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USING GREY RELATIONAL ANALYSIS TO DETERMINE THE FINANCIAL PERFORMANCE OF TURKISH FOOTBALL CLUBS**Abstract:**

Football has become an important industry in the Turkey. A huge amount of sponsoring, advertising, betting funds into football and also television rights are sold for billions of Turkish Liras. In order to compete better in Turkish league, football clubs have done considerable investments and have aspired to be listed on the stock exchange. The pioneer was Beşiktaş that went public in 2002. After that three football clubs were listed on Borsa Istanbul (BIST). The aim of this study is to evaluate the financial performance of four big (Beşiktaş, Fenerbahçe, Galatasaray and Trabzonspor) football clubs listed on BIST from 2009-2010 to 2012-2013. In order to evaluate these clubs, Grey Relational Analysis (GRA) is used. GRA is widely used in various disciplines such as economics, engineering, sociology and finance. It can be used as a rating, classification and decision making technique to determine the important factors among those required for a system with a limited amount of data set.

Keywords:

Grey Relational Analysis, Financial Performance, Turkish Football Clubs, BIST.

JEL Classification: G14, L83

1. Introduction

The economic importance of football is increasing day by day. In 2012, the Premier League (English Football League) announced new domestic live broadcasting rights deals worth just over £3 billion for the three year period from 2013/14, a %70 increase from the previous value. Domestic and oversea broadcast arrangements for England's top flight are likely to generate over £5 billion over the three year term (Deloitte 2013).

The revenue of the world's major clubs is rising every year. The increase in of their revenues also determines their sporting success. At the same time, the successful football clubs generate more revenue. This relationship is a close one; hence sporting achievements are indexed to commercial success. For example, Real Madrid, a Spanish football club, is the richest and the most valuable club in the world. Their revenue growth has been remarkable: in the 1996/97 season they generated revenues of 85 million Euro. This number was raised to 512.6 million Euro in the 2011/12 season (Deloitte 2013). The club is the world's richest football club in terms of revenue, with an annual turnover of €604 million, and is the world's most valuable sports team, worth €2.4 billion (\$3.3 billion). Real Madrid is one of three founding members of the Primera Division which have never been relegated from the top division, along with Athletic Bilbao and FC Barcelona. These club holds many long-standing rivalries, most notably El Classico with FC Barcelona and the Madrid derby with Atlético Madrid.

Currently, football teams have captivated corporate clients via sponsorship, merchandising and advertising packages. In Turkey many supporter have paid a subscription to Digiturk, a Turkish TV, to watch live football matches.

Sport and finance are two separate disciplines. Although the issues that they deal with are very different, the perspective of multi-disciplinary collaboration between the disciplines is increasing. Sport, which has become a huge industry, assigns significant responsibilities to the finance department of sport clubs. Sport clubs established as with an amateur purpose have become professional commercial enterprises. In the past, the terms budgeting, financial management and law consultancy were not considered important. However, nowadays these terms have become very popular in the sport industry (Dimitropoulos 2010).

There are numerous studies on the economics of professional football clubs. Most of them have been concerned with two issues, the first of which is the financial assessment of football clubs (Ecer & Boyukaslan 2014) (Atmaca 2012) (Uluyol 2014)(García & Rodríguez 2003) (Ascari & Gagnepain 2006) (Baroncelli & Lago 2006) The second issue is whether or not the results of matches affect the stock price of these clubs (Kaya & Gülhan 2013) (Ashton et al. 2003)(Solberg & Gratton 2004)(Coates & Humphreys 2008) (İnamlık et al. 2003) (Devecioğlu & Çoban 2003) (Berument et al. 2006) (Uludağ & Varan 2013) (Özdurak & Ulusoy 2013).

The aim of this study is to evaluate the financial performance of four major football clubs (Beşiktaş, Fenerbahçe, Galatasaray and Trabzonspor) listed on Borsa Istanbul (BIST) from 2009/10 to 2012/13. Grey Relational Analysis is used as a method.

The rest of the study is organized as follows: The next section reviews the relevant literature. Section III explains the Grey Relational Analysis. Section IV describes data, variable and methodology. Section V presents the implementation. Section VI shows the results and Section VI offers conclusions.

