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Research Article

PRIORITIZATION OF CRITICAL SUCCESS FACTORS TO CREATE COMPETITIVE ADVANTAGE WITHIN FUZZY MULTI CRITERIA DECISION MAKING

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ABSTRACT
In the today's competitive environment, for investments in companies, an evaluation financial ratio for analyzing the efficiency and status profitability shareholders is very important issue. Accordingly, the competition of companies to success in the business area is very compact. The aim of this study was to evaluate the performance of Cement Company by identifying critical success factors and using financial ratios, based on Fuzzy MCDM methods. According to FAHP, and TOPSIS method, financial ratios and competitive advantage factors were prioritized. Data were analyzed by Excel and Expert Choice software's. The results show among the financial ratios; growth ratio obtained maximum weight, and profitability, activity, liquidity, and financial leverage, are next in order of priority. Also, among the 11 factors of competitive advantage in a cement company; human skills, quality standards, capacity utilization, and closeness to the market, have been ranked first to fourth respectively. Human resources skills, human resource productivity, energy efficiency and environmental standards are found in the middle of ranking. Moreover, recognized brand, raw materials, management and operational systems, respectively, are located on the next. This study identified and ranked 11 factors which effect on financial ratios to occur competitive advantages. This could be a model for users of cement companies and researchers who can help to fulfill the financial ratios of competitive factors.

Keywords: *Critical success factors, Competitive advantage, Financial Ratios, MCDM, Fuzzy approach*

INTRODUCTION

Nowadays, with the development of cement demand in the construction sector is growing. Experts believe the increase may be due to factors such as optimization of internal lines, a variety of cement production, and economic stability of the currency exchange rate (Mardaneh, 2008). Iran is now the first cement manufacturer in the Middle East and among the top five producers of cement. Based on studies, financial interest under this section in accordance with the demand for cement will increase represents. We evaluate the performance of the company financing in order to improve the competitiveness of the industry is essential.

Conventional methods for separating and ranking of reliability which are some of their results are valid (Danesh and Fazli, 2009). These studies presents a fuzzy decision model and evaluate the financial performance of the company (Tehran Stock Exchange) by using financial ratios and reach the judgment subject to the decision-makers. In this approach: Fuzzy Analytic Hierarchy Process (FAHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is used. This presents a hybrid model of decision making, the importance of each of them, according to financial experts have been involved in the ratings, and critical success factors with respect to the amount and weight of the obtained values for this approach are ranked according to the hybrid approach. Provide an integrated model compensate weaknesses of routine ranking methods and non-combined decision-making methods (Danesh and Fazli, 2009).

This study is a review of the literature identified 11 cases (Zarkish, 2008) in which the consideration of multiple factors on the financial support to competitive advantage. This could be a model for users and researchers that can help fulfill the financial ratios (Wang, 2008; Ertugrul and Karakasoglu, 2009) of competitive factor to consider. A conceptual model is illustrated in Figure 1.

