



2528-9705



EVALUATING THE EFFICIENCY OF COMPANIES IN THE BORSA ISTANBUL CORPORATE GOVERNANCE INDEX USING DATA ENVELOPMENT ANALYSIS

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ABSTRACT

This study examines the efficiency of companies listed in the Borsa Istanbul (BIST 100) Corporate Governance Index for the year 2023 using Data Envelopment Analysis (DEA). DEA, a non-parametric method, was applied to 46 companies to evaluate their ability to maximize outputs given available inputs. The analysis employed an output-oriented Charnes, Cooper, and Rhodes (CCR) model, implemented through the Efficiency Measurement System (EMS) software. The findings revealed that 15 companies were relatively efficient, while 31 were inefficient, resulting in an overall efficiency rate of 32.6%. These results underscore the importance of robust corporate governance standards in enhancing organizational performance. The study identified corporate governance principles, such as transparency, accountability, and stakeholder engagement, as critical factors influencing efficiency. Recommendations to improve inefficiencies include strengthening governance standards, implementing training programs, and fostering transparency and accountability. The study contributes to the existing literature by providing empirical evidence of efficiency levels within Turkey's Corporate Governance Index and highlights the ongoing challenges and opportunities for improving corporate practices. The results also serve as a valuable reference for investors and policymakers seeking to enhance the performance of publicly listed companies and promote sustainable growth. Future research could expand by incorporating different variables and periods to assess longitudinal changes in corporate efficiency.

Keywords: Corporate governance index, Efficiency analysis, Data envelopment analysis, Borsa Istanbul.

INTRODUCTION

Deficiencies and poor practices in corporate governance, which play an important role in the successful realization of firm objectives, can lead to serious problems. Past scandals, such as Enron, have not only led to the bankruptcy of firms but also to the victimization of employees, loss of value of shareholder assets, failure to fulfill commitments to affiliated companies, and damage to the overall economic structure. Investors attach great importance to the corporate governance practices, decision-making processes, and management quality of publicly traded companies. Security concerns may arise in relation to other nations, alliances of states, various organizations, non-state entities, or in the context of financial structure (Çora, 2024). Therefore, the quality of corporate governance is considered extremely important and meticulously evaluated by investors (Al-Matari & Al-Swidi, 2021). For this reason, the governance quality and practices of companies are critical evaluation criteria for investors (Arora & Bodhanwala, 2021).

Geliş tarihi/Received: 23.05.2024 – Kabul tarihi/Accepted: 04.09.2024 – Yayın tarihi/Published: 15.09.2024

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Corporate governance is an important structure for a company to monitor its values, goals, and achievements. This structure requires the adoption of principles appropriate to the functioning of the company (Karamustafa *et al.*, 2016). Corporate governance enables company managers and owners to effectively control the company, with a particular focus on financial processes and structure. It is a process that requires the active participation of boards of directors, shareholders, and beneficiaries in ensuring the control of the company (Aida, 2022). According to Williamson (1988), corporate governance can have an impact on transaction costs and capital costs. Gompers, Ishii, and Metrick (2003), on the other hand, analyzed the impact of corporate governance on corporate performance and argued that the protection of shareholder rights and the adoption of risk-based management strategies enable companies to achieve higher returns. The advantages of corporate governance for companies are quite diverse. These include increasing funding opportunities, enhancing competitiveness, maintaining healthy relations with shareholders, stabilizing business operations, reducing the cost of capital, increasing profitability, increasing confidence in the company, and increasing firm value (Nsour & Al-Rjoub, 2022). Effective corporate governance ensures the protection of shareholders' rights and secures the long-term success of the company. Moreover, corporate governance practices have the potential to reduce the cost of capital by facilitating investor attraction (Bhatia & Tuli, 2021). Negative situations such as corporate scandals have further emphasized the importance of corporate governance in the international arena (Buallay, 2021). Corporate governance practices developed in the aftermath of such events have not only helped to prevent fraud and scandals but also to achieve more effective organizational success (Zameer & Usman, 2019; Wang & Zhang, 2023).

