

# Financial Performance Evaluation of Sport Clubs Traded in Borsa Istanbul by Using Grey Relational Analysis

Ceren Oral<sup>1</sup>

<sup>1</sup> Department of Economics and Finance, Fethiye Faculty of Management, Mugla Sıtkı Kocman University, Fethiye, Turkey

Correspondence: Ceren Oral, Assistant Professor, Department of Economics and Finance, Fethiye Faculty of Management, Mugla Sıtkı Kocman University, Fethiye, Turkey. E-mail: [ceren.uzar@gmail.com](mailto:ceren.uzar@gmail.com)

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## Abstract

The aim of this study is to rank the sport clubs registered in Borsa Istanbul based on their financial performances. In this respect the averages of the 5-year-financial-table data from the years 2010-2014 for the enterprises engaged in the subject sector are used. Using the Grey Relational Analysis (GRA) method performance has been measured by means of liquidity, leverage and profitability. Ten financial ratios have been used for the study. Based on the obtained findings, the most significant indicator for measuring the financial performances of the sport clubs is the profitability. Furthermore the sport clubs have also been ranked in the study based on their actual performances.

**Keywords:** grey relational analysis, performance evaluation, financial ratio, sport clubs, Borsa Istanbul

## 1. Introduction

Company performance is a qualitative and quantitative study, which achieves its objective by means of analysis measurement, evaluation and comment, which responds to the questions within a large dimension related with the structure of the company, financial structure and capital structure. Measurement of the company performance is very important both for the executives and for the partners and investors since the company performance enables to determine the extent of the effective use of the sources at hand by a company. Furthermore the increases and decreases in the level of profitability and the status of positive developments in the cost reduction efforts may be understood via performance measurements and evaluations (Kabakçı, 2008; Ecer et al., 2011).

By means of the financial performance analysis, the firms can effectively conduct the functions of making healthy decisions, planning and inspection. In fact the financial performance provides an integral perspective to the performances of the companies (Coşkun, 2007; Aydeniz, 2009). When the academic studies conducted related with the financial performance measurement are examined, it is seen that many different methods are used.

The conventional performance criteria merely based on financial data are not sufficient under the current global competition conditions; and this requires that the non-financial or subjective performance criteria (such as reputation, satisfaction, quality, analysis via little data in uncertain occasions) should also be used for measuring the performance of an enterprise (Kalkan, 2005). In this respect new approaches have been developed, which will enable that analysis via little data in uncertain occasions is also included in the performance measurement. One of these approaches is the GRA included in the Grey Theory.

Grey system theory including the GRA was developed by Deng in 1982 as a new system and is focused on the direction of the relation between two or more components based on the unknown. The GRA, as one of the sub-paragraphs of the Grey System Theory, is one of the methods used for analyzing the uncertainties in multi-criteria decision problems, and in cases of uncertainty provides an easier solution as compared to the mathematical analysis methods. By means of less data, the fundamental relations between the factors of a system can be determined and in this way the restrictive conditions of the conventional techniques are eliminated (Feng & Wang, 2000).

The most significant advantage of this method is offering solutions to the problems where the number of data is low and the distribution is not normal. Especially recently it has been observed that GRA method is frequently

used in the field of social sciences (Wang, 2009; Kuo & Liang, 2011; Golmohammadi & Mellat-Parast, 2012; Chuang, 2013).

In the study the object is to measure the performances of the sport clubs registered in Borsa Istanbul. The average of the 5-year-financial-table data from the years 2010-2014 has been taken in order to evaluate the performances of the subject sport clubs with GRA method. In line with this objective, hereinafter the study is made up of four parts. The first part is related with the literature review. The second part includes the theoretical descriptions of the methods used in the study. The third part is the stage of implementation where the obtained findings are set forth. In the last part the results and suggestions created based on findings are presented.

## 2. Literature Review

GRA method has been often used to evaluate the financial performance of companies in recent years. Studies performed by using GRA method are summarized below.

Acar (2003) have evaluated the ratios of the enterprise with the reference values determined in the study where he considered the indicators to be used for the measurement and analysis of the financial performance in agricultural enterprises and the reference values and ratios of such indicators.