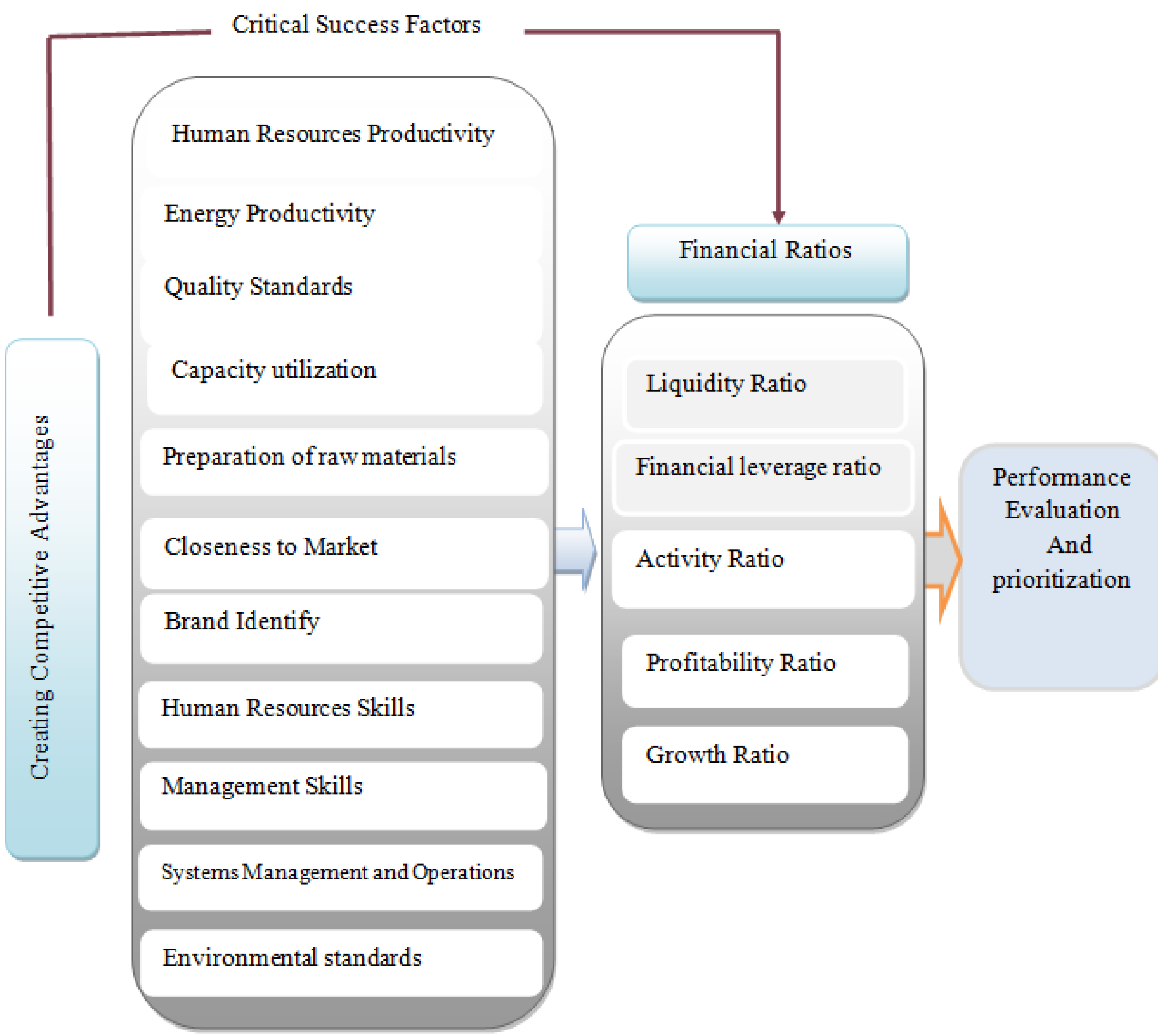

Figure 1: A conceptual mode of this research

So, the research evaluated the performance of a cement company according to financial ratios in order to encourage private sector investment in the industry will be secure. Financial interest, based on studies conducted in accordance with the demand of cement; show that increasing, so that much of the analysis of hierarchical fuzzy AHP and TOPSIS model for decision-making related to choices of the best among the available options based on the form available attributes.

The aim of this study was to evaluate the performance of Behbahan Cement Co., using financial ratios, based on fuzzy AHP model for determining the relative importance weights of criteria; and using TOPSIS technique for prioritizing critical success factors and the financial ratio is studied. Thus, in addition to the data of the literature, expert judgment and relevant information has been considered. The questionnaire was conducted among experts, a paired comparison questionnaire and another questionnaire for comparing alternative criteria based on five criteria by experts in finance is filled.

However, this is the first study on an Iranian cement company (Behbahan Co.) and is different from other studies in the literature. Two methods, Fuzzy AHP and TOPSIS were integrated in this study. FAHP is utilized for determining the weights of the criteria, and ranking of the alternatives is determined by TOPSIS method.

Literature Review

In the present study, performance of an Iranian cement company is evaluated using financial ratios. Wang (2008) had also evaluated financial performance of domestic airlines in Taiwan with fuzzy TOPSIS method. Talluri and Narasimhan (2003) have done on vendor evaluation with performance variability. Ertugrul and Karakasoglu (2009) developed a model for evaluating performance of Turkish cement companies. Zavadskas and Turskis (2011) had performed investigations on "MCDM" Methods in Economics. Sheu (2008) developed an integrating model (Fuzzy-AHP and Fuzzy –TOPSIS), to choice mode of global logistics. Aydogan (2011) proposed Performance measurement model for Turkish aviation firms using the rough-AHP and TOPSIS methods under fuzzy environment. Moreover a fuzzy model combining FAHP and TOPSIS was used to evaluate the performance of eight Cement companies using financial ratios (Moghimi *et al.*, 2013).

In addition, combining of non-economic elements and economic factors via using a FAHP approach by several researchers (Bas-lıgil, 2005; Huang *et al.*, 2006; Gu and Zhu, 2006; Ayag and Ozdemir, 2006; Lee *et al.*, 2008; Chen and Fan, 2011). However, this is the first study on an Iranian cement company and is different from other studies in the literature. Two methods, FAHP and TOPSIS were integrated in this study. FAHP is utilized for determining the weights of the criteria (financial ratios), and ranking of the "competitive advantages factors" is determined by TOPSIS method. A hierarchy of this research is illustrated in Figure 2.

