Analysis of Corporate Governance
and Financial Sustainability Using the TOPSIS Method

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Abstract

Stakeholders of listed companies are interested in the financial sustainability and corporate governance (CG) issues in the companies. This study aims to explore the relationship between corporate governance practices and financial sustainability in light of OECD principles of corporate governance. Altman's Z-scores and CG ratings of 20 companies listed in the Borsa Istanbul Corporate Governance Index (XKURY) were analyzed using the TOPSIS method. The results obtained in this study show that firms' financial sustainability and corporate governance scores don't move in the same direction for the years from 2013 to 2018.

Key words: Corporate Governance, Financial Sustainability, TOPSIS, Altman's Z-Score, BIST-XKURY

JEL Code: C10, C88, G10, G15

1. Introduction

Corporate governance (CG) provides a reliable investment environment for investors and companies to raise funds. The CG systems rely on the separation of rights, duties, and responsibilities among various members of a company such as board members, managers, shareholders, and stakeholders. There are many reasons why CG systems and practices become so important in the world. The most dominant reasons among these are declining levels of investors and creditors' trust in company reporting due to financial scandals and crises. The OECD Principles of

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CG were agreed by the OECD council in 1999 and became a criterion for creditors, investors, managers, owners, decision-makers, and stakeholders all around the world. These principles have been adopted and used by many firms since (OECD, 2004). The four pillars of CG systems suggested were shareholders, stakeholders, the board of directors, and transparency and disclosure. The principles related to each of these components were defined clearly and the main aim was to achieve the objectives of accurate measurement and improvement of company performance.

CG plays an important role in the efficiency and effectiveness of financial markets in countries. To build good CG systems, transparency between firms and shareholders is crucially important for building greater investor confidence in the system. However, this, by itself, is not sufficient to attract foreign capital and investors. Both local and foreign investors are curious about the financial sustainability of companies that they consider for investment since they are looking for the best returns from what they invest in. Therefore, they need strong and reliable evidence about the financial standings of the companies they consider for investment. Altman's Z-score is one of the most preferred models to measure companies' financial sustainability. By using Altman's Z-score, it is possible to evaluate the financial standing of a company from different views. Therefore, Altman's Z-score model is used in this study to evaluate the financial sustainability of the 20 companies listed in the Borsa Istanbul (BIST) Corporate Governance Index (XKURY). The major contribution of this study is that it provides an evaluation of the relationship between CG and financial sustainability. The existing literature had examined the relationship between CG and financial performances of firms. In this respect, TOPSIS rankings of independent CG ratings of the 20 listed companies and the Altman's Z-scores of companies are compared.

The study is constructed as follows. The next section presents the conceptual framework. The third section is a literature review that is followed by the methodology. In this part, CG rating scores of 20 companies listed in BIST-XKURY for the years from 2013 to 2018 are ranked by using TOPSIS, and then the results of TOPSIS are compared with the financial sustainability of companies obtained through calculations of Altman's Z-scores. The findings are discussed in the conclusion.

2. Conceptual Framework

Corporate scandals have negatively affected trust in international capital markets. It has been revealed that the managers and directors of even world-renowned companies do not hesitate to use certain creative accounting techniques that will make look the companies more successful and profitable. The majority of creative accounting applications are not necessarily illegal. However, they are still misleading to investors and other decision-makers interested or involved in the related company. International and national crises have once again displayed the necessity of well-designed CG systems and their solid applications (Clarke, 2001). History also reveals that, on many occasions, when certain groups such as shareholders, managers, or other related parties are relatively powerful, it would influence misleading and/or fraudulent accounting practices and financial reporting without considering their effects on investors, creditors, other shareholders and

other related parties. With a broader perspective, the biases and intentional misleading of management of corporations were among the main reasons for deformation of the trust in financial and capital markets and therefore destroying the mechanisms and operations of financial markets and almost every aspect of the economy. Enron, WorldCom, Kanebo were some of the scandals examples that influence the world economy for both developed and emerging economies. The main reasons for the bankruptcy of these companies were economic difficulty, deceit in fiscal reporting, deficiency of management. Financial reporting has an ambiguous responsibility for limiting or facilitating opportunities for fraudulent applications and therefore preventing financial scandals due to misleading financial information.

The reasons such as failures in partnership management, financial frauds committed, financial crises, and audit scandals experienced and increasing economic interdependence of countries have been effective in increasing the significance of sound CG practices (Dinc and Abalıoglu, 2009). Currently, CG practices are very significant in both developed and developing economies, since successful CG practices are considered to be the main factor of a reliable investment environment for both domestic and foreign investors and to ensure the sustainability of the economy. For global investors, issues such as transparency, independent board members and audit committee are crucially important. Most of the international investment companies have serious doubts about investing in enterprises that do not have good CG practices. The companies that ignore CG applications are facing greater difficulty in obtaining funds due to being perceived riskier (McGee, 2009).

According to Claessens (2006), higher company appraisal as well as a good relationship with other stakeholders are achieved through CG mechanisms. CG is a system guided and controlled with rules and practices which determines the relationships among the owners, managers, board members, employees, customers, suppliers, and the stakeholders of the enterprise (Colley, 2004). Stakeholder theory addresses more active participation of both shareholders and stakeholders in corporate decision making. Freeman and Reed (1983) define stakeholders as "Any identifiable group or individual who can affect the achievement of an organization's objectives or who is affected by the achievement of an organization's objectives". Positive cooperation with stakeholders ensures the success of a business. The domains addressed by CG practices aimed towards stakeholders include their effect on a company's management, protection of employees' rights, relationships with customers and suppliers, ethical behaviour, and social responsibility (Saygili et al., 2021). Accordingly, the main objective of a good corporate governance framework would be to maximize firms' contributions to the overall economy, including all stakeholders (Claessens and Yurtoglu, 2012). Therefore, better governance practices are expected to enhance monitoring and stakeholder protection, which will lead to better resource allocation and business decisions, thereby producing better financial results. According to Cheng et al. (2014), firms with superior CSR performance face much reduced capital constraints, and Ntim and Soobaroyen

(2013) found that combining CSR and CG practices had a bigger beneficial influence on financial performance.