Literature Review

Corporate Governance Concept

Corporate governance is a concept that covers the principles and practices determined for the effective, efficient, and sustainable management of companies. This concept ensures that companies act in line with the principles of transparency, accountability, fairness, and responsibility while fulfilling their responsibilities toward their shareholders, employees, customers, and society (Phan & Duong, 2021). Corporate governance supports the company in achieving its long-term value creation goals by balancing power and responsibility between the board of directors, senior executives, and shareholders (Ren *et al.*, 2021). For companies, corporate governance improves risk management processes and encourages compliance with business ethics as well as increasing financial success (Cahams & García-Blandón, 2021). In this way, companies reduce their cost of capital and gain a competitive advantage by increasing investor confidence (Chauhan & Kumar, 2021). In addition, corporate governance practices help companies comply with legal regulations and increase efficiency in business processes (Ashfaq & Saeed, 2017).

Corporate Governance Index (XKURY) Methodology

The BIST Corporate Governance Index (XKURY) is an index created by Borsa Istanbul (BIST) to measure the success of companies that comply with corporate governance principles in Turkey and to raise awareness in this area. This index aims to provide investors with more reliable and



sustainable investment options by reflecting the quality of governance, transparency, accountability, and social responsibility of companies (Darmadi, 2021; Dwekat *et al.*, 2021). The BIST Corporate Governance Index consists of companies that have received a corporate governance rating and scored above a certain threshold.

In order to be included in the index, companies must comply with the Corporate Governance Principles set out by the Capital Markets Board (CMB). These principles are categorized under four main headings: Shareholders, Public Disclosure and Transparency, Beneficiaries, and Board of Directors (Esa & Zahari, 2021). Under these headings, criteria such as fair and equal treatment of shareholders, accurate and timely public disclosure, protection of the rights of stakeholders, and effective functioning of the board of directors are included. Companies are evaluated by independent rating agencies in line with these principles.

The BIST Corporate Governance Index is recognized not only as a benchmark in Turkey's capital markets but also as a reputation indicator for companies. Companies included in the index become more attractive to investors because they prove that they are managed to high standards and are committed to sustainability principles. This is especially important for institutional investors, as they prefer to work with companies that have not only financial success but also good governance practices (Basyith *et al.*, 2022).

MATERIALS AND METHODS

Purpose and Importance of the Research

The study aims to realize the efficiency of the companies included in the BIST corporate governance index according to 2023 data using data envelopment analysis (DEA). Measuring efficiency in terms of the Corporate Governance Index is essential to objectively assess the quality of management and the value that companies offer to investors. These measurements help companies understand their strengths and weaknesses, optimize their governance practices, and ensure their long-term success (Faisal & Hasan, 2021). It also allows investors to make more informed investment decisions, which is critical to the overall stability and health of capital markets (García-Sánchez & García-Meca, 2021).

Method and Implementation

In this study, the efficiency analysis in terms of the logistics performance index for the country group will be conducted with "Data Envelopment Analysis (DEA)." DEA is a data-driven and nonparametric mathematical programming approach introduced by Charnes, (Cha, and Rhodes (1978). DEA uses multiple inputs and multiple outputs to evaluate the relative efficiency of homogeneous and comparable Decision Making Units (DMUs). DEA, which is the most widely used nonparametric method, is a linear programming method (Klimberg *et al.*, 2009).

In DEA, the comparison of each CVB is made only with the best CVBs. While these KVBs, which are expressed as the best, constitute the efficiency frontier, the efficiency of other KVBs is determined based on this efficient frontier (Gerged & Elheddad, 2021). The DEA method considers the best CVBs above the efficiency frontier as "relatively efficient" and calls these units the "reference set." The other CVBs that are not above the efficiency frontier are called "relatively inefficient" units. In this context, DEA is an analysis method that is a guiding guide for managers



and decision-makers on what should be done in order to improve the efficiency values of relatively inefficient CVBs (Özel *et al.*, 2017: 91).