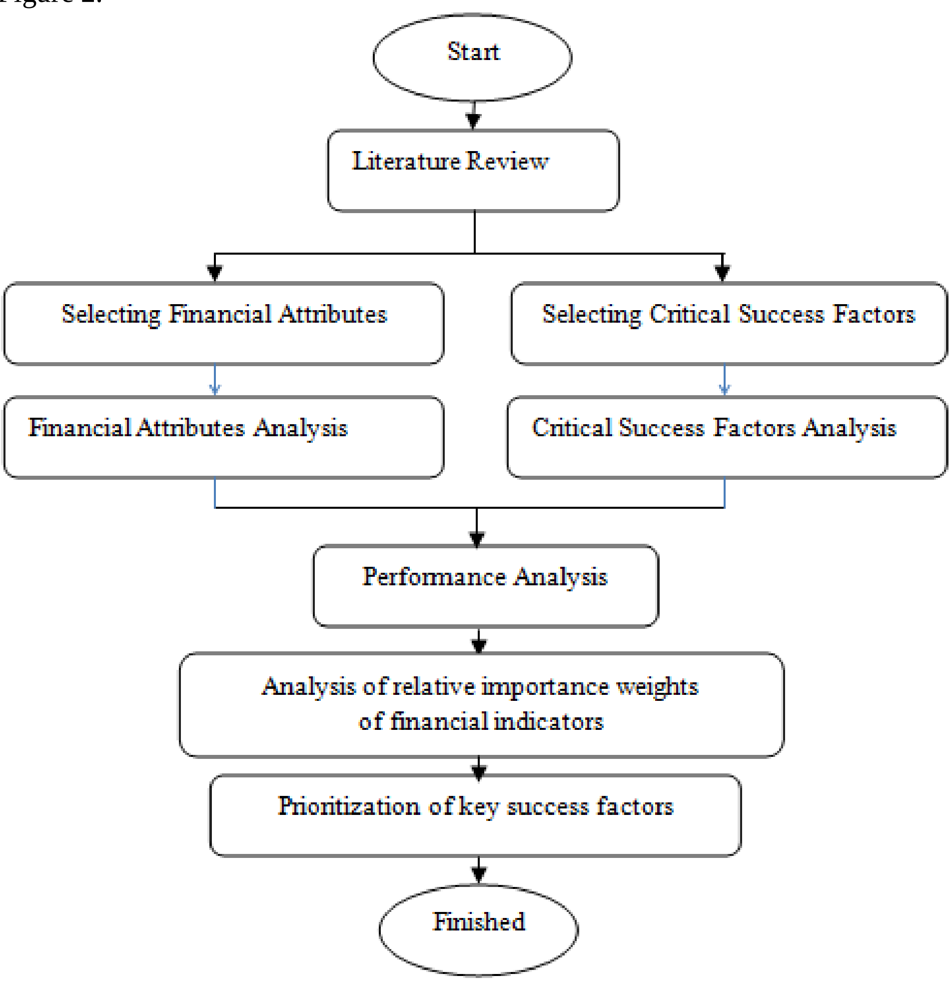

Figure 2: A hierarchy of the research

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MATERIALS AND METHODS

The third section is including: calculating inconsistency rate (Saaty, 1965), determine weights of criteria via fuzzy approach (Zadeh, 1980; Chang, 1996), and application of TOPSIS method (Wang, 2007) to rank the alternatives, as following.

Calculating Inconsistency Rate

First of all, it was provided a comparison matrix between five criteria, which filled through five experts as shown in Table 1.

Table 1: Paired comparisons criteria

Goal	Liquidity Ratios	Financial Leverage Ratios	Activity Ratios	Profitability Ratios	Growth Ratios
Liquidity Ratios	1,1,1,1,1	1/2, 1/3 , 1/3 , 1/3 , 1/2	1/3 , 1/5 , 1/4 , 1/3 , 1/2	1/4 , 1/5 , 1/3 , 1/4 , 1/3	1/5 , 1/6 , 1/6 , 1/4 , 1/3
Financial Leverage Ratios	2,3,3,3,2	1,1,1,1,1	1/4 , 1/3 , 1/3 , 1/3 , 1/2	1/3 , 1/3 , 1/4 , 1/5 , 1/2	1/4 , 1/4 , 1/3 , 1/4 , 1/5
Activity Ratios	3,5,4,3,2	4,3,3,3,2	1,1,1,1,1	1/2 , 1/3 , 1/4 , 1/3 , 1/2	1/3 , 1/3 , 1/4 , 1/3 , 1/5
Profitability Ratios	4,5,3,4,3	3,3,4,5,2	2,3,4,3,2	1,1,1,1,1	1/2, 1/4, 1/3, 1/3, 1/2
Growth Ratios	5,6,6,4,3	4,4,3,4,5	3,3,4,3,5	2,4,3,3,2	1,1,1,1,1

According to calculation of Inconsistency Ratio (IR=0.07), it is less than 0.1; we conclude that the judgment of the experts rated close together and enjoys a high reputation. Furthermore, alpha Cronbach is about 93%.