Shareholders who are members of the board may have interests that conflict with those of other shareholders and stakeholders. Therefore, CG principles seek to guarantee equal treatment and protection of the overall groups of both shareholders and stakeholders. Other studies have focused on the beneficial role of stakeholders and corporate social responsibility for firms (Barnett and Salomon, 2012; Berman et al., 1999; Berrone et al., 2007; Choi and Wang, 2009; Harrison and Wicks, 2013). Relations with employees or with the natural, social, or business environment influence the going concern of an entity, its ability to achieve its targets, and its profitability. A fair, transparent, and responsible company signals its characteristics through its activity. It is broadly agreed that the quality of corporate policies related to business relations with owners, employees, suppliers, customers, competitors, and the community are reflected in a firm's financial results.

Corporate Governance Environment in Turkey

CG concepts have been very welcomed by most of the developed and developing countries. The authorities all over the world have quickly grasped the main philosophy and understood the benefits to be derived from successful and honest applications of CG systems and practices. Turkish economy is a developing economy and as it is in most other developing economies, companies have problems raising funds for sufficient financing of their investments and operations in Turkey. Therefore, the need for the adoption of solid CG systems and practices has been clearly understood by Turkish Companies. CG systems and applications play a crucial role for companies in Turkey to attract foreign investors to raise the necessary funds. After an evaluation of both international codes and practices, CG studies have been started in Turkey in 2002. The first study about CG applications in Turkey is a report which is based on OECD principles of CG and it was done by Turkish Industrialists and Businessmen's Association-TUSIAD (TUSIAD, 2002). In this initial report, published by TUSIAD in 2020, information about actions and obligation of the board of directors were especially emphasized. It has five main parts, namely, shareholders' rights, fair treatment of shareholders, disclosure to public, transparency, and responsibilities of boards of directors. In 2003, Turkey Corporate Governance Association-TKYD was started for determining the finest CG technics and practices for companies (TKYD, 2019).

In 2003, the Capital Markets Board (CMB, 2005) has declared CG principles which were adapted from OECD (2004) CG principles. This was necessary to enable foreign companies that traded their shares and other forms of securities in the Turkish Capital Markets. Afterward, CMB CG principles were revised and republished in 2005 because of dynamic economic situations. The four pillars of CG are shareholder rights, public disclosure and transparency, stakeholder rights, and the board of directors (CMB, 2005). Shareholder rights include issues like voting rights, dividend rights, minority rights, and the right to attend the general assembly. Public disclosure and transparency are concerned with timely and accurate disclosure of material issues and periodic corporate reports. Stakeholder

rights include issues about employees, creditors, trade unions, non-governmental organizations, potential investors and suppliers, customers, and governmental organizations. The board of director's principle comprises matters like duties, meetings, and the number of independent board members, board committees, and CEO duality.

The stock market of Turkey, BIST accepts a CG index that is called XKURY. In 2005, Istanbul Stock Exchange has identified the main criteria of scoring procedure of the index and declared to the main aim of the index as to compute and evaluate the price and return performances of firms operated in BIST Markets. XKURY examines listed firms, which are not included in the Watch List and Lists C and D, with a CG rating of minimum 7 and over 10 as a whole and a minimum of 6.5 for each of the four main principles (SPL, 2014). The companies are assigned a value between 1 and 10 by independent rating agencies for their CG systems and applications regarding each of the four main principals. 1 is the lowest value meaning there is a weak CG system and 10 is the highest value showing an effective management and audit mechanism for investors (BIST, 2019). In Turkey, SAHA is an independent CG rating agency that determines professionally CG scores of companies that are listed in BIST. After evaluating the related information, the rating committee determines a rating for the company (SAHA, 2019).

Financial Sustainability and Altman's Z-score

Global competition among companies has been very fierce in the last 2-3 decades. Sustainability concept has emerged to be the main topic for the firms trying to continue their existences and maintain their competitiveness (Demir and Sezgin, 2014). The sustainability concept can be used in many different areas. For example, sustainable innovation, sustainable tourism, sustainable economy, sustainable operations, etc. It is hard to make a definition of sustainability concept accepted by everyone (Yavuz, 2010). The basic definition of sustainability is the ability to continue processes, productivity, and functions of the ecological system in the future (Chapin et al. 1996). Within the frame of social sustainability, future generations should be thought while using resources to provide needs for today's humans. The sustainability concept can be used by companies in different areas. Corporate sustainability is a strategy that integrates economic, social, and environmental aspects. When companies enter the international markets and operate in these areas, they need to have additional responsibilities and adopt common values such as preventing discrimination because of race, gender, religion, etc. Besides, they have to be more willing to take advantage of developments of communication technologies and to be more sensitive about social and environmental responsibilities (Ozturkoglu and Esendemir, 2014). Financial sustainability is an important component in terms of corporate social responsibility (CSR), sustainable development, and corporate sustainability. According to Carroll's (1991) CSR pyramid, the primary responsibility of a corporation is sound financial performance. According to Sheehy and Farneti (2021) sustainable development includes economic sustainability and profitability is equated with

ecological sustainability. The United Nations (UN) Sustainable Development Goal (SDG) 8 refers to economic sustainability as "promoting sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all." Furthermore, corporate sustainability is concerned with financial sustainability (Sheehy and Farneti, 2021). Dyllick and Hockert's definition of corporate sustainability includes organization's stakeholders, those who have a direct impact on the company's operations, finance or market.

Economic sustainability includes issues such as the management of equity capital, foreign resources, and intellectual capital. If the company achieves and maintains effective economic sustainability, it will be able to provide a sustainable return and liquidity to its stakeholders. Intellectual capital is usually the most important asset of a business and is very difficult to measure. Especially in the 21st-century digitalization and digital know-how are crucially important (Karacaer et al., 2009). The purpose of companies is to create long term value within existing constraints of economic, social, and environmental issues considering the inherent risks and opportunities available (Nemli, 2004). Economic sustainability can be achieved through careful consideration and optimal combination of operating expenses, profitableness, and utilization of resources of the company by giving the highest emphasis given to human and environmental resources. Economic sustainability is the financial continuity of their operations in business life. Staying in business requires making investments with an expected rate of return, which is a minimum profit. Although profits may be relatively easy to determine, other non-measurable or not easily measured but very important factors that determine gauge economic sustainability. A company's financial sustainability can affect customers, shareholders, workers, suppliers, capital owners, etc. Good financial sustainability contributes to the prosperity of the country. While a good CG plays a positive role in business operations. The sustainability of publicly held corporations is more significant. To support economic sustainability, firms may supplement standard financial accounting and reporting systems with more advanced versions and techniques. CG systems require management and audit committees of corporations to be fully transparent, equitable, accountable, and honest. All of these factors are basics for maintaining financial sustainability for firms (Nemli, 2004).