In DEA, basically following models are utilized. It is possible to list them as follows (Charnes & Cooper, 1978):

CCR (Charnes-Cooper-Rhodes) Model (1978)

BBC (Banker-Charnes-Cooper) Model (1984)

Aggregative Model

Since the institutions in the banking sector have more control over the input variables, this study utilizes the input-oriented CCR model under the assumption of "constant returns to scale" to calculate efficiency values.

Charnes, Cooper ve Rhodes (CCR) Model

The CCR model was introduced by Charnes, Cooper, and Rhodes in 1978. Under the assumption of constant returns to scale, the CCR model aims to produce a result by summing the aggregate efficiency value, technical efficiency value and efficiency of scale of the decision-making units to only 1 value. In DEA, if there are m inputs and p outputs related to each of the n CVDs, it is an input-oriented fractional DEA model such that the i 'th input quantity $X_{ij} \geq 0$ and the r 'th output quantity $Y_{rj} \geq 0$ produced by the j 'th CVD (Cooper *et al.*, 2007).

In DEA, if there are n CVBs, n models are formed, and n optimization models need to be analyzed in order to measure the relative efficiency of each CVB. The objective function of the models is to maximize the ratio of total weighted outputs to total weighted inputs for k CVBs. The constraints in the models indicate that the ratio of output to input for each CVB should not be greater than 1, and the best objective function value can be at most 1. In order to solve the fractional model by linear programming method, Charnes and Cooper transformed $\sum_{i=1}^m v_i X_{ik} = 1$ in 1962, and the new version of the model is presented as a table in the linear equation part of the input-oriented CCR model. This model called the "Input Oriented CCR Model," measures relative aggregate efficiency under the assumption of constant returns and provides the same optimal solution as the fractional model.

Similar to Linear Programming (LP) models, DEA models are expressed in two different forms, linear and dual. In DEA, the dual model is a more frequently used method in terms of providing the best solution compared to the linear model, as it requires fewer mathematical operations and provides important managerial information. According to the duality theory, since the linear model is max, its dual is min, and the best value of the linear model and the best value of the dual model are equal to each other (Akdogan & Acar, 2010). In the equations in **Table 1** below;

E_k : the efficiency value of the k th CVB,

u_r : The weight given to the r -th output by the k -th KBV,

v_i : weight given to the i 'th input by the k th KBV,

Y_{rk} : the r -th output produced by the k -th KBV,

X_{ik} : the i 'th input produced by the k th KBV,

Y_{rj} : the r -th output produced by the j -th KBV,

X_{ij} : the i -th input produced by the j -th KBV,

ϵ : A positive number that is small enough (e.g. 0.00001),



α : Shrinkage coefficient (It shows the extent to which the amount of input can be reduced without any change in the amount of output),

β : Expansion coefficient (It shows the rate at which output can be increased without any change in the amount of input).

λ_j : The intensity value received by the j th CVU,

S_i^- : The residual variable for the i 'th input of the k th CVU (Input surplus),

S_r^+ : is the residual variable for the r -th output of the k th CVU.