Determine Weights of Criteria via Fuzzy Approach

Calculation of criteria weight criteria have been done by fuzzy AHP. With the help of Table 1, is the opinion of five experts, the following steps are needed:

Step 1 Determine the data table based on triangular fuzzy model

Consider the following two triangular numbers that are plotted in Fig. 3.

$M_1 = (l_1, m_1, u_1)$ و $M_2 = (l_2, m_2, u_2)$

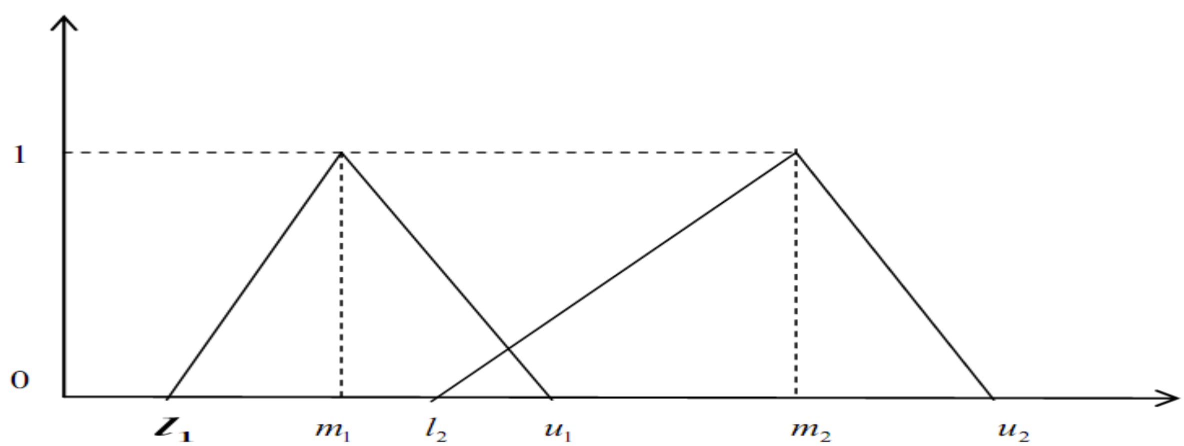

Figure 3: Triangle numbers $M_1 = (l_1, m_1, u_1)$ **and** $M_2 = (l_2, m_2, u_2)$

The arithmetic operators are defined as follows:

$$M_1 + M_2 = (l_1 + l_2, m_1 + m_2, u_1 + u_2)$$

$$M_1 \times M_2 = (l_1 \times l_2, m_1 \times m_2, u_1 \times u_2)$$

$$M_1^{-1} = (1/u_1, 1/m_1, 1/l_1); M_2^{-1} = (1/u_2, 1/m_2, 1/l_2)$$

For this work, the biggest number, smallest number, and number average (mean of five numbers) are considered as three triangular numbers (Table 2).

Table 2: Data based on triangular fuzzy model

Goal	Liquidity Ratios	Financial Leverage Ratios	Activity Ratios	Profitability Ratios	Growth Ratios
Liquidity Ratios	1, 1,1	0.33,0.38,0.5	0.2,0.29,0.5	0.2,0.26,0.0.33	0.17,0.21,0.33
Financial Leverage Ratios	2,2.6,3	1,1,1	0.25,0.33,0.5	0.2,0.29,0.5	0.2,0.25,0.33
Activity Ratios	2,3.4,5	2,3,4	1,1,1	0.25,0.36,0.5	0.2,0.28,0.33
Profitability Ratios	3,3.8,5	2,3.4,5	2,2.8,4	1,1,1	0.25,0.36,0.5
Growth Ratios	3,4.8,6	3, 4,5	3,3.6,5	2,2.8,4	1,1,1

Step 2: Determine the vector Si

The analysis of paired comparisons for each of the rows of the matrix, the amount of $\mathbf{S_k}$ which is a triangular number, is calculated as follows: $S_k = \sum_{j=1}^{n} M_{k1} \times (\sum_{i=1}^{m}\sum_{j=1}^{n} M_{ij})^{-1}$

***k**: number of rows;* ***i**; number of alternatives;* ***j**: number of criteria*

Accordingly, the sum of the fuzzy numbers in each row according to the above formula $(\sum_{j=1}^{n} M_{k1})$ is obtained.