Stakeholders, managers, employees, shareholders of the corporation are interested in the financial sustainability of the corporation. Financial ratios are often used for analyzing the financial health of companies. Investors prefer to invest in companies that have the potential to gain value and to make a profit. So, they try to avoid investing in the companies that are in or have the potential to be in financial distress. For this reason, many stakeholders are willing to search for techniques to evaluate financial performance and to predict bankruptcy. There are many examples of unexpected bankruptcy, but it is not quite possible to predict them long before they occur. Altman's Z-Score is the most preferred (Carton and Hofer, 2006; Hayes et al., 2010; Kivuvo and Olweny, 2014; Tyagi, 2014) numerically predictive method which is applied to estimate a companies' financial sustainability (Moyer, 2004). Edward Altman, who is a professor of finance, established Altman's Z-score in which is the first multivariate bankruptcy prediction model (Altman, 1968). Besides, Altman's model has been used widely by academicians and professionals

(Coats and Fant, 1993; Wilson and Sharda, 1994). After this model, multivariate prediction models have become widespread around the world through finance and banking researches.

Bankruptcy forecasting models are significant mechanisms for rating agencies that they use these models to choose the most suitable companies for their portfolio. Financial difficulties possess danger to investor earnings, but the risk can provide higher returns under certain circumstances with short sale strategies. Rating agencies try to understand and quantify the risks involved with the existence and issuance of securities so, they will have a rational prediction for future values and the possibility of both favorable and unfavorable outcomes. Altman (1983) suggested that the administration of troubled companies can apply the Z-Score model for financial evaluations. The Z-Score is a model consisting of financial ratios and discriminant analysis is a very helpful tool to predict companies' future bankruptcy. It is so popular because Z-Score is applied easily, and data can be acquired effortlessly. Also, its high predictive power is a reason for its preferences.

In accounting, financial ratios can be used for analyzing a company's financial standing through consideration of liquidity, operational efficiency, profitability, financial structure, long term solvency, and turnover ratios. In this study, the Z-score model that was developed by Altman based on solvency ratios. Solvency ratios test the financial standing of a firm and its capacity to pay back especially long-term loans. These ratios are extremely important for bank loan officers. Solvency ratios supply evidence for the financial health and activities of a business.

Table 1. Altman's Z-Score Intervals for Publicly Traded Companies

Score	Zone	Result
Z < 1.81	Distress	likely to be bankrupt
1.81< Z <2.99	Gray Zone	Stable
Z > 2.99	Safe Zone	Safe

Resource: Hauschild, (2013)

If Z-score is greater than 2.99, the company is financially safe and doesn't have a bankruptcy risk. If the Z-score is less than 1.23 means that the business has a moderate risk of bankruptcy. A Z-score of less than 1.81 is a signal of high bankruptcy risk. A high Z-score is an indicator of strong financial sustainability while low Z-score indicates that the company is not financially sustainable (Ferrier et al., 2002). Altman's early analysis was applied to a sample of 66 publicly traded, production companies. Thirty-three of the companies had been classified for having a high risk for bankruptcy and all had resources over $ 1 million. The model did an excellent job of being able to foresee financial failures for 95% of the companies, one year earlier to their collapses. Efficiency decreases to 72% in two years and 52% in three years earlier to bankruptcy (Altman, 1968).

3. Literature Review

Agency theory which describes the relationship between agent and principal has an important role in theories of CG. According to Ross (1973), the agent as a director of the corporation behaves on behalf of shareholders for every kind of decision. When companies become larger, the number of shareholders increase and if the company grows, professional managers can be hired for managing operations of the firms (Ogbechie, 2012). This creates a relationship of agency theory between the person(s) called principal(s) and employed managers called agents with the authority to operate and decide for the principals (Jensen and Meckling, 1976). Both the principal and agent aim to maximize their interests which may lead to conflicts between agent and principal. An agent may favor his/her benefits rather than the benefits of the principle, although he/she is employed and expected to protect and favor the overall benefit and well-being of the principle. Conflict of interest causes agency problems. When companies are taken under close perspective, it can be seen that in almost all of them the problems of conflict of interest or the power of attorney are evident between managers and shareholders. Principles need to set up a system to prevent or minimize the agency problem caused by usually the principal's lack of information related to material issues. These systems are all components of CG applications more specifically systems related to the auditing committee, transparency, and minority interest concepts. Also, reward systems set up to benefit agency when certain objectives obtained should be designed carefully to prevent and minimize conflict of interest between the principal and the agent (Jensen and Meckling, 1976). However, it is almost impossible to get rid of this problem altogether solely by even the best reward systems. According to Shleifer and Vishny (1997), this issue varies among companies based on different cultural and economic parameters. Therefore, it becomes evident once again that the system of CG is extremely important to provide harmony between shareholders and managers that may have conflicts of interest.

In the research stream, there is a wide range of studies related to CG. Up to our knowledge, there aren't any studies investigating the relationship between CG and financial sustainability. There are studies about CSR and financial performance (Brammer and Millington, 2008; Fiori et al., 2007; Rettab et al., 2009; Karagiorgos, 2010) while most of the studies focus on the relationship between CG and financial performance. Past researchers reported conflicting results about the relationship between CG variables and financial performance. Some of the studies indicated a positive relationship (Saygılı and Öztürkoğlu, 2017), while some of them reported a negative (Lehman and Weigand, 2000) or no relationship (Burkhart et al., 1997; Bolton and Von Thadden, 1998; Demsetz and Villalonga, 2001). In this part, recent studies searching for the relationship between financial performance and CG will be reviewed. Table 2 presents a summary of the reviewed articles.

Past studies mostly conducted in developed countries provided evidence for the relationship between CG practices and financial performance. Rhodes et al.

(Rhoades et al., 2000) conducted a meta-analysis including 37 studies with a total data of 7644 large companies, mostly from Fortune 500. Accordingly, board compositions of companies had a small relationship with financial performance. Kiel and Nicholson (Kiel and Nicholson, 2003) presented a positive correlation between board size and market capitalization, the proportion of inside directors, and Tobin's Q for Australian listed companies. Erhardt et al. (Erhardt et al., 2003) indicated a positive relationship between board diversity and ROA for large U.S. companies. Berthelot et al. (Berthelot et al., 2010) argued that CG rankings published by the market information intermediary were related to firm market value and accounting results. Ueng (2016) stated that good CG practices had a positive impact on financial performance. The CG indicators included board rating, compensation policy, takeover defense strategy, accounting practice, and formal governance policy. The research conducted in the emerging market, Singapore (Nguyen et al., 2014) provided evidence for a positive relationship between board diversity, board size, and ownership structures, and Tobin's Q. Gruszczynski (2006), observed a significant association between the governance rating and the operating profit margin and also with the debt leverage ratio in Polish companies. On the other hand, Sanda et al. (2010) found there was no effect on director shareholding and board size on ROE. Ownership concentration had a significant positive effect in all but one case, PE ratio.