Table 1. Fractional, Linear and Dual Formulas of the CCR Model

Input Oriented CCR Model		Output Oriented CCR Model	
Fractional Model		Fractional Model	
$E_k = \max \frac{(\sum_{r=1}^p u_r Y_{rk})}{(\sum_{i=1}^m v_i X_{ik})}$	(1)	$E_k = \min \frac{\sum_{i=1}^m v_i X_{ik}}{\sum_{r=1}^p u_r Y_{rk}}$	(12)
$\frac{\sum_{r=1}^p u_r Y_{rj}}{\sum_{i=1}^m v_i X_{ij}} \leq 1$	(2)	$\frac{\sum_{i=1}^m v_i X_{ij}}{\sum_{r=1}^p u_r Y_{rj}} \geq 1$	(13)
$u_r \geq \varepsilon, v_j \geq \varepsilon$	(3)	$u_r \geq \varepsilon, v_j \geq \varepsilon$	(14)
Linear Model		Linear Model	
$E_k = \max \sum_{r=1}^p u_r Y_{rk}$	(4)	$E_k = \min \sum_{i=1}^m v_i X_{ik}$	(15)
$\sum_{r=1}^p u_r Y_{rj} - \sum_{i=1}^m v_i X_{ij} \leq 0$	(5)	$\sum_{i=1}^m v_i X_{ij} - \sum_{r=1}^p u_r Y_{rj} \geq 0$	(16)
$\sum_{i=1}^m v_i X_{ik} = 1$	(6)	$\sum_{r=1}^p u_r Y_{rk} = 1$	(17)
$u_r \geq \varepsilon, v_j \geq \varepsilon$	(7)	$u_r \geq \varepsilon, v_j \geq \varepsilon$	(18)
Dual Model		Dual Model	
$E_k = \min \alpha - \varepsilon \sum_{i=1}^m S_i^- - \varepsilon \sum_{r=1}^p S_r^+$	(8)	$E_k = \max \beta + \varepsilon \sum_{i=1}^m S_i^- + \varepsilon \sum_{r=1}^p S_r^+$	(19)
$\sum_{j=1}^n X_{ij} \lambda_j + S_i^- - \alpha X_{ik} = 0$	(9)	$\sum_{j=1}^n X_{ij} \lambda_j + S_i^- - X_{ik} = 0$	(20)
$\sum_{j=1}^n Y_{rj} \lambda_j - S_r^+ - Y_{rk} = 0$	(10)	$\sum_{j=1}^n Y_{rj} \lambda_j - S_r^+ - \beta Y_{rk} = 0$	(21)
$\lambda_j \geq 0, S_i^- \geq 0, S_r^+ \geq 0$	(11)	$\lambda_j \geq 0, S_i^- \geq 0, S_r^+ \geq 0$	(22)

The fractional, linear, and dual formulas of the model are summarized in **Table 1**. In the model solution; when $E_k=1$, it is concluded that the CVB whose efficiency is measured is efficient. In the opposite case, it is interpreted that the KVB in question is inefficient. It is possible to calculate the reference set that can be sampled by an inefficient CVB with the formulas given below:

$$X_{ik} = \sum_{j=1}^n X_{ij} \lambda_j \quad (23)$$

$$Y_{rk} = \sum_{j=1}^n Y_{rj} \lambda_j \quad (24)$$

Or;



$$X_{ik} = \alpha X_k - S_i^- \quad (25)$$

$$Y_{rk} = Y_k + S_r^+ \quad (26)$$

It is possible to calculate the "Potential Improvements (PI)" for the inputs and outputs of the relatively inefficient CVBs in percentage terms with the formula given below.

$$PI(\%) = \frac{Target - Actualized}{Realized} \times 100 \quad (27)$$

In order to make the relatively ineffective CVBs effective, the values of the variables whose calculated PI percentages are found to be negative should be decreased by PI, and the values of the variables that are found to be positive should be increased by PI. If the PI value is zero, it is interpreted that there is no need to make any improvement for the variable.

It is possible to calculate relative aggregate efficiency values with output-oriented CCR models as well as input-oriented CCR models. However, it is sufficient for the relative aggregate efficiency value of a CVB to be calculated in line with only one orientation model. In fact, it is known that the relative aggregate efficiency value calculated with the input-oriented CCR model will be equal to the relative aggregate efficiency value calculated with the output-oriented CCR model. On the other hand, there is a possibility that the PI percentages of the input-output variables may be calculated differently according to these two orientations (Cooper *et al.*, 2007).

Decision-Making Units (DMUs)

In order for the outputs obtained as a result of DEA to be valid, the selection of decision points is very important. The factors to be considered in the selection of decision units can be listed as follows (Erpolat, 2011):

Decision-making units should consist of homogeneous units that perform the same task with similar objectives.

Decision units should be similar in terms of the inputs they use and the outputs they produce.

In order for the research to be reliable, if the number of inputs is m and the number of outputs is n , the number of KVBs to be evaluated should be at least 3 times the number of these inputs and outputs. ($DMUs\ Number \geq 3 \times (m + n)$).

The list of companies included in the analysis, i.e. decision units (DMs), is presented in **Table 2**.