2. Literature Review

The finance literature is rich with studies investigating numerous interrelationships between sports and finance.

Ecer and Boyukaslan (2014) revealed that Fenerbahce has the most successful performance among the four major football clubs of Turkey by using GRA between 2008-2012 periods. The reason for the successful performance is the fact that it's high liquidity and profitability, and low liability ratios. According to the results, the second best performance is Trabzonspor. Beşiktaş takes the third place and Galatasaray is the last.

Atmaca (2012) evaluated the financial performance of four football clubs listed on Istanbul Stock Exchange (ISE) by using Topsis method. The results indicate that between 2003-2010 periods Fenerbahçe has the highest performance among its rivals.

Ascari and Gagnepain (2006) have analyzed the first and second football league of Spain. They revealed that there are some weaknesses in this league. For example their TV revenues have not been increasing, the depreciation rate reduces the profitability of the clubs and in the balance sheet there has been an imbalance between assets and liabilities. All of these have overwhelmed the ability of making profit of Spanish teams. As a result, the Spanish football clubs are not making good improvement in internal operations, efficiency, and financial management.

Buraimo et al. (2006) have analyzed the financial performance of English football clubs. In recent years, the number of English clubs which are in trouble with financial problems is increasing. The reason for financial problem is insufficient revenues, high transfer fees and bad sporting performance. Barros (2006) has stated that similar reasons exist in Portugal Football League. According to his study, the reasons for the financial instability of Portuguese football clubs are inappropriate government policy, the club's small size and poor management.

Frick and Prinz (2006) have surveyed the financial data of German football league and compared with other European leagues. The total amount of liabilities of German clubs is half of the all Italian and English club's liabilities. The supporter and the sponsorship revenues are increasing among the other leagues.

Dimitropoulos (2009) have investigated the Greek football clubs' financial data between 1994-2004 periods. According to this study, the liabilities of Greek clubs are high, the return of assets and equities are negative.

A number of papers have questioned whether football results have a sufficiently big impact on mood to justify a reaction of prices. These studies have tried to demonstrate whether there is a link between mood and stock returns on the basis of team performance.

Edmans et al. (2007) have investigated the stock market reaction after the international football results. They have found a significant market decline after losses. This loss effect is stronger in small size stocks. In addition, the football matches which are important affect the stock prices more than ordinary matches.

Berument et al. (2006) have analyzed the effect of football success on stock market returns in Turkey. They have found that Beşiktaş's victory against foreign competitors in winner's cup increase stock market returns. However, the success of other two big football clubs, Galatasaray and Fenerbahçe does not affect the stock market returns.

Renneboog and Vanbrabant (2000) have investigated the share price of soccer clubs listed on the London Stock Exchange and the Alternative investment Market at the first day of trading after a game. They have revealed that the share prices of clubs are influenced by the soccer teams' weekly sport performance. Positive abnormal returns almost 1% were realized expected following a soccer victory. On the other hand, defeats or draws are punished, respectively, by negative abnormal returns of 1.4% and 0.6%. Uludağ and Varan (2013) also have found similar results. According to their study, defeats and draws significantly affect the market value of four big football clubs which are listed on Borsa Istanbul. They claim that the investors' reactions to defeats are negative and stronger than those to draws. They conclude that the investors are not rationale. Their emotions determine the buy and sell decisions.

In contrast to the studies which were mentioned above, Zuber et al. (2005) argues that soccer team investors do not respond the information that is expected to have a measurable impact on financial situation and shareholder wealth.

3. Grey Relational Analysis (GRA)

GRA is widely used in various disciplines such as economics, engineering, sociology and finance. It can be used as a rating, classification and decision making technique to determine the important factors among those required for a system with a limited amount of data set.

The process of Grey Relational Analysis (GRA) is detailed here. Let the number of listed football clubs be m , and the number of influence factors be n . Then a $m \times n$ value matrix which is called eigenvalue is set up.

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

where $x_i(k)$ is the value of the number i listed football clubs and the number k influence factors.