Recent studies in Turkey stated either a positive or no relationship between CG and financial performance indicators. For instance, Gurbuz et al. (2010) found a positive relationship between corporate ownership and financial performance in 164 companies listed in ISE. Acar Erdur and Kara (2014) indicated a favorable relation between CG ratings and market to book ratio in companies listed in BIST-XKURY from 2006 to 2012. However, there was no relevant link between CG ratings, and return on sales ratio, return on assets ratio, return on sales ratio, and net profit. Accordingly, (Cengiz, 2016) the companies that were listed in BIST-XKURY have higher financial performances compared to the companies that were not listed. The results of the study conducted by Alper and Aydogan (2017) illustrated a significant positive relationship between CG ratings and ROA and Tobin's Q. Further, Suadiye (2017) argued a positive effect of CG on financial performance 107 listed firms in ISE. A number of studies exploring the relationship between CG ratings and financial performance indicators using the TOPSIS method didn't found any significant relationship (Conkar et al., 2011; Ege et al., 2013; Esendemirli and Erdener Acar, 2016; Yildirim et al. 2018; Saygili and Sahin, 2018).

Table 2. Literature Review about Corporate Governance and Financial Performance

Author	Variables	Data Set	Methodology	Results
Rhoades et al. (2000)	Accounting indicators	37 studies including 7644 organizations	Meta-analysis	Corporate board composition had a small positive relationship with financial performance.

Kiel and Nicholson (2003)	Market capitalization, ROA, Tobin's Q	348 largest publicly listed corporations of Australia	Regression analysis	Board size was positively correlated with firm value. A positive relationship between the proportion of inside directors and Tobin's Q.
Erhardt et al. (2003)	ROA, Return on Investment (ROI)	127 large U.S. companies	Correlation and regression analyses	Board diversity was positively associated with ROA.
Berthelot et al. (2005)	Accounting indicators	289 listed Canadian companies from 2002 to 2005	Panel data analysis	CG rankings published by the market information intermediary are related to firm market value and accounting results.
Gruszczynski (2006)	20 financial ratios	16 Polish listed companies	Ordered logistic regression	The significant association had been observed between the governance rating and the operating profit margin and also with the debt leverage ratio.
Gurbuz et al. (2010)	ROA	164 companies listed in ISE from 2005 to 2008	Panel data analysis	A positive relationship between corporate ownership and financial performance.
Sanda et al. (2010)	ROA ROE Tobin's Q	93 listed companies in the Nigerian Stock Exchange	Pooled ordinary least squares regression analysis	No effect of director shareholding and board size on ROE. Ownership concentration has a significant positive effect in all but one case, PE ratio.
Conkar et al. (2011)	Current ratio, Profit to capital ratio, Leverage ratio	7 companies from 2007 and 10 companies from 2008 which are from ISE.	TOPSIS	A significant relationship was not found between CG ratings and financial performances of the companies.
Ege et al. (2013)	9 financial ratios	18 firms traded in ISE-XKURY Index from 2009 to 2011	TOPSIS	A significant relationship was not found between CG ratings and financial performances of the companies.
Acar Erdur and Kara (2014)	Market to book ratio, Return on sales ratio, ROA, Return on sales, and Net profit.	Companies listed in BIST-XKURY from 2006 to 2012	Panel data analysis	Positive relationship CG ratings and market to book ratio.

Esendemirli and Acar (2014)	10 Financial ratios	The research covers data for 24 non-financial companies in 2013 and 28 non-financial companies in 2014	TOPSIS	A significant relationship was not found between CG ratings and the financial performances of the companies.
Nguyen et al. (2014)	Tobin's Q	257 Singaporean domiciled non-financial listed companies	System generalized method of moments estimator	A positive relationship between board diversity, board size and ownership structure, and Tobin's Q.
Cengiz (2016)	ROA, ROE, EPS, Net profit margin, Market to book ratio	The companies listed and non-listed in the BIST-XKURY	T-test and Mann-Whitney U test	The companies that were listed in BIST-XKURY have higher financial performances compared to the companies that are not listed.
Ueng (2016)	Stock Return	3068 firms from the database of 2010 Corporate Library	The logistic regression model	Firms that had excellent CG tactics provide better financial performance to increase shareholders' worth.
Alper and Aydogan (2017)	ROA, Tobin's Q	38 firms in BIST-XKURY between 2007 and 2015	System Generalized Moments Method	A significant positive relationship between CG scores, and ROA and Tobin's Q.
Suadiye (2017)	Tobin's Q, ROA, ROE	107 listed firms in ISE from 2010 to 2015	Regression analysis	A positive effect of CG on financial performance.
Yildirim et al. (2018)	9 Financial Ratios	5 food and beverage companies listed in ISE between 2013 and 2016	Entropy-based TOPSIS	A significant relationship was not found between CG ratings and financial performances of the companies.
Saygili and Sahin (2018)	10 Financial Ratios	BIST cement sector companies from 2009 to 2016	TOPSIS	The results indicated that there was no relationship between stock prices and financial performances of the companies.

Source: Authors

4. Methodology

This study aims to find the relationship between CG and the financial sustainability of the companies listed in BIST-XKURY. CG ratings of 20 companies listed in BIST-XKURY between 2013 and 2018 fiscal years are ranked by assigning equal weight to each criterion using the TOPSIS method. The financial

sustainability of the companies is calculated by using Altman's Z-score. Finally, TOPSIS and Altman's Z-score results of the companies are compared and evaluated. CG ratings and financial data were obtained from Public Disclosure Platform (KAP, 2019). The selected BIST-XKURY companies are presented in Table 3.