Table 2. DEA Decision Units

Akiş GMYO	İş Yatırım Menkul Değerler
Akmerkez GMYO	Lider Faktoring
Aksa	Logo Yazılım
Albaraka Türk	Migros
Anadolu Efes	Otokar
Anadolu Grubu Holding	Park Elek. Madencilik
Anadolu Sigorta	Pegasus
Aselsan	Pınar Et ve Un
Arçelik	Pınar Su
Aygaz	Pınar Süt

Coca Cola İçecek	Sekerbank
Creditwest Faktoring	Sise Cam
Doğan Holding	T.S.K.B.
Doğuş GMYO	Tat Gıda
Doğuş Otomotiv	TAV Havalimanları
Enka İnsaat	Tofaş Oto. Fab.
Ereğli Demir Çelik	Turcas Petrol
Garanti Bankası	Tüpraş
Garanti Faktoring	Türk Prysmian Kablo
Global Yat. Holding	Türk Telekom
Halk GMYO	Türk Traktör
Hürriyet Gazetesi	Vestel
İhlas Ev Aletleri	Yapı ve Kredi Bankası

It is important to work with a sufficient number of decision units to ensure the accuracy of the analysis. In the literature, there are different opinions about the number of decision units. According to one view, the number of decision units should be at least 2 or 3 times the sum of the number of inputs and outputs. According to another view, the number of inputs m , the number of outputs s , and the number of decision units n should be $n \geq \max [m*s, 3(m+s)]$ (Alora & Bodhanwala, 2018). These conditions were met at each stage.

Since $(3+1)*2=8$ or $(3+1)*3=12$ for a total of 46 decision units traded in BIST, more than 2 and 3 times the number of inputs and outputs were taken, which was found sufficient for the applicability of the analysis and the reliability of the results. In the selection of inputs and outputs, many studies suitable for the purpose of the study were examined and a set of variables including 3 inputs and 1 output was determined as a synthesis of these studies.



Table 3. Input-Output Variables Used in DEA

Inputs	Outputs
Return on Assets (ROA)	
Return on Equity (ROE)	Corporate Governance Index
Size (total assets)	

RESULTS AND DISCUSSION

Based on presumptions and use cases, several data envelopment analysis (VZA) models may be developed. The level of control over the inputs and outputs determines the model to use. An output-oriented model ought to be used if input control is restricted, while an input-oriented model ought to be chosen if output control is restricted. Additive models could be a better option if a clear emphasis cannot be determined. In VZA, the choice of model should be made by considering the direction of the control power. In this study, the goal of "producing the most output with existing inputs" was adopted, and the output-oriented model was examined. In input-oriented models, the goal is to use the least amount of input to produce the current output,

whereas in output-oriented models, the goal is to produce the most output with the available inputs (Cooper *et al.*, 2007).

The financial data used in the study were taken from the Finnet database. The data were collected for 46 companies included in the BIST 100 index and included in the corporate governance index. However, some companies were not included in the analysis because they had incomplete data. In the study, efficiency values were measured with the "Efficiency Measurement System (EMS)" package program by using the output-oriented CCR model method for 46 companies in the 2023 period. The result of the analysis is in **Table 4**.

Table 4. Activity Status of Companies in 2023

Companies	Event	Companies	Event
Akis GMYO	1	Is Yatirim Menkul Degerler	1
Akmerkez GMYO	1	Lider Faktoring	0.993
Aksa	1	Logo Yazilim	0.825
Albaraka Türk	0.987	Migros	0.912
Anadolu Efes	0.871	Otokar	0.928
Anadolu Grubu Holding	0.912	Park Elek. Madencilik	1
Anadolu Sigorta	0.765	Pegasus	0.706
Aselsan	0.903	Pinar Et Ve Un	1
Arçelik	0.935	Pinar Su	1
Aygaz	0.956	Pinar Süt	0.882
Coca Cola İçecek	0.847	Sekerbank	1
Creditwest Faktoring	1	Sise Cam	0.994
Dogan Holding	0.988	T.S.K.B.	1
Dogus GMYO	1	Tat Gida	0.947
Dogus Otomotiv	1	TAV Havalimanlari	0.951
Enka Insaat	0.821	Tofas Oto. Fab.	0.808
Eregli Demir Çelik	0.992	Turcas Petrol	1
Garanti Bankasi	1	Tüpras	0.967
Garanti Faktoring	1	Türk Prysmian Kablo	0.895
Global Yat. Holding	0.990	Türk Telekom	0.763
Halk GMYO	0.984	Türk Traktör	0.609
Hürriyet Gzt.	0.976	Vestel	0.972
Ihlas Ev Aletleri	0.873	Yapi ve Kredi Bank.	0.991
Number of active companies	15	Number of inactive companies	31