1+0.33+0.33+0.2+0.17= 2.03 1+0.38+0.29+0.26+0.21= 2.14 1+0.5+0.5+0.33+0.33= 2.66	Vector 1: the sum of fuzzy numbers in row number 1
2+1+0.25+0.2+0.2= 3.65 2.6+1+0.33+0.29+0.25= 4.47 3+1+0.5+0.5+0.25= 5.25	Vector 2: the sum of fuzzy numbers in row number 2
2+2+1+0.25+2= 7.25 3.4+3+1+0.36+0.28= 8.04 5+4+1+0.5+0.33=10.83	Vector 3: the sum of fuzzy numbers in row number 3
3+2+2+1+0.25= 8.25 3.8+3.4+2.8+1+0.36= 11.36 5+5+4+1+0.5= 15.5	Vector 4: the sum of fuzzy numbers in row number 4

3+3+3+2+1=12 4.8+4+3.6+2.8+1= 16.2 6+5+5+4+1= 21	Vector 5: the sum of fuzzy numbers in row number 5

Aggregate fuzzy numbers in each level (minimum, medium, maximum) are obtained according to the above formula $(\sum_{i=1}^{m}\sum_{j=1}^{n} M_{ij})$.

(1+0.33+0.33+0.2+0.17)+(2+1+0.25+0.2+0.2)+ (2+2+1+0.25+2)+(3+2+2+1+0.25) + (3+3+3+2+1) = 33.18	Sum of fuzzy numbers-lowest
(1+0.38+0.29+0.26+0.21)+(2.6+1+0.33+0.29+0.25)+(3.4+3+1+0.36+0.28)+ (3.8+3.4+2.8+1+0.36)+(4.8+4+3.6+2.8+1)= 42.21	Sum of fuzzy numbers-average
(1+0.5+0.5+0.33+0.33)+(3+1+0.5+0.5+0.25)+(5+4+1+0.5+0.33)+ (5+5+4+1+0.5) +(6+5+5+4+1)= 55.24	Sum of fuzzy numbers-highest

Then, with calculated $(\sum_{i=1}^{m}\sum_{j=1}^{n} M_{ij})^{-1}$, and finally the formula ($S_k = \sum_{j=1}^{n} M_{k1} \times (\sum_{i=1}^{m}\sum_{j=1}^{n} M_{ij})^{-1}$);
The following calculations are performed.
S1= (2.03, 2.14, 2.66) X (1/55.24, 1/42.21, 1/33.18) = (0.0367, 0.0507, 0.0802)
S2= (3.65, 4.47, 5.25) X (1/55.24, 1/42.21, 1/33.18) = (0.0661, 0.1059, 0.1582)
S3= (7.25, 8.04, 10.83) X (1/55.24, 1/42.21, 1/33.18) = (0.1312, 0.1905, 0.3264)
S4= (8.25, 11.36, 15.5) X (1/55.24, 1/42.21, 1/33.18) = (0.1493, 0.2691, 0.4671)
S5= (12, 16.2, 21) X (1/55.24, 1/42.21, 1/33.18) = (0.2172, 0.3838, 0.6329)
Step 3: Calculate the magnitude of the result
Now, it should be calculated, the magnitude of each of these elements on other elements

$$V(M_1 \geq M_2) = 1; if, m_1 \geq m_2$$

$$V(M_1 \geq M_2) = hgt(m_1 \cap m_2); otherwise$$

$$V(S_1 \geq S_2) = (u_1 - l_2) / ((u_1 - l_2) + (m_2 - m_1)$$

Calculate the magnitude of the result comparisons for each of the elements of a pair of elements
S1>S2= (0.08-0.07))/ (0.08-0.07) + (0.11-0.05) =0.14
S1>S3= (0.08-0.13)/ (0.08-0.13) + (0.19-0.05) =0.63
S1>S4= (0.08-0.15)/ (0.08-0.15) + (0.27-0.05) =0.47
S1>S5= (0.08-0.22)/ (0.08-0.22) + (0.38-0.05) =0.74
S2>S1= 1
S2>S3= (0.16-0.13)/ (0.16-013) + (0.19-0.11) =0.27
S2>S4= (0.16-0.15)/ (0.16-015) + (0.27-0.11) =0.06
S2>S5= (0.16-0.22)/ (0.16-0.22) + (0.38-0.11) =0.29
S3>S1= 1
S3>S2= 1
S3>S4= (0.33-0.15)/ (0.33-015) + (0.27-0.19) =0.32
S3>S5= (0.33-0.22)/ (0.33-0.22) + (0.38-0.19) =0.37
S4>S1= 1
S4>S2= 1
S4>S3= 1

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S4>S5= (0.47-0.22)/ (0.47-0.22) + (0.38-0.27) = 0.69
S5>S1= 1
S5>S2= 1
S5>S3= 1
S5>S4= 1
Then, with the results of the previous step, calculate the magnitude of the result of each of the other elements, we calculate a mass basis.