Wang et al. (2004), have used GRA method for measuring the business operation performances of 10 large airports in Taiwan by means of the financial ratios and have considered the factors such as passengers, airline companies and fire extinguishing services.

Chang (2006), has examined the performances of the commercial banks in Taiwan via GRA method. They have concluded that there is an important relationship between the quality of the clients and the financial performance and the largest share in financial performance is occupied by the profitability indicators.

Kung and Kun (2007) have stated that the GRA method is appropriate for evaluating the financial performances of the enterprises and have determined and ranked the financial performances of twenty venture capital companies in Taiwan between 2001 and 2003 using GRA method.

Lin and Wu (2011) used GRA method for analyzing the loan risks of the banking sector in their study. A GRA approach has been developed for generating a financial crisis warning system for the banking sector and an implementation has been performed of a data set of 11 samples.

Baş and Çakmak (2012) have used the GRA method and the logistic regression analysis for determining the financial failure of the enterprises. In the study, the variables used for predicting the financial failure have been considered as the independent variables and have been determined based on their level of significance by means of GRA, wherein the obtained variable set logistic regression analysis was used to develop a model with a classification degree of high precision.

Ayriçay et al. (2013) have performed the financial evaluations the non-financial firms traded in BIST 30 index using GRA in their studies in BIST. In the study, 23 financial ratios obtained from the financial tables published by the firms in March 2011 have been used.

Bektaş and Tuna (2013) have examined 11 firms based on 6 financial ratios for measurement of the performances of the firms traded in BIST Emerging Companies Market using GRA method.

Ecer and Günay (2014) benefited from GRA method in their studies where they reviewed the financial performances of the tourism firms traded in BIST. 9 firms determined as the alternative set in the study have been examined based on 17 criteria.

Ecer and Büyüksalan (2014) have measured the financial performances of the football clubs in Turkey in 2008-2012 period by means of the ratios and the GRA method.

Kaya (2016) has evaluated the financial performances of the insurance companies other than those for life insurance by means of GRA method considering 2010-2014 period.

## 3. Grey Relational Analysis

GRA has six steps (Zhai et al., 2009).

Step 1: Generation of a decision matrix: the  $m \times n$  decision matrix is generated as follows, wherein  $m$  indicates the alternatives and  $n$  indicates the criteria:

$$X = \begin{bmatrix} x_1(1), x_1(2), \dots, x_1(n) \\ x_2(1), x_2(2), \dots, x_2(n) \\ \dots \\ \dots \\ x_m(1), x_m(2), \dots, x_m(n) \end{bmatrix} \quad (1)$$

Step 2: Generation of the reference series: A reference series is formed by adding the data of an imaginary company.

Step 3: Generation of the comparison series: The difficulty in comparison of the indicators of different dimension requires standardization of the data. In this step the data are normalized. There are 3 possible outcomes.

In case it is more appropriate that the criteria value is obtained greater after the normalized process, formula (2) should be used,

$$x_i(k) = \frac{x_i(k) - \min x_i(k)}{\max x_i(k) - \min x_i(k)} \quad (2)$$

In case it is more appropriate that the criteria value is obtained smaller after the normalized process, formula (3) should be used,

$$x_i(k) = \frac{\max x_i(k) - x_i(k)}{\max x_i(k) - \min x_i(k)} \quad (3)$$

In case it is more appropriate that the criteria value is obtained as an average value after the normalized process, the formula (4) should be used.

$$x_i(k) = \frac{|x_i(k) - x_0(k)|}{\max x_i(k) - x_0(k)} \quad (4)$$

Wherein formula (2) is used for converting the benefit values into standard values, formula (3) is used for converting the cost values into standard values and formula (4) is used for converting the average type values into standard values.

Step 4: Generation of the absolute values table: The coefficient differences are calculated based on the characteristics of the criteria. The coefficient difference is the difference between the sequence number and the reference number. It is calculated by means of formula (5).

$$\Delta x_i(k) = |x_0(k) - x_i(k)| \quad (5)$$

Step 5: Generation of the Grey relational coefficient matrix: In Grey relational analysis, Grey relational coefficient  $\xi$  can be expressed as follows.

$$\xi_i(k) = \frac{\Delta \min + p \Delta \max}{\Delta x_i(k) + p \Delta \max} \quad (6)$$

In formula (6),  $\delta$  is the distinguisher coefficient and is in the [0,1] interval. However it is recommended that it should be taken as 0.5 during transactions.

