Investigate Factors Affecting on the performance of Agricultural Machinery Companies Based on Taxonomy Algorithm

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Abstract. Taxonomy (general), the practice and science of classification of things or concepts, including the principles that underlie such classification. Economic taxonomy, a system of classification for economic activity. The main objective of the study was to find whether financial ratios affect the performance of the Agricultural Machinery companies in Iran. A firm performance evaluation and its comparison with other companies can help the investors to reach the investment goals. The study is based on secondary data collected from financial reports which is accepted in Tehran Stock Exchange for the period of one year from 1389-1390.This research did by using data of 5 accepted in Tehran stock Exchange Agricultural Machinery companies and the size sample is equal to the size society. In this research, the method is measuring descriptive method and based on and practical applicable goals. In this research used Taxonomy algorithm for performance evaluation companies. From our study can conclude that Eshtad Iran company has the first ranking indicates that some criteria such, , liquidity , activity and financial leverage are affect performance of the Agricultural Machinery companies in Iran.

Keywords: Financial Ratios;Taxonomy algorithm; liquidity ; activity ; financial leverage

1. INTRODUCTION

The evaluating of performance, by decreasing weakness and increasing powers, will make a great condition for progress. In each organization, designing method for long and short term planning and also reformations will start by evaluating and knowing the present condition. The financial evaluating model, by stating the present condition of company among other companies and by making a competitive space, encourages companies to achieve a higher level and it provides needed tools for them to access the same information in whole industry and also not being satisfied of the position of organization and believing in endless ability of human being will lead to growth in standards of industry.

1.1. Background

Taxonomy analysis method is most important areas grading methods of development that have been discussed widely in geography. This method was first proposed in 1763 by Adenson and was developed in 1950 by a group of mathematicians. . In 1968 was introduced an important technique in the classification of the degree of development of the international by Holling in UNESCO and Today has been proposed in the fields of agricultural science, geology, industry, veterinary and medicine. Analysis of taxonomy is used in classification several sciences that a particular type is numerical taxonomy. Numerical Taxonomy to assess similarities and affinities between taxonomic units and grading elements are used taxonomic groups. In this way, a series is divided to more and less homogeneous set and scales reasonably to consider and assess the areas of development giving to planners. Taxonomy analysis is based on a series of pre-

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determined indicators that a series of options will be used to prioritize and offers a full calibration for evaluating options. In this analysis can be determined indicators and can be compared different organizations with each other. Organizations for grading the level of success, they examined.[1] The relationship between management and decision making speeds mechanism. Investment is main base and cause survival and increased power in the business activities. Nature of Investment is not usually renewable but it is long-term and a selection is between solutions.[2] Also multi criteria decision making topic that is operational research topic. It is useful in the more investment decisions. Decision making models are divided to two major categories: multi objective models and multi criteria models. The multi objective models are used to designing while the multi criteria models used to choose the best option.[3]

2. RELEVANT STUDIES

Research by Rangriz and et al (2012) done as Performance Evaluation of Iran Cement Companies based on AHP and [1]TOPSIS Methods. Purpose of this study is representing manners which select the problem and solve ranking optimally by multi criteria decision making methods and by high ability. If the manners are combined correctly, by power keeping of each ways, its weakness will be offset by other powers. In this research, the method is measuring descriptive method and based on and practical applicable goals. For using conceptual model in the company's performance evaluation, statistical society is all cement companies which accepted in Tehran Exchange Markets since (1379 to 1388). In this study, a combined method (TOPSIS- AHP) in the company's performance evaluation is presented by financial ratios. Financial ratios weights respected to views of different groups of experts are determined by AHP and thus, each ratio is used by its importance in the performance of firm evaluation and ranking of each firm is determined by TOPSIS method. based on implemented ranking, Ardabil and Azar Shahr lime cement company have the first ranking indicates that some criteria such as growth , profitability , liquidity , activity and financial leverage are combined method (TOPSIS-AHP) is better than uncombined one.[4] Hajihassani (2013) presented Using Latin Square Design Model in The Study of Factors Affecting on Mass Construction Industry. The aim of this study was to evaluate the impact of the time, financial financials and company type on mass construction industry. We study using Latin square design. In this research, the method is measuring descriptive method and based on goal is application. Space domain is Tehran stock exchange and time domain is (1385-1388). Data collection method is procedures and documents and tools for data collection is financial data from the financial reports of accepted mass construction companies in Tehran Stock Exchange. Statistical society is all four mass construction companies which accepted in Tehran stock exchange and the size sample is equal to the size society. From our study can conclude that the factors of the time and the company type haven't same effects on the efficiency but different financial ratios have the same effect on the efficiency of companies.[5] Hajihassani (2013) presented the relationship between Working Capital Management and Profitability: A Case Study of Cement Industry in Iran. The main objective of the study was to find whether financial ratios affect the performance of the companies in the special context of cement industry in Iran. This study empirically examines the relationship between working capital management and profitability by using data of 28 Iran cement companies. The study is based on secondary data collected from financial reports which is accepted in Tehran stock exchange for the period of six years from 2004-2009. The data was analyzed using the techniques of correlation coefficient and multiple regression analysis. All the findings were tested at 0.01 and 0.05 level of significance. We found that the return on investment is very weak negatively correlated with the current ratio (CR), inventory turnover ratio (ITR). While, ROI is very weak positively correlated with the liquid Ratio (LR) and credit turnover ratio (CTR). The results of other diagnostics suggest that the LR and CTR have a positive relation with ROI. On the other hand, LR and CTR both have a negative impact on ROI. However, CR relationship is insignificant with ROI, the relationship is not conclusive. Here is substantial decrease in the value of the R-squared that it shows the