Before calculating the Grey Relation coefficients, the data series can be treated based on the following three kinds of situations and the linearity of data normalization to avoid distorting the normalized data. They are:

1. Benefit – type factor (the bigger the better),

If a high criteria value is an appropriate result from the operation of normalization, the formula

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

is used.

2. Defect – type (the smaller the better)

If a low criteria value is an appropriate result from the operation of normalization, the formula

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

is used

3. Medium – type, or nominal-the-best (the nearer to a certain standard value the better).

A third situation would be an average value being an appropriate result from the operation of normalization, the formula

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

is used.

where $x_0(k)$ is the objective value of entity k .

The grey relation degree can be calculated by the following steps:

a) The absolute difference of the compared series and the referential series should be obtained by using the following formula:

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

and the maximum and the minimum difference should be found.

b) The distinguishing coefficient p is between 0 and 1. Generally, the distinguishing coefficient p is set to 0.5.

c) Calculation of the relational coefficient and relational degree by the following:

In Grey Relational Analysis, Grey relational coefficient ξ can be expressed as follows:

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

and then the relational degree follows as:

$$r_i = \sum [w(k)\xi(k)] \quad (7)$$

ξ is the Grey relational coefficient, $w(k)$ is the proportion of the number k influence factor to the total influence indicators. The sum of $w(k)$ is 100%.

4. Data, Variables and Methodology

The aim of this study is to evaluate and compare the financial performance of four major football clubs listed on Borsa Istanbul from the years 2009/10 to 2012/13. The data has been acquired from finnet's web page (www.finnet.com.tr). For evaluation of football clubs fifteen financial ratios have been used. The financial ratios used in Grey Relational Analysis (GRA) are shown in table 1.

Table 1: The Financial Ratios Used in GRA

Financial Indicators	Formulation	Code	Aim
Profitability	Return on Asset Net Income/Total Assets	PR1	Max
	Cost Margin Costs of Goods Sold/Sales	PR2	Min
	Profit Margin Net Income/Sales	PR3	Max
Growth	Net Income Growth (CY Net Income - PY Net Income) / PY Net Income	GR1	Max
	Net Sale Growth (CY Net Sale – PY Net Sale) / PY Net Sale	GR2	Max
	Asset Growth (CY Total Asset – PY Total Asset) / PY Total Asset	GR3	Max
	Liabilities Growth (CY Current Liabilities – PY Current Liabilities) / PY Current Liabilities	GR4	Min
Valuation	P/S Ratio Price/Sale	VR1	Max
	Earnings Per Share (EPS) Net Income/Number of Shares	VR2	Max
Operating Performance	Accounts Receivable Ratio (Accounts Receivable)/ ((Sales/365))	OR1	Max
	Asset Turnover Ratio (Current Assets)/((Sales/365))	OR2	Max
Debt	Debt Coverage Ratio Net Operating Income / Current Liabilities	DR1	Max
	Debt Ratio Total Debt / Total Assets	DR2	Min
Liquidity	Current Ratio Current Assets / Current Liabilities	LR1	Max
	Quick Ratio (Current Assets – Inventory) / Current Liabilities	LR2	Max

CY=Current Year PY= Present Year

In this study, three profitability, four growth, two valuation, two operating performance, two debt and two liquidity financial ratios are used as financial indicators.

Profitability indicators show a company's overall efficiency and performance. Profitability ratios can be divided into two types: margins and returns. Ratios that show margins represent the firm's ability to translate sales into profits at various stages of measurement. Ratios that show returns represent the firm's ability to measure the overall efficiency of the firm in generating returns for its shareholders. In this study, the Return on Asset, Cost Margin and Net Profit Margin profitability ratios are used. The Return on Asset ratio measures the efficiency with which the company is managing its investment in assets and using them to generate profit. Additionally, it measures the amount of profit earned relative to the firm's level of investment in total assets. The Cost Margin ratio indicates the percentage of cost in the sales. The higher cost margin ratio, the less profitability for companies. The net profit margin measures profitability after consideration of all expenses including taxes, interest, and depreciation. Return on Asset and Net Profit Margin ratios are considered to be high, on the other hand Cost Margin Ratio is considered to be low.