Table 3. The Selected BIST- XKURY Companies for the Analysis

No	Code	No	Code	No	Code	No	Code
1	AEFES	6	DOAS	11	OTKAR	16	TUPRS
2	ARCLK	7	GLYHO	12	PRKME	17	TTKOM
3	ASELS	8	HURGZ	13	TAVHL	18	PRKAB
4	AYGAZ	9	IHLAS	14	TOASO	19	TTRAK
5	CCOLA	10	LOGO	15	TRCAS	20	VESTL

The Altman's Z-score model is as noted below:

$$Z = 3,3\ X1 + 0,99\ X2 + 0,6\ X3 + 1,2\ X4 + 1,4\ X5$$

Financial Ratios included in Altman's Z-Score model are:

X1: Return on Total Assets (ROA) = Earnings before Interest and Taxes / Total Assets
X2: Sales to Total Assets= Net Sales /Total Liabilities
X3: Equity to Debt =Market Value of Equity / Total Liabilities
X4: Working Capital to Total Assets = Working Capital / Total Assets
X5: Retained Earnings to Total Assets =Retained Earnings / Total Assets

4.1. TOPSIS Method

TOPSIS (Technique for Order Preference by Similarity to Ideal Situation) is one of the multi-criteria decision-making technique (Hwang and Yoon, 1981). While making a decision or selecting an alternative with the TOPSIS method, it is expected to be close to a positive ideal solution and far from a negative ideal solution. In the TOPSIS method, the chosen alternative should have the shortest geometric distance from the positive ideal solution and the longest geometric distance from the negative ideal solution (Assari and Assari, 2012). TOPSIS is created with seven successive steps as follows:

Step 1: Creating the Decision Matrix

The first step of TOPSIS is to arrange of decision matrix by a decision maker with m alternatives, n attributes (criteria) in Aij matrix. The representation of the decision matrix is as follows:

$$A_{ij} = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix}$$

Step 2: Obtaining the Normalized Decision Matrix

In this step, the decision matrix has formed. The square of each aij value (a11, a21, … am1) is taken and the column sums of these squares are calculated. Then, each aij value is divided by the square root of the column totals to which they belong. As a result of this process, the normalized decision matrix is obtained which is necessary since each aij value may have very different absolute values that may distort a rational comparison. The representation of the process with the formula is as follows;

$$N_{ij} = \frac{a_{ij}}{\sqrt{\sum_{i=1}^{m} a_{ij}^2}} \ (i = 1, \dots, m \ ve \ j = 1, \dots, n$$

After applying the formula, the normalized matrix is created as follows.

$$N_{ij} = \begin{bmatrix} n_{11} & n_{12} & \dots & n_{1p} \\ n_{21} & n_{22} & \dots & n_{2p} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ n_{m1} & n_{m2} & \dots & n_{mp} \end{bmatrix}$$

Step 3: Determine the Weighted Normalized Decision Matrix

The weight of each criterion is assigned with a value such as wij in the matrix, which is determined according to its level of importance. The only subjective input of the TOPSIS method is the weights. In this study, the weight of each decision criteria is determined to be equal. The total of the assigned wij values must be equal to one. It can be represented as;

$$\sum_{i=1}^{n} w_i = 1$$

In this step, the bij values obtained from the normalized matrix are multiplied by the wij weights so that the weighted normalized matrix side V matrix is obtained.

$$
V_{ij} = \begin{bmatrix} w_1 n_{11} & w_2 n_{12} & \cdots & w_n n_{1p} \\ w_1 n_{21} & w_2 n_{22} & \cdots & w_n n_{2p} \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ w_1 n_{m1} & w_2 n_{m2} & \cdots & w_n n_{mp} \end{bmatrix} \overset{V_{ij}}{\Rightarrow} \begin{bmatrix} V_{11} & V_{12} & \cdots & V_{1P} \\ V_{21} & V_{22} & \cdots & V_{2P} \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ V_{m1} & V_{m2} & \cdots & V_{mp} \end{bmatrix}
$$

Step 4: Obtaining Ideal and Negative Ideal Solution Values

After obtaining the V matrix, that is, the weighted normalized matrix, the maximum values of each column are selected by adhering to the purpose of the research, that is, if the goal is maximization. These selected values are ideal solution values. Then, the minimum values for each column are selected. These selected values are negative ideal solution values. The formula for ideal positive and negative solution value is shown below.

Positive ideal solution + A:

$$
A^+ = (v_1{}^+ , v_2{}^+ ,..., v_n{}^+) = max
$$
$$
v_{ij}
$$

Negative ideal solution – A:

$$
A^- = (v_1{}^- , v_2{}^- ,..., v_n{}^-) = min
$$
$$
v_{ij}
$$

Step 5: Calculate the separation measures from the positive ideal solution and the negative ideal solution

Euclidean is used for calculating distance values.

Ideal distance:

$$
S_i^* = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^*)^2}
$$

Non-ideal distance:

$$
S_i^- = \sqrt{\sum_{j=1}^{n}(v_{ij} - v_j^*)^2}
$$

where, i = criterion index, j = alternative index. As a result of these calculations, S_i^* and S_i^- values will be found as much as the decision point.

Step 6: Calculate the Relative Closeness to the Ideal Solution

In calculating the relative proximity, distances to non-ideal and ideal points are used. The relative proximity to the ideal solution is indicated by the C_i^* symbol.

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^*}.$$

C_i^* value should be between zero and one. The absolute proximity to the ideal solution is shown as $C_i^* = 1$, while the absolute proximity to the negative ideal solution is shown as $C_i^* = 0$.

Step 7: Rank the preference order or select the alternative closest to 1.

A set of alternatives now can be ranked by the descending order of the value of C_i^*.

4.2 Results and Discussion

CG ratings of 20 firms were converted to digits to show overall performance by using the TOPSIS method and companies are listed among themselves based on their financial performance. Shareholders, transparency, stakeholders, and the board of directors are the evaluation point. Later, these rates are normalized and shown in Table 3.