$$V(M_1 \geq M_2,...,M_k) = Min[V(M_1 \geq M_2),...,V(M_1 \geq M_k)]$$

V (S1≥ S2, S3, S4, S5) = Min (0.14, 0.63, 0.47, 0.74) = 0.14
V (S2≥ S1, S3, S4, S5) = Min (1, 0.27, 0.06, 0.29) = 0.06
V (S3≥ S1, S2, S4, S5) = Min (1, 1, 0.32, 0.37) = 0.32
V (S4≥ S1, S2, S3, S5) = Min (1, 1, 1, 0.69) = 0.69
V (S5≥S1, S2, S3, S4) = Min (1, 1, 1, 1) = 1
Step 4: Calculate the normalized and weighted
Then, with sum of the numbers based on formula $W' = [W'(c_1), W'(c_2), ..., W'(c_n)]^T$
W= 0.14+0.06+0.32+0.69 = 2.07
Then it is necessary to normalized using the following formula:

$$W_i = \frac{W_i'}{\sum W_i'}$$

W_i = (0.14/2.07); (0.06/2.07); (0.32/2.07); (0.69/2.07); (1/2.07)
After these calculations, the following results based on fuzzy criteria weights are.
W_i = (0.07, 0.03, 0.15, 0.33, 0.48); The results are shown in Table 3.

Table 3: Final ranking measures the performance of the fuzzy

Goal	**Liquidity Ratios**	**Financial Leverage Ratios**	**Activity Ratios**	**Profitability Ratios**	**Growth Ratios**
Weight	0.07	0.03	0.15	0.33	0.48
ranked	4	5	3	2	1

Application of TOPSIS Method to Rank the Alternatives
The TOPSIS method for ranking the alternative, which is explained in several stages.
Step 1: Prepare decision matrix
Table 4 shows rating of 11 alternatives rated based on five criteria by five experts in the financial affairs of the represents "Behbahan Cement Company".

Table 4: Rating to 11 alternatives based on 5 criteria, by 5 experts

Goal	**Liquidity Ratios**	**Financial Leverage Ratios**	**Activity Ratios**	**Profitability Ratios**	**Growth Ratios**
Productivity of human resources	3, 3,4,2,3	7,7,6,7,5	9,7,8,6,6	5,6,6,5,5	4,3,4,4,4
Energy Productivity	3,4,3,2,3	5,5,4,5,6	6,5,6,7,4	7,6,6,6,6	5,2,1,6,7
Quality standards	2,2,3,3,1	3,3,4,5,2	5,7,6,4,5	3,3,3,4,3	7,7,7,7,5
Capacity utilization	3,3,4,3,2	5,4,4,4,3	7,6,7,7,5	5,5,4,5,3	7,5,3,4,5
Preparation of raw	2,3,4,1,2	2,4,3,3,2	5,6,5,6,5	5,4,3,4,4	3,4,4,4,3

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materials					
Proximity to market	5,5,6,4,3	2,2,2,3,1	5,6,5,5,5	3,4,3,4,4	7,4,4,4,7
Brand Recognition	3,4,,4,3,2	3,5,2,3,1	8,8,9,9,6	2,3,2,3,2	5,5,6,5,4
Human resource skills	3,3,3,4,3	4,5,3,5,3	7,7,8,8,6	3,4,3,4,3	4,4,4,5,5
Management skills	4,3,3,3,4	4,3,4,4,4	5,8,4,7,6	4,4,3,4,3	7,9,7,6,5
Systems Management and Operations	3,3,3,4,4	4,6,2,3,4	5,6,6,5,5	2,3,4,3,4	2,3,1,4,2
Environmental standards	2,3,3,3,2	2,4,3,2,3	4,5,4,5,4	2,2,1,2,3	6,8,7,4,5

Step 2: Calculate the geometric mean
There are the five rates in each cell of Table 4; the geometric mean is converted into one score. For example, to calculate the cell 11, the following procedure is:
a11= (3x3x4x2x3) ^1/5 = 2.93; and results of operations are shown in Table 5.

Table 5: Geometric mean matrix of 11 alternatives based on 5 criteria

Goal	Liquidity Ratios	Financial Leverage Ratios	Activity Ratios	Profitability Ratios	Growth Ratios
Productivity of human resources	2.93	6.35	7.11	5.38	3.78
Energy Productivity	2.93	4.96	5.5	6.19	3.35
Quality standards	2.05	3.25	5.3	3.18	6.54
Capacity utilization	2.93	3.95	6.35	4.32	4.62
Preparation of raw materials	2.17	2.7	5.38	3.95	3.57
Proximity to market	4.48	1.89	5.19	3.57	5
Brand Recognition	3.1	2.46	7.92	2.35	4.96
Human resource skills	3.18	4.32	7.16	4.37	4.37
Management skills	4.37	3.78	5.83	3.57	6.67
Systems Management and Operations	4.37	3.57	5.38	3.1	2.17
Environmental standards	2.55	2.7	4.37	1.89	5.83

Step 3: Normalized decision matrix
To normalize decision matrix (Table 5) the following formula is used.