Growth indicators, or growth rates, tell the analyst just how quickly a company is growing. In this study, income, sale, total asset and current liabilities growth ratios are used. These ratios are normally stated in terms of a percentage growth from the prior year. It is important to see the growth ratios as high as possible except for current liabilities growth ratio. If this ratio is low, it means the company does not have to pay too much interest.

A valuation indicator is a measure of how cheap or expensive a common stock (or business) is, compared to some measure of profit or value. Valuation ratios help us figure out how the current stock price of the company compares to its performance. In this study, Price/Sales (P/S) and Earnings Per Share (EPS) are used as valuation ratios. The P/S ratio measures the price of a company's stock against its annual sales, instead of earnings. Since earnings are subject, to one degree or another, to accounting estimates and management manipulation, many investors consider a company's sales (revenue) figure a more reliable ratio component in calculating a stock's price multiple than the earnings figure. The Earnings Per Share ratio (EPS ratio) measures the amount of a company's net income that is theoretically available for payment to the holders of its common stock. A company with high earnings per share ratio is capable of generating a significant dividend for investors, or it may plow the funds back into its business for more growth; in either case, a high ratio indicates a potentially worthwhile investment, depending on the market price of the stock.

Operating Performance Indicators show how well a company turns its assets into revenue as well as how efficiently a company converts its sales into cash. Basically, these ratios look at how efficiently and effectively a company is using its resources to generate sales and increase shareholder value. In general, the higher these ratios are, the better it is for shareholders. In this study Accounts Receivable Ratio and Asset Turnover Ratio are used. Accounts Receivable Ratio is an efficiency ratio or activity ratio that measures how many times a business can turn its accounts receivable into cash during a period. In other words, the accounts receivable turnover ratio measures how many times a business can collect its average accounts receivable during the year. The asset turnover ratio evaluates how well a company is utilizing its assets to produce revenue. This ratio considers all assets, current and fixed.

Debt indicators give users a general idea of the company's overall debt load as well as its mix of equity and debt. Debt ratios can be used to determine the overall level of financial risk a company and its shareholders face. In general, the greater the amount of debt held by a company, the greater the financial risk of bankruptcy. In this study, debt coverage and debt ratios are used. "Debt coverage ratio," (DCR) is the ratio of cash available for debt servicing to interest, principal and lease payments. The higher this ratio, the easier it is to obtain a loan. Debt ratio is a solvency ratio that measures a firm's total liabilities as a percentage of its total assets. In a sense, the debt ratio shows a company's ability to pay off its liabilities with its assets. In other words, this shows how many assets the company must sell in order to pay off all of its liabilities. Companies with higher levels of liabilities compared with assets are considered highly leveraged and more risky for lenders.

Liquidity indicators are the ratios that measure the ability of a company to meet its short term debt obligations. These ratios measure the ability of a company to pay off its short-term liabilities when they fall due. Generally, the higher the liquidity ratios are, the higher the margin of safety that the company possesses to meet its current liabilities. Liquidity ratios greater than 1 indicate that the company is in good financial health and is less likely fall into financial difficulties. The most common examples of liquidity ratios include current ratio and quick ratio. In this study both ratios are used. Current ratio is balance-sheet financial performance measure of company liquidity. Current ratio indicates a company's ability to meet short-term debt obligations. The quick ratio is a measure of a company's ability to meet its short-term obligations using its most liquid assets (near cash or quick assets).

Table 2: Financial Ratios of Football Clubs

FC	Profitability			Growth				Valuation		Operation		Debt		Liquidity	
	PR1	PR2	PR3	GR1	GR2	GR3	GR4	VR1	VR2	OR1	OR2	DR1	DR2	LR1	LR2
BJKAS	-85.152	127.47	-73.602	-57.754	12.64	-9.368	30.122	2.128	-1.792	10.712	4.086	-0.24	302.174	0.202	0.092
FENER	11.784	64.986	30.414	-262.642	43.042	27.42	168.258	9.19	0.258	34.27	1.786	1.97	67.456	3.924	3.884
GSRAY	-14.016	97.752	-8.562	-27.904	24.582	63.108	46.476	3.894	-2.496	9.08	1.998	0.038	128.206	0.702	0.656
TSPOR	0.96	83.372	14.066	-228.304	40.336	8.946	60.408	3.094	0.04	11.934	4.366	0.286	84.42	0.8	0.788

PR1: From its assets, only Fenerbahçe's assets are generating profit. Other clubs are not.