Step 6: Calculation of the relational degree.

$$r_i = 1/n \sum_{k=1}^n \xi_i(k) \quad (7)$$

and then the relational degree follows as:

$$r_i = \sum [w(k) \xi_i(k)]$$

#### 4. Implementation

In this study the object is to determine the financial performances of sport clubs traded in Borsa Istanbul using the GRA method. For this purpose an exemplification has been created using the financial data of the sport clubs traded in Borsa Istanbul in 2010-2014. According the availability of data, there are four sport clubs. These clubs

are: Beşiktaş, Fenerbahçe, Galatasaray and Trabzonspor. During analysis stage of the study; in terms of confidentiality of performance data's about sport clubs, codes were used instead of the names of the sport clubs. The codes of sport clubs are respectively A, B, C and D. Four sport clubs in the study was evaluated by 10 criteria. The data used in the study have been obtained from Public Disclosure Platform (www.kap.gov.tr).

The implementation stages of the Grey Relational Analysis have been determined as follows: Determining the financial ratios, creating the decision matrix, creating the reference series, creating the comparison series, creating the absolute value table and creating the grey relational coefficient matrix.

#### 4.1 Determining the Financial Ratios

The financial ratios used for the study are shown in Table 1. These rates render information to the company managers about the precautions to be taken.

Table 1. Financial ratios

Type of Ratios	Ratios	Code
Liquidity Ratios	Current Assets/Short Term Loans	F1
	Current Assets - Inventories/Short Term Loans	F2
Leverage Ratios	Long Term Loans/Equity Capital	F3
	Total Debts/Total Assets	F4
	Short Term Loans/Total Debts	F5
	Total Assets/Equity Capital	F6
Profitability Ratios	Gross Profit/Net Sales	F7
	Net Profit/Net Sales	F8
	Net Profit/Total Assets	F9
	Net Profit/Equity Capital	F10

#### 4.2 Generation of the Decision Matrix

The following decision matrix table has been generated by means of the financial rates calculated based on the data obtained from the balance sheets and income tables of the sport clubs. The decision matrix of the sport clubs are shown in Table 2.

Table 2. Decision matrix of the sport clubs

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
A	0,164	0,144	-0,574	3,511	0,609	-0,445	-0,260	-0,783	-0,962	0,402
B	1,844	1,829	-0,125	1,129	0,706	1,376	0,149	-0,011	-0,088	0,294
C	0,362	0,341	-5,814	1,214	0,526	-13,329	-0,126	-0,473	-0,222	2,324
D	0,419	0,4189	-0,463	1,018	0,784	-2,224	-0,195	-0,261	-0,103	1,449

#### 4.3 Generating the Reference Series

By means of creating an imaginary reference company and adding the imaginary values of such an imaginary company, the values stated in Table 3 have been obtained.

Table 3. Decision matrix with generated reference series of the sport clubs

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
X	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
A	0,164	0,144	-0,574	3,511	0,609	-0,445	-0,260	-0,783	-0,962	0,402
B	1,844	1,829	-0,125	1,129	0,706	1,376	0,149	-0,011	-0,088	0,294
C	0,362	0,341	-5,814	1,214	0,526	-13,329	-0,126	-0,473	-0,222	2,324
D	0,419	0,4189	-0,463	1,018	0,784	-2,224	-0,195	-0,261	-0,103	1,449

#### 4.4 Generation of the Comparison Series

The company directors and partners always desire that the company profitability and the short term payment capacity is high. Therefore formula (2) has been used for liquidity and profitability ratios. Since the leverage

ratios indicate the debt burden of the firm, it is desired that such level should be low particularly in terms of the grantor of loans. Therefore the leverage ratios have been calculated by using formula (3). Table 4 shows the comparison series of the sport clubs.