Table 4. Normalized Matrix

Companies	2013	2014	2015	2016	2017	2018
AEFES	0.821	0.897	1.000	1.000	1.000	1.000
ARCLK	0.779	0.884	0.926	0.882	0.910	0.924
TAVHL	0.747	0.836	0.884	0.846	0.910	0.924
DOAS	0.746	0.804	0.838	0.844	0.881	0.897
TUPRS	0.746	0.780	0.828	0.840	0.831	0.856
TRCAS	0.705	0.765	0.814	0.828	0.826	0.852
VESTL	0.668	0.729	0.798	0.815	0.823	0.808
HURGZ	0.644	0.725	0.786	0.799	0.802	0.723
CCOLA	0.639	0.710	0.768	0.777	0.754	0.719
OTKAR	0.621	0.676	0.754	0.749	0.688	0.716
TTKOM	0.599	0.657	0.706	0.721	0.647	0.713
AYGAZ	0.595	0.651	0.653	0.705	0.636	0.694
PRKME	0.590	0.648	0.636	0.661	0.629	0.689
GLYHO	0.590	0.647	0.633	0.660	0.624	0.646
ASELS	0.553	0.645	0.622	0.657	0.603	0.640
TTRAK	0.519	0.645	0.622	0.638	0.580	0.631
LOGO	0.504	0.589	0.597	0.621	0.552	0.609
TOASO	0.502	0.585	0.528	0.601	0.512	0.608
PRKAB	0.472	0.454	0.482	0.597	0.505	0.556
IHLAS	0.152	0.000	0.000	0.000	0.000	0.000

Source: Authors' calculations

To determine objective weights by the measure, the decision matrix needs to be normalized for each criterion to obtain the best company value of each ratio. Later, the positive ideal solution and the negative ideal solution for each company is calculated. Table 4 shows the ideal and negative solution of the TOPSIS between 2013-2018.

Table 5. Ideal and Negative Solutions

		Shareholders	Transparency	Stakeholders	Board of Directors
2013	A$^+$	0.085	0.072	0.076	0.077
	A-	0.036	0.024	0.008	0.028
2014	A$^+$	0.079	0.073	0.073	0.068
	A-	0.019	0.024	0.008	0.019
2015	A$^+$	0.078	0.069	0.068	0.065
	A-	0.019	0.023	0.007	0.027
2016	A$^+$	0.078	0.068	0.065	0.063
	A-	0.019	0.022	0.007	0.027
2017	A$^+$	0.078	0.066	0.062	0.070
	A-	0.029	0.029	0.021	0.035
2018	A$^+$	0.08	0.065	0.063	0.069
	A-	0.020	0.021	0.014	0.035

Source: Authors' calculations

Moreover, Altman's Z-Score was used to measure the financial performance of companies listed in the BIST-XKURY Index between 2013 and 2018. Table 6 shows the overall Altman's Z-score between 2013-2018.

Table 6. Altman's Z-score results between 2013 and 2018

Companies	2013	2014	2015	2016	2017	2018
VESTL	1.623	1.814	1.954	1.954	1.455	1.455
TOASO	3.264	2.961	3.090	3.090	3.421	3.421
TTRAK	4.335	3.846	3.719	3.719	3.513	3.513
HURGZ	1.465	1.635	0.721	0.721	1.270	1.270
TUPRS	3.205	3.267	2.629	2.629	3.421	3.421
OTKAR	2.160	2.468	4.781	4.781	2.822	2.822
AEFES	1.581	1.541	1.226	1.226	1.259	1.259
CCOLA	2.839	2.859	1.850	1.850	1.662	1.662
ARCLK	3.183	3.297	3.277	3.277	3.133	3.133
TAVHL	1.455	1.678	0.966	0.966	1.171	1.171
ASELS	2.650	2.909	2.389	2.389	4.411	4.411
TTKOM	2.618	3.095	1.566	1.566	1.825	1.825
LOGO	3.122	7.846	6.900	6.900	7.616	7.616
PRKAB	2.337	2.450	2.572	2.572	2.694	2.694

AYGAZ	8.633	9.104	6.809	6.809	6.559	6.559
PRKME	11.836	11.922	5.523	5.523	8.800	8.800
TRCAS	1.732	1.989	1.303	1.303	1.529	1.529
IHLAS	0.899	0.958	0.982	0.982	0.732	0.732
GLYHO	0.573	0.353	0.226	0.226	0.428	0.428
DOAS	6.095	6.305	3.693	3.693	3.977	3.977

Source: Authors' calculations

4. Findings

Firm-level yearly comparisons of CG and Alman's Z-score comparisons are shown in Table 7 for years 2013, 2014 and 2015 and in Table 8 for years 2016, 2017, and 2018. The rankings of the companies indicate that CG scores and Altman-Z values do not move in the same direction. The yearly findings of CG and Altman-Z rankings of the companies' are as follows:

Results of 2013: According to Altman's Z-Score calculation, PRKME ranks the top in terms of financial sustainability. However, it is ranked 17th in TOPSIS ranking with a CG score of 8.98. AYGAZ, DOAS, and TTRAK are ranked respectively 2nd, 3rdand 4th places according to Altman's Z-Score analysis. When CG ratings are taken into consideration same firms are ranked respectively 5th, 13th and 11th places. The five firms in the top 10 according to CG rankings are listed in top ten in Altman-z rankings. However, the orders of listing are not identical. For example, ARCLK is ranked 3rd and AYGAZ is ranked 8thaccording to their CG scores; whereas, ARCLK is placed 7th and AYGAZ is placed 2nd according to their Altman-Z scores. The first two firms TAHVL and AEFES placed 1st and 2nd respectively according to CG rankings are in 16th (for AEFES) and 18th (for TAHVL) places in Altman Z rankings. The results show that firms' financial sustainability levels and CG scores don't move in the same direction in 2013.

Results of 2014: According to Altman's – Z score rankings, PRKME is placed at the top in terms of financial sustainability just like the previous year. The compnay's CG ranking has improved to 10th place in the current year from 17th place of the previous year. ARCLK is placed top in CG rankings whereas it is placed 6thin Altman's Z rankings. The other two firms placed 2ndand 3rd in CG rankings are placed 18th and 17th respectively in 2014. AYGAZ, LOGO and DOAS are ranking respectively in 2nd, 3rd and 4th places according to Altman's Z-Score analysis.