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[1] Technique for Order Preference by Similarity to Ideal Solution

importance of ITR in the model. The result concludes that there is a weak relationship between working capital management and profitability in the specific context of cement industry in Iran.[6]

3. MATERIAL AND METHODS

A firm performance evaluation and its comparison with other companies can help the investors to reach the investment goals. The study is based on secondary data collected from financial reports which is accepted in Tehran Stock Exchange for the period of one year from 1389-1390. This research did by using data of 5 accepted in Tehran stock Exchange Agricultural Machinery companies and the size sample is equal to the size society. In this research, the method is measuring descriptive method and based on and practical applicable goals. In this research used Taxonomy algorithm for performance evaluation.

3.1. Algorithm Taxonomy

Taxonomy analysis of the various stages in nine steps are as follows:

Step1: Specify options with regard to the target topic and a set of several indicators to select options.

Selection criteria will be performed by the analyst or a team of experts. The M option to consider at this stage are evaluated by n index.

Step2: Forming data matrix and then calculating the mean and standard deviation.

Step3: Normalizing the data matrix obtained.

In the table data matrix, options are expressed in terms of the indicators are different scales and at this stage, it is trying to eliminate various units that used equation Z standard normal and in the matrix, each column is determined by the largest number of visible.

$$Z_{ij} = \frac{X_{ij} - \overline{X}_j}{S_j}$$

(1)

Step4: Determine the combined distance between options.

At this stage, with the standard matrix can be obtained distance any option from of the other options.

$$D_{ab} = \sqrt{\sum_{j=1}^{n}(Z_{aj} - Z_{bj})^2}$$

(2)

Step5: Determine the shortest distance.

In this step is determined the minimum distance between each row of the matrix then are calculated the mean and standard deviations.

Step6: Homogenization Options.

There are some units may have a greater or lesser distances than are other options. This option must be removed from the set of heterogeneous. For this should be taken to limit up and down.

$$O_r = \overline{d}_r \pm 2\sigma_{dr} \tag{3}$$

Step7: setting Pattern or paradigm Options.

At this point setting the distance of each alternative from the ideal amount. Development represents the distance is less than ideal.

$$C_{io} = \sqrt{\sum_{j=1}^{n}(Z_{ij} - DO_j)^2}$$
(4)

Step8: Ranking the rate of development options. In this step is focused on the development and condition of calibration options. [1]

$$F_i = {C_{io}}/{Co}$$
(5)

$$Co = \overline{C}_{io} + 2\,\sigma C_{io} \tag{6}$$

3.2. Liquidity Ratio

Liquidity ratios measures the company's ability in preparing the sufficient cash for business leadership in the following months.In other words, liquidity ratios measures the company's power and ability in refund short-term debts. Ratio that measure the company's liquidity is current, ratio.[7]

Current Ratio = Current Assets/Current Liabilities (7)

3.3. Activity Ratio

Activity ratios used to operation period evaluation and composition of current assets of companies. Composition of current assets refers to what amount of current assets of the company is converted rapidly to the cash. .[7] Ratio that measure the company's activity is:

Total Asset Turnover Ratio = Sales/Total Assets (8)

3.4. Financial Leverage Ratio

Ratios are that evaluating the relationship financial resources of the company accounting to current debts, long term debts, shareholder's equity and how to combine them. Leverage financial ratios compare cash that provided to investment from the creditors and ratios measures them.[7] Ratio that measure the company's leverage financial is:

Debt Ratio = Total Debt/Total Assets (9)

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4. RESULTS AND DISCUSSION

In this study, options are the five accepted in Tehran stock Exchange Agricultural Machinery companies that can be calibrated by three indicators of liquidity, operating and financial leverage that sub criteria are Current Ratio, Total Asset Turnover Ratio, Debt Ratio.