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$n_{ij} = x_{ij} / (\sum_{j=1}^{m} x_{ij}^2)^{1/2}$; with the help of the above formula, normalized decision matrix is given in Table 6. For example, to normalize the number of cell 11, "the first row, first column" (2.93), is calculated as follows:
2.93/(2.93^2+2.93^2+2.05^2+2.05^2+2.17^2+4.48^2+3.1^2+3.18^2+4.37^2+4.37^2+2.55^2)$^{1/2}$=0.27605576

Table 6: Normalized decision matrix of 11 alternatives based on 5 criteria

Goal	Liquidity Ratios	Financial Leverage Ratios	Activity Ratios	Profitability Ratios	Growth Ratios
Productivity of human resources	0.27605576	0.512199	0.36377	0.41099	0.254692
Energy Productivity	0.27605576	0.40008	0.281397	0.472868	0.225719
Quality standards	0.19314482	0.262149	0.271164	0.242927	0.440658
Capacity utilization	0.27605576	0.318612	0.324886	0.330014	0.311291
Preparation of raw materials	0.20445086	0.217785	0.275257	0.301749	0.240543
Proximity to market	0.42209209	0.15245	0.265536	0.27272	0.336895
Brand Recognition	0.29207265	0.198427	0.405212	0.179522	0.3342
Human resource skills	0.29961001	0.348457	0.366328	0.333834	0.294446
Management skills	0.41172822	0.3049	0.298281	0.27272	0.449418
Systems					
Management and Operations	0.41172822	0.287961	0.275257	0.236816	0.146212
Environmental standards	0.24025331	0.217785	0.223583	0.144381	0.392819

Table 7: Normalized decision matrix 11 alternatives based on 5 criteria

Goal	Liquidity Ratios	Financial Leverage Ratios	Activity Ratios	Profitability Ratios	Growth Ratios
Productivity of human resources	0.019324	0.015366	0.054565	0.135627	0.122252
Energy Productivity	0.019324	0.012002	0.04221	0.156046	0.108345
Quality standards	0.01352	0.007864	0.040675	0.080166	0.211516
Capacity utilization	0.019324	0.009558	0.048733	0.108905	0.14942
Preparation of raw materials	0.014312	0.006534	0.041289	0.099577	0.115461
Proximity to market	0.029546	0.004573	0.03983	0.089998	0.161709
Brand Recognition	0.020445	0.005953	0.060782	0.059242	0.160416
Human resource skills	0.020973	0.010454	0.054949	0.110165	0.141334
Management skills	0.028821	0.009147	0.044742	0.089998	0.21572
Systems	0.028821	0.008639	0.041289	0.078149	0.070182
Management and Operations					
Environmental standards	0.016818	0.006534	0.033537	0.047646	0.188553

Step 4: Calculate the criteria weights
As the process of calculating criteria weights of fuzzy AHP is presented in Section 3.2 (Table 3), the results are as follows:

W_i = (0.07, 0.03, 0.15, 0.33, 0.48)

Step 5: Calculate the normalized weighted decision matrix
In this step the normalized decision matrix (Table 6) and weight matrix (Step 4) is multiplied. Results are shown in Table 7. A sample calculation of the Table 7, cell 11; (o.27605*0.07=0.019324), as shown in cell 11, of Table 7.

Step 6: Find the ideal and anti-ideal solutions

If the ideal solution, $A^- = \{v_1^-, v_2^-, ..., v_j^-, ..., v_n^-\}$ v_j^-, and anti-ideal solution A^-, is shown; in this case:

$$A^* = \{v_1^*, v_2^*, ..., v_j^*, ..., v_n^*\}$$

$$A^- = \{v_1^-, v_2^-, ..., v_j^-, ..., v_n^-\}$$

Where, v_j^* the best value j of all options, and v_j^- the worst j of all options. The options that are sets A^* and A^- , respectively, indicate the options which are quite good and quite bad.

		C1	C2	C3	C4	C5
A^*	max	0.029546	0.015366	0.060782	0.156046	0.21572
A^-	min	0.01352	0.004573	0.033537	0.047646	0.070182

Table 8: Calculating the distance from the ideal solution and the anti-ideal

Alternative		Distance from the Ideal solution		Distance from the anti- Ideal solution
A1	d1+	0.09641776	d1-	0.105092
A2	d2+	0.10949954	d2-	0.115634
A3	d3+	0.08057866	d3-	0.14524
A4	d4+	0.08307554	d4-	0.101591
A5	d5+	0.11802923	d5-	0.069366
A6	d6+	0.08851581	d6-	0.10231
A7	d7+	0.11225462	d7-	0.09523
A8	d8+	0.088148	d8-	0.09757
A9	d9+	0.06825616	d9-	0.152826
A10	d10+	0.16635861	d10-	0.03523
A11	d11+	0.11606473	d11-	0.118433

Step 7: Calculate the distance between the ideal and anti-ideal solution
At this point, the distance of each alternative from the ideal solution and the anti-ideal solution are calculated, respectively, from the following equations:

$$d_{i+} = \sqrt{\sum_{j=1}^{m} (v_{ij} - v_j^+)^2} \text{ ; i = 1, 2,…,m}$$

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$$d_{i-} = \sqrt{\sum_{j=1}^{m}(v_{ij} - v_j^{-})^2} \; ; i = 1, 2,\ldots,m$$

Where j represents a measure of the relationship represents the index i is the preferred option. Results of these calculations are presented in Table 8.