PR2: Beşiktaş's cost of goods is bigger than its sales. This means it is not earning enough money. Fenerbahçe's cost is about 65%.

PR3: After all expenses and taxes are paid, Fenerbahçe's net income percentage is 30%. However, Beşiktaş and Galatasaray exceed their income or total revenue generated for a given period.

GR1: All football club's net income growth is negative. They have not generated a profit for in a four year average period.

GR2: The sale growth of four major clubs is positive. However it does not minimize the loss entirely.

GR3: Galatasaray's asset growth is higher than the other three clubs. However, Beşiktaş's asset growth is negative.

GR4: Fenerbahçe's current liabilities growth is notably higher than the others. Fenerbahçe has to pay much more interest. For Fenerbahçe, this is alarming.

VR1: Fenerbahçe's P/S ratio is greater than others. It indicates that share price has increased much more than others.

VR2: Galatasaray's and Beşiktaş's expenses are more than the revenue each company brought in. As a result of this situation, the EPS of these two clubs is negative. Fenerbahçe's and Trabzonspor's EPS is positive; however, it is too low.

OR1: The higher Accounts Receivable ratio of Fenerbahçe reflects a short lapse of time between sales and the collection of cash. It is about three times more than the others. A low accounts receivable ratio implies that Galatasaray, Trabzon and Beşiktaş should reassess their credit policies in order to ensure the timely collection of credit sales.

OR2: Beşiktaş and Trabzonspor generate approximately four Turkish Liras for every one Turkish Lira of assets. However, others generate about 1.8 Turkish Liras. Their lower ratios mean that these clubs are not using their assets efficiently and most likely have management or production problems.

DR1: The debt coverage ratio of Beşiktaş, Galatasaray and Trabzonspor is less than 1. If a debt coverage ratio is less than 1, it means a negative cash flow. Additionally a low debt coverage ratio indicates that there is not enough net operating income to cover annual debt payments. Fenerbahçe's debt coverage ratio is about 2. This figure means that Fenerbahçe's assets are generating enough income to pay its debt obligations.

DR2: Beşiktaş and Galatasaray's debt ratio is greater than 1. This indicates that these clubs have more debt than assets. In other words, it means higher risk in operation since the business would find it difficult to obtain loans for new projects. Fenerbahçe's debt ratio is 68%. It shows that 68% of the company's assets is financed through debts.

LR1: Among the clubs, only Fenerbahçe has the ability to pay its short term liabilities with its current assets. Galatasaray, Beşiktaş and Trabzonspor's net working capital is negative. Currently, all their ratios are less than 1. This indicates the liquidity weakness of three clubs.

LR2: As same as current ratio only Fenerbahçe meets its short term liabilities using its liquid assets. However, Beşiktaş's cash power is the worst.

5. Implementation

The first step of GRA is to form a comparison matrix. Table 3 shows the comparison matrix of four football clubs' financial ratios which have been formed from the table 2. In this matrix, there has to be a reference series (RF) row. If the aim is maximum value, the largest value in column will be the reference number. On the other hand, if the aim is minimum value, the smallest value will be the reference number.

Table 3: Comparison Matrix

FC	Profitability			Growth				Valuation		Operation		Debt		Liquidity	
	PR1	PR2	PR3	GR1	GR2	GR3	GR4	VR1	VR2	OR1	OR2	DR1	DR2	LR1	LR2
RF	11.784	64.986	30.414	-27.904	43.042	63.108	30.122	9.19	0.258	34.27	4.366	1.97	67.456	3.924	3.884
BJKAS	-85.152	127.47	-73.602	-57.754	12.64	-9.368	30.122	2.128	-1.792	10.712	4.086	-0.24	302.174	0.202	0.092
FENER	11.784	64.986	30.414	-262.642	43.042	27.42	168.258	9.19	0.258	34.27	1.786	1.97	67.456	3.924	3.884
GSRAY	-14.016	97.752	-8.562	-27.904	24.582	63.108	46.476	3.894	-2.496	9.08	1.998	0.038	128.206	0.702	0.656
TSPOR	0.96	83.372	14.066	-228.304	40.336	8.946	60.408	3.094	0.04	11.934	4.366	0.286	84.42	0.8	0.788