Table 7. Overall comparison of the results for years 2013, 2014, 2015

	2013				2014				2015			
Query	Firms	CG	Firms	Altman-Z	Firms	CG	Firms	Altman-Z	Firms	CG	Firms	Altman-Z
1	TAVHL	0,8211	PRKME	11,84	ARCLK	0,8965	PRKME	11,92	AEFES	1	LOGO	9,35
2	OTKAR	0,7793	AYGAZ	8,63	AEFES	0,8843	AYGAZ	9,10	ARCLK	0,9260	AYGAZ	7,36
3	AEFES	0,7472	DOAS	6,10	HURGZ	0,8355	LOGO	7,85	TAVHL	0,8835	PRKME	5,66
4	ARCLK	0,7459	TTRAK	4,33	AYGAZ	0,8037	DOAS	6,31	OTKAR	0,8383	DOAS	5,18
5	AYGAZ	0,7459	TOASO	3,26	OTKAR	0,7796	TTRAK	3,85	HURGZ	0,8283	TUPRS	3,26
6	TUPRS	0,7052	TUPRS	3,20	TAVHL	0,7653	ARCLK	3,30	DOAS	0,8135	PRKAB	3,15
7	HURGZ	0,6679	ARCLK	3,18	CCOLA	0,7292	TUPRS	3,27	AYGAZ	0,7982	TTRAK	3,13
8	VESTL	0,6440	LOGO	3,12	DOAS	0,7250	TTKOM	3,10	TUPRS	0,7856	ARCLK	3,11
9	CCOLA	0,6394	CCOLA	2,84	TUPRS	0,7103	TOASO	2,96	TRCAS	0,7680	TOASO	2,80
10	TOASO	0,6214	ASELS	2,65	PRKME	0,6757	ASELS	2,91	CCOLA	0,7538	OTKAR	2,74
11	TTRAK	0,5987	TTKOM	2,62	ASELS	0,6568	CCOLA	2,86	PRKME	0,7057	ASELS	2,74
12	ASELS	0,5947	PRKAB	2,34	VESTL	0,6508	OTKAR	2,47	VESTL	0,6531	CCOLA	2,08
13	DOAS	0,5904	OTKAR	2,16	TRCAS	0,6477	PRKAB	2,45	ASELS	0,6362	TTKOM	1,99
14	PRKAB	0,5896	TRCAS	1,73	LOGO	0,6474	TRCAS	1,99	LOGO	0,6334	VESTL	1,97
15	LOGO	0,5529	VESTL	1,62	TOASO	0,6452	VESTL	1,81	TOASO	0,6216	HURGZ	1,64
16	GLYHO	0,5185	AEFES	1,58	TTRAK	0,6452	TAVHL	1,68	TTRAK	0,6216	AEFES	1,40
17	PRKME	0,5039	HURGZ	1,47	PRKAB	0,5887	HURGZ	1,63	PRKAB	0,5974	TAVHL	1,39
18	TRCAS	0,5024	TAVHL	1,45	GLYHO	0,5851	AEFES	1,54	TTKOM	0,5281	TRCAS	0,89
19	TTKOM	0,4723	IHLAS	0,90	TTKOM	0,4544	IHLAS	0,96	GLYHO	0,4816	IHLAS	0,70
20	IHLAS	0,1523	GLYHO	0,57	IHLAS	0	GLYHO	0,35	IHLAS	0	GLYHO	0,48

Source: Authors' calculations

Table 8. Overall comparison of the results for years 2016, 2017, 2018

Query	2016				2017				2018			
	Firms	CG	Firms	Altman-Z	Firms	CG	Firms	Altman-Z	Firms	CG	Firms	Altman-Z
1	AEFES	1	LOGO	6,90	AEFES	1	PRKME	8,80	AEFES	1	ASELS	8,54
2	TAVHL	0,8822	AYGAZ	6,81	ARCLK	0,9108	LOGO	7,62	ARCLK	0,9248	PRKME	6,45
3	ARCLK	0,8455	PRKME	5,52	TAVHL	0,9108	AYGAZ	6,56	TAVHL	0,9248	AYGAZ	5,35
4	TUPRS	0,8443	OTKAR	4,78	DOAS	0,8815	ASELS	4,41	DOAS	0,8976	TUPRS	4,55
5	OTKAR	0,8395	TTRAK	3,72	TUPRS	0,8315	DOAS	3,98	TUPRS	0,8564	LOGO	4,03
6	HURGZ	0,8276	DOAS	3,69	AYGAZ	0,8261	TTRAK	3,51	TRCAS	0,8529	HURGZ	3,72
7	DOAS	0,8145	ARCLK	3,28	TRCAS	0,8234	TOASO	3,42	VESTL	0,8087	TOASO	3,70
8	AYGAZ	0,7989	TOASO	3,09	OTKAR	0,8023	TUPRS	3,42	HURGZ	0,7237	DOAS	3,57
9	TRCAS	0,7773	TUPRS	2,63	VESTL	0,7544	ARCLK	3,13	CCOLA	0,7197	PRKAB	2,85
10	CCOLA	0,7491	PRKAB	2,57	CCOLA	0,6887	OTKAR	2,82	OTKAR	0,7168	ARCLK	2,76
11	VESTL	0,7213	ASELS	2,39	GLYHO	0,6473	PRKAB	2,69	TTKOM	0,7130	TTRAK	2,72
12	PRKME	0,7047	VESTL	1,95	HURGZ	0,6367	TTKOM	1,82	AYGAZ	0,6941	OTKAR	2,46
13	LOGO	0,6608	CCOLA	1,85	TTKOM	0,6298	CCOLA	1,66	PRKME	0,6893	CCOLA	2,14
14	TTRAK	0,6601	TTKOM	1,57	PRKME	0,6249	TRCAS	1,53	GLYHO	0,6465	VESTL	1,75
15	ASELS	0,6571	TRCAS	1,30	ASELS	0,6031	VESTL	1,45	ASELS	0,6400	TTKOM	1,49
16	TOASO	0,6382	AEFES	1,23	TTRAK	0,5807	HURGZ	1,27	TTRAK	0,6313	AEFES	1,28
17	GLYHO	0,6214	IHLAS	0,98	TOASO	0,5520	AEFES	1,26	LOGO	0,6093	IHLAS	1,15
18	TTKOM	0,6006	TAVHL	0,97	LOGO	0,5121	TAVHL	1,17	TOASO	0,6082	TAVHL	1,10
19	PRKAB	0,5970	HURGZ	0,72	PRKAB	0,5052	IHLAS	0,73	PRKAB	0,5563	TRCAS	1,02
20	IHLAS	0	GLYHO	0,23	IHLAS	0	GLYHO	0,43	IHLAS	0	GLYHO	0,65

Source: Authors' calculations

When CG ratings are taken into consideration the same firms are ranking respectively 4th, 15th and 8th. HURGZ has a high CG score, while experiencing financial difficulties. Likewise, AEFES has a high CG score but it has a financial challenge as well. On the other hand, TTRAK is in a financially safe zone but it has a lower corporate rating score compared to HURGZ and AEFES. The results show that firms' financial sustainability and CG scores do not move in the same direction in 2014.