Then the data matrix is formed and is calculated the mean and standard deviation. The results are shown in Table 1.

Table 1. Data matrix.

Index	1	2	3
Options			
Eshtad Iran	0.72	0.92	0.99
Teractorcazi	1.32	1.05	0.70
Agricultural Services	2.42	1.10	0.48
Combaincazi	0.72	0.46	1.31
Machinery Tractorcazi Iran	1.01	0.84	0.94
$\sum X_i$	6.19	4.07	4.42
$\overline{X}_j$	1.24	0.81	0.88
σ_j	0.71	0.29	0.31

Standardize the criteria specified in Table 2.

Table 2. Normalization of data.

Index	1	2	3
Options			
Eshtad Iran	-0.73	0.38	0.35
Teractorcazi	0.11	0.83	-0.58
Agricultural Services	1.66	1	-1.29
Combaincazi	-0.73	-1.21	1.39
Machinery Tractorcazi Iran	-0.32	-0.93	0.19
DO_j	1.66	1	1.39

In table 2 is achieved normal values and the positive ideal.

The More is determined complex the distance between items and the shortest distance and giving in the table 3.

Table 3. Complex the distance between items and the shortest distance.

options	1	2	3	4	5	d =shortest distance
1	0	1.33	2.98	1.89	1.68	1.33
2	1.33	0	1.71	2.96	1.97	1.33
3	2.96	1.71	0	4.21	3.13	1.71
4	1.90	2.96	4.21	0	1.30	1.30
5	1.38	1.97	3.13	1.30	0	1.30
$\sum d_r$	-	-	-	-	-	6.97
$\overline{d}_r$	-	-	-	-	-	1.39
σ_{dr}	-	-	-	-	-	0.17

Then the upper and lower limits are specified.

$$O_r = \bar{d}_r \pm 2\sigma_{dr}$$

$$= 1.39 + 2(0.17) = 1.73$$

$$= 1.39 - 2(0.17) = 1.05$$

Since the shortest distance are between the upper and lower limits So all locations in the series are homogeneous and during the next steps.

In next steps used C_{io} formula that is specified in the table 4.

Table 4. Pattern of development options.

index option	$\sqrt{(Z_{i1} - DO_1)^2}$	$\sqrt{(Z_{i2} - DO_2)^2}$	$\sqrt{(Z_{i3} - DO_3)^2}$	C_{io}
DO_j	1.66	1	1.39	-
1	2.39	0.62	1.04	2.38
2	1.55	0.17	1.97	2.51
3	0	0	2.68	2.68
4	2.39	2.21	0	3.25
5	1.98	1.93	1.2	3.01
$\sum C_{io}$	-	-	-	13.83
$\bar{C}_{io}$	-	-	-	2.77
σC_{io}	-	-	-	0.36

In next step calculated Co and in the table 5 specified ranking options.

$$Co = 2.77 + 2(0.36)$$

Table5. Ranking options.

index Option	C_{io}	F_i	Rank
Eshtad Iran	2.38	0.68	1
Teractorcazi	2.51	0.72	2
Agricultural Services	2.68	0.77	3
Combaincazi	3.25	0.93	5
Machinery Tractorcazi Iran	3.01	0.86	4

As Table 5 indicates the lowest number is the best option for investment. Eshtad Iran company is best company and Teractorcazi, Agricultural Services, Machinery Tractorcazi Iran, Combaincazi companies are next ranks. We conclude that some criteria such, , liquidity , activity and financial leverage are affect performance of the Agricultural Machinery companies in Iran.

5. CONCLUSION

From our study can conclude that Eshtad Iran company have the first ranking indicates that some criteria such, , liquidity , activity and financial leverage are affect performance of the Agricultural Machinery companies in Iran. As a result, the companies in the first rank should design good methods in order to keep their condition. Meanwhile the weaker companies focus their attention toward decreasing the gap between stronger companies and try to make their condition better in ranking.

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