The second step of GRA is to form a normalize matrix. Table 4 shows the normalize matrix. In order to form normalize matrix, we have to need Eq (2) and Eq (3). The aim determines the Eq. If the aim is maximum (the bigger the better), we should use Eq (2). If the aim is minimum (the smaller the better), we should use Eq (3). After the calculation, table 4 the normalized matrix has been formed.

Table 4: Normalized Matrix

FC	Profitability			Growth				Valuation		Operation		Debt		Liquidity	
	PR1	PR2	PR3	GR1	GR2	GR3	GR4	VR1	VR2	OR1	OR2	DR1	DR2	LR1	LR2
RF	11.784	$\frac{64.986}{6}$	30.414	-27.904	43.042	$\frac{63.108}{8}$	$\frac{30.122}{2}$	9.19	0.258	34.27	4.366	1.97	$\frac{67.456}{6}$	3.924	3.884
BJKAS	0	0	0	0.872	0	0	1	0	0.255	0.064	0.891	0	0	0	0
FENER	1	1	1	0	1	0.507	0	1	1	1	0	1	1	1	1
GSRAY	0.733	0.475	0.625	1	0.392	1	0.881	0.250	0	0	0.082	0.125	0.741	0.134	0.148
TSPOR	0.888	0.705	0.842	0.146	0.910	0.252	0.780	0.136	0.920	0.113	1	0.238	0.927	0.160	0.183

The fourth step of GRA is to form an absolute values table. This table is formed by using Eq (5). In other words, normalized values are subtracted from reference values.

Table 5: Absolute Values Table

FC	Profitability			Growth				Valuation		Operation		Debt		Liquidity	
	PR1	PR2	PR3	GR1	GR2	GR3	GR4	VR1	VR2	OR1	OR2	DR1	DR2	LR1	LR2
BJKAS	1	1	1	$\frac{0.127}{1}$	1	1	0	1	$\frac{0.744}{3}$	$\frac{0.935}{2}$	$\frac{0.108}{5}$	1	1	1	1
FENER	0	0	0	1	0	$\frac{0.492}{4}$	1	0	0	0	1	0	0	0	0
GSRAY	0.2661	0.524	0.3747	0	$\frac{0.607}{1}$	0	$\frac{0.118}{3}$	$\frac{0.749}{9}$	1	1	$\frac{0.917}{8}$	$\frac{0.874}{2}$	$\frac{0.258}{8}$	$\frac{0.865}{6}$	$\frac{0.851}{2}$
TSPOR	0.1116	0.2942	0.1571	$\frac{0.853}{7}$	0.089	$\frac{0.747}{3}$	$\frac{0.219}{2}$	$\frac{0.863}{2}$	$\frac{0.079}{1}$	$\frac{0.886}{7}$	0	$\frac{0.761}{9}$	$\frac{0.072}{2}$	$\frac{0.839}{3}$	$\frac{0.816}{4}$

The fifth step of GRA is to form the Grey Relational Analysis Coefficient matrix. Table 6 is constructed by using Eq (6). In the Eq (7) the value 0,5 is used as a grey relational coefficient. It is a common use in financial researches.

Table 6: Grey Relational Coefficient Matrix Table

FC	Profitability			Growth				Valuation		Operation		Debt		Liquidity	
	PR1	PR2	PR3	GR1	GR2	GR3	GR4	VR1	VR2	OR1	OR2	DR1	DR2	LR1	LR2
BJKAS	0.333	0.033	0.033	0.797	0.033	0.033	1	0.033	0.401	0.034	0.082	0.033	0.033	0.033	0.033

FENER	1	1	1	0.033	1	0.050	0.033	1	1	1	0.033	1	1	1	1
GSRAY	0.652	0.488	0.571	1	0.451	1	0.808	0.366	0.033	0.033	0.008	0.036	0.658	0.366	0.370
TSPOR	0.817	0.629	0.760	0.369	0.848	0.400	0.695	0.366	0.863	0.360	1	0.396	0.873	0.373	0.379

The last step of GRA is to indicate the grey relational grades of football clubs. For calculation of these ranks and grades Eq (7) is used.