Results of 2015: According to Altman's Z-score, LOGO ranks at the top in terms of financial sustainability; whereas, it is ranked 14th with a CG score of 90,76. AYGAZ, PRKME and DOAS are ranking respectively in 2nd, 3rd and 4th places according to Altman's Z-Score analysis. However, according to CG ratings the same firms are listed in 7th, 11th and 6th places respectively. AEFES has the best CG score. However, it is in a financially unfavorable situation and listed in 16th place in Altman's Z-score rankings. Similarly, TAVHL ranked 3rd in CG ratings is placed 17th in Altman's Z-score rankings. The results show that firms' financial sustainability and CG scores do not move in the same direction in 2015 too.

Results of 2016: LOGO ranks at the top in terms Altman's Z-score calculation. It ranks 13th with a 9.12 CG score. AYGAZ, PRKME and DOAS are ranking 2nd, 3rd and 4th places respectively according to Altman's Z-Score analysis; whereas, the same firms are ranked 8th, 12th and 5th respectively according to their CG scores. AEFES has the best CG score but it is placed 16th in Altman's Z-score list. TAVHL that is placed seconds in CG rankings, is placed 18th in Altman's – Z rankings. Just like the previous three years, the results in 2016 show no meaningful relationship between CG scores and financial sustainability.

Results of 2017: Based on Altman's Z-Score calculation, PRKME ranks at the top in terms of financial sustainability. However, it is ranked 10th in TOPSIS ranking with 89,45 which is CG score. AYGAZ, LOGO and DOAS are placed respectively in 2nd, 3rd and 4th places according to Altman's Z-Score analysis whereas they are listed respectively 4th, 15th and 8th according to their CG scores. AEFES has the best CG score but ranks 17th in financial sustainability evaluations. Similarly, TAVHL that is in 3rd place according to CG ratings, is ranked 18th in financial sustainability ratings. The results in 2017 are similar to the results of previous years in analysis.

Results of 2018: According to Altman's Z-score ASELS ranks at the top. On the other hand, it is ranked 15th in TOPSIS ranking with a CG score of 92,04. PRKME, AYGAZ and TUPRS that are ranked 2nd, 3rd and 4th respectively according to Altman's Z-Score analysis are ranked 13th, 12th and 5th respectively according to CG evaluations. AEFES with the highest CG score is placed 16th in financial sustainability rankings. TAVHL with the highest third CG score is placed 18th in Altman's Z-score rankings in 2018. The results in 2018 show that firms' financial sustainability and CG scores do not move in the same direction too.

It is worth to mention that CG scores and Altman's Z-score rankings do not have a meaningful relationship for the same company over the years. For example, AEFES is ranked 3rd in 2013 and 2nd in 2014. However, AEFES's Altman-Z scores and Altman-Z placings are worsened from 2013 to 2014. For the later years under investigation, AEFES is always ranked at the top with perfect CG scores, but its Altman's Z-score is lower compared to the years where AEFES was ranked lower in CG rankings. This situation is similar for TAHVL and ARCLK which are two other successful firms in terms of CG rankings. On the other hand, PRKME which is always below the average in terms of CG ratings is placed in the top three when it comes to Altman-Z evaluations. In summary, it is difficult to determine any kind of meaningful relationship between CG scores and financial sustainability for the firms in the years under investigation.

5. Conclusions

This study aims to contribute to the literature by exploring the relationship between CG and financial sustainability. The existing literature had examined the relationship between CG and financial performances of firms. In this study, a comprehensive literature review was provided related to CG applications and their relations to financial performance and sustainability. Further, the most up to date data related to the financial standings and CG ratings of the companies listed in the Borsa Istanbul Corporate Governance Index is presented. The efforts were directed towards finding a relationship between CG applications and financial strength and sustainability of the companies.

In the research Altman's Z-score model is one of the techniques used. Altman's Z-score is the output of a credit-strength test that measures the likelihood of bankruptcy of publicly-traded companies. The Altman's Z-score uses five groups of financial ratios measuring profitability, leverage, liquidity, solvency, and activity to predict the probability of a company becoming insolvent. Altman's Z-score is used to measure the financial sustainability of firms. Based on the results of Altman's Z-score bankruptcy model, the companies are placed in safe, neutral, or distress zones. The other technique used in the research is TOPSIS a multi-criteria decision analysis method. It is a method of compensatory aggregation that compares a set of alternatives by identifying weights for each criterion, normalizing scores for each criterion and calculating the geometric distance between each alternative and the ideal alternative, which is the best score in each criterion. TOPSIS is used in this research because compensatory methods such as TOPSIS allow trade-offs between criteria, where a poor result in one criterion can be negated by a good result in another criterion. This provides a more realistic form of modelling than non-compensatory methods, which include or exclude alternative solutions based on hard cut-offs. It is based on the principle of the proximity of decision points to the ideal solution. It includes a 6 steps solution process. This method was used to rank CG ratings.

In this study data of 20 firms listed in BIST for the years between 2013 and 2018 were used to find a relationship between CG and financial sustainability scores of companies traded in BIST. Results show that firms' financial sustainability and CG scores do not move in the same direction for the years

between 2013 and 2018. The findings of this study are somehow similar to most of the studies conducted in Turkey and other developing countries. There can be various reasons for this situation. One reason may be due to the methods used. The recent studies conducted in Turkey using TOPSIS reached the same conclusion. Future studies may apply different research methodologies. Second and a more significant reason is thought to be related by the nature of the business and finance world, that is, CG systems and applications are adopted more seriously by companies that are experiencing financial difficulties and in need of sufficient financial sources. They focus their efforts on developing and maintaining very solid CG systems to attract investors and therefore, their CG scores are usually higher than other companies.

It should be noted that CG systems and successful applications undeniably help to improve a company's operational efficiency and create a positive and attractive environment for the investors. Therefore, it is possible to say that companies that have been taking advantage of CG applications and that have been in this system for a long time will have future advantages. In short, the CG system is a start point for companies seeking long term benefits of operational efficiency and sufficient, sustainable financial resources. Finally, there are two points to be mentioned for the researchers aiming to explore this issue further. Firstly, the companies included in this analysis are mostly from different industries since there are not many companies in the same industry that have been consistently in BIST-XKURY for the years between 2013 and 2018. If it was possible, grouping companies in the same or related industries in this type of research is believed to have provided insights leading to more meaningful comparisons and interpretations. Secondly, TOPSIS is widely used in many researches including this one, which in a way enables comparisons among a big number of studies.

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