Source: Created by the author. Note: Active companies are indicated as "1".

According to the assessment in 2023, 15 companies were found to be relatively effective, while 31 companies were not effective. In this period, the effectiveness rate was 32.6%. In the literature, there are efficiency analyses evaluated in terms of the Corporate Governance Index for different periods. In Şekeroğlu and Acar (2017) study, 17.6% for 2009, 17.6% for 2010, 17.6% for 2010, 23.5% for 2011, 17.6% for 2012, 17.6% for 2013, 17.6% for 2014, 11.7% for 2014, 29.4% for 2015 and 47% for 2016 for 17 companies. Tahmaz (2022) obtained an efficiency ratio of 38.4% for 13 companies in the finance sector. In Uğurlu and Okan's (2023) study, for 33 companies, 15 institutions were evaluated as effective with an effectiveness rate of 45.4% in 2017. In 2018, the effectiveness rate decreased to 24.2% and 8 institutions were found effective. In 2019, the effectiveness rate increased to 36.3% and 12 organizations were considered relatively effective. In 2020, when the effects of the pandemic were intense, the effectiveness rate decreased to 27.2% and 9 organizations were determined as effective. In this study, the effectiveness rate increased by 32.6% for 46 companies.

CONCLUSION

Global corporate scandals have contributed to the development of the concept of corporate governance, along with efforts to regain investor confidence. Changes in the management approach of companies have been realized in order to provide a more solid foundation for businesses (Ghosh, 2021). An important point that has emerged in this process is that all countries should have their own corporate governance structure; because the fact that countries are under different conditions requires them to develop special structures (Halder & Raithatha, 2021).

Globally accepted common corporate governance principles include responsibility, transparency and public disclosure, accountability, and fairness/equity (Hassan & Mollah, 2021). These fundamental principles shape the management approach of companies and are generally accepted in the business world. Companies' responsibilities toward society and their commitment to ethical values play an important role in corporate governance (Hussain *et al.*, 2021). Likewise, it is critical for trust and reputation that companies present their operations in a transparent manner and inform the public in an accurate and timely manner. The principle of accountability ensures that the results of companies' activities are clearly traceable and that they are accountable for these results (Javeed & Lefen, 2021). Finally, the principles of fairness and equality aim to provide equal opportunities and a fair environment for everyone inside and outside the company. The implementation of these principles supports the long-term success of companies and enhances their sustainability (Yeh, 2020).

While the implementation of corporate governance principles, which are established to ensure that businesses are managed with more robust structures, is a voluntary choice in some countries, it has become a legal obligation in others (Khan *et al.*, 2021). In particular, countries such as the USA, which pioneered developments through legislation, have made significant changes in the field of corporate governance with important laws such as Sarbanes-Oxley. Turkey has also taken important steps in this regard, establishing corporate governance principles in line with the country's conditions, creating corporate governance indices and encouraging company managements to create sound structures with the new TCC laws (Yılmaz & Yıldız, 2021).