Table 7: Grey Relational Coefficient Matrix Assessment Table

	Profitability		Growth		Valuation		Operation		Debt		Liquidity	
	Relation Grade	Rank	Relation Grade	Rank	Relation Grade	Rank	Relation Grade	Rank	Relation Grade	Rank	Relation Grade	Rank
BJKAS	13.3%	4	46.6%	3	21.8%	4	6%	3	3%	4	3%	4
FENER	100%	1	27.9%	4	100%	1	51.7%	1	100%	1	100%	1
GSRAY	57.0%	3	81.5%	1	20.0%	3	2%	4	35%	3	36.7%	3
TSPOR	73,5%	2	57.9%	2	61.5%	2	68%	2	63.4%	2	37.7%	2

Table 8: General Results of Grey Relational Analysis

	General	
	Relation Grade	Rank
BJKAS	19.66%	4
FENER	74.34%	1
GSRAY	45.64%	3
TSPOR	60.91%	2

6. Findings

According to GRA results, the rank shows that Fenerbahçe is at top of the list, Trabzonspor is second, Galatasaray is third and Beşiktaş is at the bottom. Except for Growth indicator, in all financial indicators Fenerbahçe takes first place. Trabzonspor's rank does not change. In all indicators it maintains its rank. It is the second team that shows good performance. Beşiktaş's financial performance is the worst among the four clubs. According to four indicators, Beşiktaş is at the bottom of list. In the remaining two indicators, its rank is third. Galatasaray is ranked first only in growth indicator. In general it shares the last ranks with Beşiktaş. This means the financial performance of Galatasaray is poor.

These findings are consistent with Ecer and Boyukaslan (2014) study. In this study they found that Fenerbahçe was ranked first, and Trabzonspor second. My findings show these same rankings. However, the third and fourth ranks differ. Ecer and Boyukaslan (2014) revealed that the rank of Beşiktaş is ranked third and Galatasaray is fourth according to their GRA. Atmaca (2012) also revealed that the financial performance of Fenerbahçe is better than the other three. In Atmaca's (2012) study, he used TOPSIS method to rank the four major football clubs in Turkey.

7. Conclusion

In Turkey football is a very popular sport. There are numerous football clubs, however the four major clubs, Beşiktaş, Fenerbahçe, Galatasaray and Trabzonspor, are the largest and most supported of all. Only these clubs are listed and traded on Borsa Istanbul. The financial value of these clubs is determined in this stock exchange. The rising share price of these clubs increases the market value. On the other hand, the downward movement decreases the value of club. The reason of increasing value is sporting success: thanks to sporting success, football clubs may generate more revenue. For example, Real Madrid, Barcelona and Manchester United have achieved success and have generated revenue. Sporting success and financial success are inter-connected and highly correlated.

According to Grey Relational Analysis, Fenerbahçe is at the top of the rankings and Beşiktaş is at the bottom. The analysis made among the four clubs is not able to draw enough attention to the huge gulf which exists between them. In my opinion, the normal performance of Fenerbahçe appears as a good performance among others poor performance. In fact, the most important issue from the analysis is the worst performance of Beşiktaş. Depending on financial ratios, the situation of Beşiktaş worsens. For Beşiktaş it will be difficult to survive in professional football in Turkey, as it had to change its balance sheet composition to survive. Galatasaray also suffers from management of its financial performance. In its accounts there is some structural weakness. In both clubs' balance sheets there is equilibrium between assets and liabilities. There is a huge disparity.

Beşiktaş and Galatasaray are highly leveraged. Moreover, they have trouble with severe losses and negative returns on assets and equities. All these facts may lead these clubs to have intense financial troubles in the future. The negative financial results affect the sporting performance of Beşiktaş adversely. Hence, these clubs cannot maximize their sporting performance without taking into account the financial performance.

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