To determine the best strategy with the largest value.

Electer Model

This method determines efficiency of companies by ranking them. In this model, financial ratios are used as tools for ranking companies.

Steps of Electer Model

Step 1: To convert D decision matrix to a descaled matrix by the following relation:

$$n_{ij} = \frac{r_{ij}}{\sqrt{\sum_{i=1}^{m} r_{ij}^2}} \quad (1)$$

Step 2: To form weighted descaled matrix (V) by vector W
Step 3: To identify coordinate set and non-coordinate set for each pair
Step 4: To calculate coordinate matrix. The possible value of coordinated set (S_{kl}) is measured by existing weights of coordinated indices in that set.
Step 5: To calculate non-coordinated matrix.
Step 6: To identify effective coordinated matrix.
Step 7: To identify effective non-coordinated matrix.
Step 8: To identify total matrix and effective matrix.
Step 9: To delete low-attractive options.

Entropy Method

Entropy is an important concept in social sciences, physics, and information theory. When data of a decision matrix is identified completely, entropy method can be used to evaluate weights. The idea of this method is the more the dispersion of values of an index; the more important is the index.

In information theory, entropy is an uncertainty criterion that is indicated by probability distribution P_i. This uncertainty (E_i) was measured by Shnon as:

$$E_i = S(p_1, p_2, \ldots, p_n) = -k \sum_{i=1}^{n} [p_i \times l_n p_i] \quad (2)$$

Before we use multi-criterion decision methods to rank companies, we must calculate weights of the specified indices. One of the methods is Shanon
Entropy method. In this research, we used this method and the results are shown in table 1.

Table 1: Weights of indices by Shanon entropy method

Year	Current ratio	Immediate ration	Debt ratio	Debt-equity ratio	Receivable revolving	Inventory revolving	Revolving period	Assets revolving	Fixed assets revolving	Gross profit margin	Profit margin before tax	Capital return	Operational profit margin	Gross profit margin	Equity return rate	Interest payment power
2007	0.04	0.067	0.01	0.04	0.195	0.074	0.074	0.038	0.07	0.001	0.02	0.0454	0.008	0.022	0.0411	0.257
2008	0.163	0.165	0.01	0.031	0.085	0.0877	0.0877	0.026	0.06	0.002	0	0.0272	0.001	0.002	0.0918	0.159
2009	0.041	0.055	0.07	0.09	0.209	0.0105	0.0105	0.018	0.07	0.009	0.01	0.1024	0.003	0.115	0.0897	0.0904
2010	0.038	0.064	0.04	0.056	0.143	0.0854	0.0854	0.043	0.09	0.004	0.03	0.0457	0.009	0.020	0.0371	0.2136
2011	0.104	0.094	0.01	0.043	0.276	0.0124	0.0124	0.027	0.04	0.006	0.03	0.0688	0.022	0.037	0.0466	0.1644

Conclusion

Regarding to the extracted data from the financial statements of cement companies accepted in Tehran Stock Exchange from 2007 to 2011, after calculation by Excel, the companies were ranked by SAW and Electer methods. The results are shown in table 2.

Table 2: Ranking cement companies accepted in Tehran Stock Exchange

Company	SAW 2007	Electer 2007	SAW 2008	Electer 2008	SAW 2009	Electer 2009	SAW 2010	Electer 2010	SAW 2011	Electer 2011	Mean	Rank
Behbahan Cement	1	2	4	2	2	1	2	1	1	1	1.7	1
Ghaen Cement	2	2	2	1	3	1	3	2	4	2	2.2	2
Isfahan Cement	5	3	5	2	6	3	1	1	2	2	3	3
Neyriz Cement	4	1	1	1	7	3	6	4	5	4	3.6	4
Kerman Cement	7	3	3	2	8	3	7	4	3	2	4.2	5
Gharb Cement	6	1	17	5	5	1	5	2	6	2	5	6
Fars Cement	13	8	7	3	4	2	4	3	12	8	6.4	7
Tehran Cement	8	2	10	5	1	1	9	5	15	9	6.5	8
Khash Cement	9	8	8	4	9	5	12	4	14	5	7.8	9
Urmia Cement	11	6	15	6	16	10	11	4	7	2	7.8	10
Darab Cement	14	9	12	5	12	7	14	7	9	6	8.3	11
Sufian Cement	12	3	13	5	13	8	19	8	19	10	8.7	12
Karoon Cement	15	6	6	4	11	6	10	2	10	6	8.8	13
Shahrood Cement	16	4	19	9	10	4	8	3	8	2	9.5	14
Khazar Cement	19	11	14	6	17	10	13	4	13	3	10.2	15
Mazandaran Cement	18	5	9	3	19	10	15	6	11	7	10.3	16
Shomal Cement	3	1	16	7	15	10	17	9	17	11	11.4	17
Dorud Cement	10	7	11	5	14	9	16	8	16	12	11.7	18
Bojnurd Cement	17	10	18	8	18	11	18	9	18	13	14	19

According to table 2 and by SAW method for 2007, Behbahan Cement Co. was the most efficient company (rank 1) and Khazar Cement Co. was the least efficient company (rank 19). According to electer method for 2007, Neyriz Cement and Gharb Cement Shomal Cement Co. was the most efficient company (rank 1) and Bojnurd Cement Co. was the least efficient company (rank 19). In turn, the other companies were ranked by SAW and Electer methods. Finally, Behbahan Cement Co. was the most efficient company and Bojnurd Cement Co. was the least efficient company for 5 years.

Evaluation of Assumption Test Result

Regarding to data analysis for the assumption, we point to the results of these assumption separately. Wil coxon Test was used to test the assumption.

Assumption: There is a significant difference between SAW and Electer methods for evaluation of financial efficiencies of cement companies.

Since p-value=0.85 is less than 0.01, this assumption is rejected; namely, there is not a significant difference between SAW and Electer methods for financial efficiencies of cement companies. According to table 2, average of ranks of financial efficiency evaluation by Electer method is more than that by SAW method.

This paper evaluates financial efficiencies of cement companies by SAW and Electer methods. The results show that there is not a significant difference between saw and Electer methods for evaluation of financial efficiencies of cement companies. Also, the companies can be ranked by their efficiencies. According to the obtained information, it was found that Electer method has the highest rank average during 5 year and SAW method has the lowest rank average.

Proposals Based on the Results

Regarding to the result of assumption, it is proposed that managers, investors, and beneficiaries of cement companies use the results of this research for an effective portfolio for efficient companies, to decrease investment risks and selection of optimum portfolio, to use the results of SAW and Electer models to improve efficiency levels of companies, to determine weaknesses of companies, and to recognize the effects of variables to increase efficiency levels of companies in the efficient portfolio.

Future Research

Since the results of this research can be used for future related ones, the following items are recommended:

1. This research only studies cement companies; so it is proposed to do a similar research for other industries.
2. This research uses SAW, Electer methods so it is proposed to use other decision methods.
3. It is proposed to compare multi-criterion decision methods with other ones such as Data Envelopment Analysis method, nervous networks, etc.
4. It is proposed to combine multi-criterion decision methods with fuzzy logics.

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