Step 8: Similarity index

In the final stage, the similarity index is calculated from the following equation:

$cl_{i+} = d_{i-} / (d_{i+} + d_{i-})$; $0 \le cl_{i+} \le 0$, i = 1, 2,…,m

The similarity index is changed between zero and one change. The preferred option is more similar to the ideal case, the similarity index, as a closer. For ranking, the alternatives based on similarity index, an option that has the highest similarity index, the first option is the lowest similarity index, is ranked in the final. Results of these calculations are presented in Table 9.

Table 9: The similarity index and ranking of alternatives

Alternative		CL_{i^+}		Ranked
A1	Productivity of human resources	CL1	0.521523	6
A2	Energy Productivity	CL2	0.513624	7
A3	Quality standards	CL3	0.643171	2
A4	Capacity utilization	CL4	0.550132	3
A5	Preparation of raw materials	CL5	0.370157	10
A6	Proximity to market	CL6	0.536144	4
A7	Brand Recognition	CL7	0.458974	9
A8	Human resource skills	CL8	0.525366	5
A9	Management skills	CL9	0.691263	1
A10	Systems Management and Operations	CL10	0.174764	11
A11	Environmental standards	CL11	0.505051	8

Results of 11 alternative solutions (Competitive factors) above, is shown in Table 10.

Table 10: Results of ranking alternatives

Ranked	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
	A9	**A3**	**A4**	**A6**	**A8**	**A1**	**A2**	**A11**	**A7**	**A5**	**A10**
Alternative	Management skills	Quality standards	Capacity utilization	close to the market	Human resources skills	human resource productivity	energy productivity	environmental standards	Recognized brand	Raw materials	operational management systems

It can be concluded that the technique of human skills, quality standards, capacity utilization, and close to the market, respectively, have been ranked first to fourth. Human resources skills, human resource productivity, energy productivity and environmental standards in the ranks of middle and recognized brand, raw materials, and operational management systems, have been ranked in the final.

Discussion and Conclusion

In general, this research was following to answer the questions: what are weights importance of critical success factors and financial ratios based on weighting technique for the company? What is the most important critical success factors and financial ratios (with high importance weights) to assess the overall

performance of the plant under study? What is prioritizing critical success factors and financial ratios for the development of comparative advantage based on ranking method "TOPSIS"?
According to the literature there were identified, 11 factors (human resource productivity, energy productivity, quality standards, capacity utilization, raw materials, proximity to market, brand recognition, human skills, management skills, management and operational systems, and environmental standards) that can guarantee competitive companies. On the other hand, it is said that the five main indicators of financial ratios (liquidity ratios, financial leverage ratios, activity ratios, profitability ratios, and growth ratios) can be a good measure to achieve competitive advantage.
Also, in the sub-section 3.2 (Table 3), the weight of each criterion is calculated; were ranked according to their weights. Growth ratios of the utmost importance and profitability ratios, activity ratios, liquidity ratios and leverage financial ratios, the following priorities have been.
To answer the third research question, the TOPSIS method is used. The results human skills, quality standards, capacity utilization, and close to the market, respectively, have been ranked first to fourth. Human resources skills, human resource productivity, energy productivity and environmental standards in the ranks of middle and recognized brand, raw materials, and operational management systems, have been ranked in the final.
Consequently, the question of " what factors are more effective role (Deng *et al.*, 2000), which was answered by the company some factors are more important. Meanwhile the results of this research support of reviews and investigations by many researchers (for example: Wang, 2008; Tolga *et al.*, 2005). So those on the factors of 11-fold competitive advantage are positive effect on factors of five financial ratios.
As a result, according to Zarkesh (2008), the critical success factors for each transition that occurs in organizations; and of guidelines organizations in the development to be lean, with about concepts such as strategy, process and people, perspectives on the seekers of knowledge opens new and innovative. The study also supports the finding of Zarkesh (2008); and 11 items of competitive advantage in the production of cement enterprise can be effective on the five indicators (financial ratios). The proposed model (Fig.1) that has been developed in this context; can be a model and strategy for the company, related companies, and are even more efficient in the industry.

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