Table 4. Comparison series table of the sport clubs

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
X	1	1	1	1	1	1	1	1	1	1
A	0	0	0,079	0	0,677	0,124	0	0	0	0,053
B	1	1	0	0,955	0,2995	0	1	1	1	0
C	0,018	0,117	1	0,921	1	1	0,328	0,402	0,846	1
D	0,152	0,163	0,0595	1	0	0,245	0,159	0,676	0,982	0,569

#### 4.5 Generation of the Absolute Value Table

In order to find the highest and the lowest values, the absolute value table (Table 5) has been created as follows by using formula (5).

Table 5. Absolute value table for the sport clubs

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
X	1	1	1	1	1	1	1	1	1	1
A	1	1	0,921	1	0,323	0,876	1	1	1	0,947
B	0	0	1	0,045	0,700	1	0	0	0	1
C	0,982	0,883	0	0,079	0	0	0,672	0,598	0,154	0
D	0,848	0,837	0,940	0	1	0,755	0,841	0,324	0,018	0,431

#### 4.6 Generation of the Grey Relational Coefficient Matrix Table

In order to transform all the financial ratios into grey relational coefficient, the grey relational coefficient matrix table has been created as follows (Table 6) using formula (7) by taking  $\delta=0,5$ .

Table 6. Grey relational coefficient matrix table

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
A	0,333	0,333	0,352	0,333	0,608	0,363	0,333	0,333	0,333	0,346
B	1	1	0,333	0,918	0,417	0,333	1	1	1	0,333
C	0,337	0,361	1	0,864	1	1	0,427	0,455	0,765	1
D	0,371	0,374	0,347	1	0,333	0,398	0,373	0,607	0,966	0,537

There are two different conditions for evaluation of the grey relational coefficient matrix. In the first condition the criteria have the same level of importance, which is also the case for the study. In the second conditions the concerned levels are different. Assuming that the criteria have an equal level, the evaluation table (Table 7) including the degree of relationship and the rating of the companies has been created as follows. In Table 7, the numbers within brackets express the rating for each financial ratio.

Table 7. Grey relational coefficient matrix evaluation table

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	Degree of Relation	Ranking
A	0,333 (4)	0,333 (4)	0,352 (2)	0,333 (4)	0,608 (2)	0,363 (3)	0,333 (4)	0,333 (4)	0,333 (4)	0,346 (3)	0,367	4
B	1,00 (1)	1,00 (1)	0,333 (4)	0,918 (2)	0,417 (3)	0,333 (4)	1,00 (1)	1,00 (1)	1,00 (1)	0,333 (4)	0,733	1
C	0,337 (3)	0,361 (3)	1,00 (1)	0,864 (3)	1,00 (1)	1,00 (1)	0,427 (2)	0,455 (3)	0,765 (3)	1,00 (1)	0,721	2
D	0,371 (2)	0,374 (2)	0,347 (3)	1,00 (1)	0,333 (4)	0,398 (2)	0,373 (3)	0,607 (2)	0,966 (2)	0,537 (2)	0,531	3

## 5. Conclusion

In the study a comparison is performed based on the financial performances of four sport clubs registered in Borsa Istanbul. By means of the implemented method, a rating has been obtained by focusing on the entirety of the ratios instead of examining them individually. In the study each financial ratio has been taken equally with the respective level. Considering the liquidity ratios, the sport clubs with the highest degree are B, D, C and A respectively. Considering the profitability ratios, the sport clubs with the highest degree are B, C, D and A respectively.

Considering all the performance criteria integrally and implementing a general rating among the sport clubs, the sport clubs with the highest degree are B, C, D and A respectively. In this context, the B has the highest performance and A has the lowest performance. When the liquidity and profitability ratios of company B, which has the best performance in the general rating, are considered, it is observed that company B occupies the top rank. When the liquidity and profitability ratios of company A, which has the worst performance in the general rating, are considered, it is observed that company A occupies the last rank. These results indicate that the liquidity and profitability rates are effective on the general financial performances of the sport clubs. The highest effect is the effect of the profitability ratios. However it is observed that the ranking based on the profitability ratios is identical with the ranking based on the general performance ratios.

The restriction of this study is the fact that all the financial ratios were not considered. This can be improved in the future by means of a study where all the financial ratios are considered. Also by using different and multi-criteria decision making techniques, different performance evaluation studies of the sport clubs may be performed and the results may be compared.

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