The purpose of this study is to identify efficient companies with the help of Data Envelopment Analysis for 46 companies traded in the BIST 100 index and included in the corporate governance index for the year 2023. In this study, the objective of producing the maximum output with the available input was adopted, and the output-oriented model (CCR) was used. The analysis was conducted with the help of the "Efficiency Measurement System (EMS)" package program. As a result of the analysis, 15 companies were found to be efficient, while 31 companies were found to be inefficient. The efficiency ratio for the period 2023 is 32.6%. The results are consistent with the studies of Şekeroğlu and Acar (2017), Tahmaz (2022), and Uğurlu and Okan (2023) in the literature. It is observed that the efficiency ratios of the companies included in the corporate governance index have increased over the years. Especially today, when sustainability processes have started, it can be said that companies have taken a more active position on the governance side. The following steps can be taken to increase the number of active companies in the corporate governance index:

Strengthening Corporate Governance Standards: It is important that the standards set for companies to be included in the corporate governance index are clearly defined and aligned with international best practices (Khan, 2021). Companies' compliance with these standards should be audited and suggestions for improvement should be made.

Training and Awareness Programs: Company executives and stakeholders should be trained on the importance and benefits of corporate governance (Khan & Johl, 2021a). Awareness-raising campaigns should be organized to emphasize that compliance with corporate governance principles is critical for companies' sustainable growth and long-term success.

Incentive and Support Mechanisms: Tax incentives, investment advantages, and other financial support can be provided to companies included in the corporate governance index (Khan & Johl, 2021b). This may encourage companies to improve their corporate governance practices.

Transparency and Accountability: Companies should increase their financial and managerial transparency and be more openly accountable to stakeholders and the public (Khan & Johl, 2021c). This will increase credibility and become attractive to investors.

Raising Awareness of Investors: Investors should be informed that companies that comply with corporate governance principles carry lower risks and may be more profitable in the long run. In this way, investors may show more interest in companies included in the corporate governance index (Widiastuti & Susanto, 2021).

Improvement of Legal and Regulatory Frameworks: Legal regulations and sanctions should be introduced to enforce compliance with corporate governance principles. Furthermore, effective implementation and supervision of these regulations should be ensured (Khan & Johl, 2021d).

Independent Audit and Consulting Services: Companies should be encouraged to regularly review their corporate governance processes and engage the services of independent audit firms or consultants for improvement. This makes it easier for companies to recognize their shortcomings and take the necessary steps (Blanton *et al.*, 2021).

Promotion of the Index: The advantages of the corporate governance index and the conditions for participation should be introduced to a wide audience, and the process of inclusion in the index should be facilitated, especially for small and medium-sized enterprises (Khan & Johl, 2021e).



These steps will contribute to increasing the number of effective companies in the corporate governance index and to establishing a better governance culture in the business world in general (El-Abiad *et al.*, 2023). For future studies, a meta-analysis is suggested to analyze the effectiveness of the companies included in the Corporate Governance Index every year with different input-output combinations and different effectiveness methods and to reveal their development.

This study analyzed the efficiency of 46 companies listed on the Borsa Istanbul (BIST) Corporate Governance Index for the year 2023 using the Data Envelopment Analysis (DEA) method. The output-oriented CCR model was applied to evaluate how effectively companies converted their inputs into outputs. The results revealed that only 15 companies were relatively efficient, while 31 were not, yielding an efficiency ratio of 32.6%. These findings highlight the importance of strong corporate governance practices in improving operational and financial performance. The study underscores the need for enhancing governance standards, fostering transparency, and implementing awareness programs to improve organizational efficiency. Furthermore, aligning corporate governance with sustainability objectives is critical for long-term success and resilience in volatile markets (Jiang & Xu, 2015).

The results provide practical implications for companies, investors, and policymakers. By identifying inefficiencies, companies can address governance shortcomings, optimize resource utilization, and achieve better alignment with stakeholder expectations. Policymakers can leverage these insights to design better regulations and support mechanisms to encourage adherence to corporate governance principles (Rizk & Othman, 2021).



Limitations and Dimensions for Future Research

This study has several limitations. First, the dataset covers only companies listed on the BIST Corporate Governance Index for 2023, limiting the generalizability of findings to other markets and periods. Second, the analysis uses a single set of input and output variables, potentially omitting other relevant factors influencing efficiency

ACKNOWLEDGMENTS: Authors would like to express their heartfelt gratitude to their family for their unwavering support and encouragement throughout this research journey. Their belief in the authors has been a constant source of motivation and strength. Furthermore, financial data used in the study were taken from the Finnet database.

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

ETHICS STATEMENT: None

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