

THE IMPACT OF CORPORATE GOVERNANCE ON CLIMATE CHANGE PERFORMANCE: EVIDENCE FROM TÜRKİYE*

Assoc. Prof. Bekir GEREKAN**

Prof. Erdal YILMAZ***

Asst. Prof. Emre BULUT****

Araştırma Makalesi / Research Article

Muhasebe Bilim Dünyası Dergisi
Eylül 2025, 27(3), 253-275

ABSTRACT

This study attempts to test whether corporate governance performance has an impact on climate change ratings. The sample covers firms with climate change and corporate governance ratings in BIST from 2018 to 2022. The panel regression results show that corporate governance performance has a statistically significant effect on climate change performance. Accordingly, shareholders, boards of directors, and public disclosure ratings statistically impact firms' climate change disclosures. Besides, size of the audit committee, number of female audit committee members, asset size, and firm age have statistically significant effects on disclosures of climate change.

Keywords: Climate Change, Corporate Governance, Carbon Disclosure Project

JEL Classification: Q54, G30, Q5

* Makale Geliş Tarihi (Date of Submission): 08.01.2024; Makale Kabul Tarihi (Date of Acceptance): 30.06.2025
This is an extended version of the abstract presented at MODAV-ICA 2023, 20th International Conference on Accounting.

** Ağrı İbrahim Çeçen University, Department of Business, bgerekan@agri.edu.tr, orcid.org/0000-0001-6724-4729

*** Ağrı İbrahim Çeçen University, Department of Business, eyilmaz@agri.edu.tr, orcid.org/0000-0002-2491-446X

**** Ağrı İbrahim Çeçen University, Department of Business, ebulut@agri.edu.tr, orcid.org/0000-0002-1468-2175

Atıf (Citation): Gerekan, B., Yılmaz, E., & Bulut, E. (2025). The Impact of Corporate Governance on Climate Change Performance: Evidence from Türkiye, *Muhasebe Bilim Dünyası Dergisi*, 27(3), 253-275. <https://doi.org/10.31460/mbdd.1411464>

KURUMSAL YÖNETİMİN İKLİM DEĞİŞİKLİĞİ NOT PERFORMANSINA ETKİSİ: TÜRKİYE'DEN BİR ÖRNEK

ÖZ

Çalışmanın amacı, işletmenin kurumsal yönetim performansının iklim değişikliği notları üzerinde etkisinin olup olmadığını test etmektir. Borsa İstanbul'a kayıtlı ve iklim değişikliği ile kurumsal yönetim derecelendirme notuna sahip şirketlerin 2018-2022 verileri üzerinde yapılan panel regresyon analizi, genel olarak kurumsal yönetim performansının iklim değişikliği performansı üzerinde istatistiksel açıdan anlamlı etkisinin olduğunu göstermektedir. Kurumsal yönetim derecelendirme sisteminin unsurlarından pay sahipleri, yönetim kurulu ve kamuyu aydınlatma notlarının işletmelerin iklim değişikliği açıklamaları üzerinde istatistiksel açıdan anlamlı etkilerinin olduğu tespit edilmiştir. Denetim komitesi üye sayısı, denetim komitesi bayan üye sayısı, aktif büyüklüğü ve işletme yaşının da iklim değişikliği açıklamaları üzerinde istatistiksel açıdan anlamlı etkilerinin olduğu görülmüştür.

Anahtar Kelimeler: İklim Değişikliği, Kurumsal Yönetim, Karbon Saydamlık Projesi

JEL Sınıflandırması: Q54, G30, Q5

GENİŞLETİLMİŞ ÖZET

AMAÇ VE MOTİVASYON

Kurumsal yönetimin ve iklim değişikliğinin işletmenin finansal performansı, yönetim kurulu yapısı, denetim komitesi yapısı gibi değişkenlerle ilişkisinin incelendiği çok sayıda çalışma mevcuttur. Ancak literatürde kurumsal yönetim performansının iklim değişikliği notları üzerindeki etkisinin incelendiği ulusal bir çalışmaya rastlanamamıştır. Bu açıdan çalışmanın literatüre katkı sağlayacağı düşünülmektedir. Bu çalışmanın amacı, işletmenin kurumsal yönetim performansının iklim değişikliği notları üzerinde etkisinin olup olmadığını test etmektir. Bu amaçla öncelikle 2018-2022 yılları arasında düzenli olarak Karbon Saydamlık Projesi (CDP) kapsamında gerçekleştirilen iklim değişikliği anketini yanıtlayıp notlandırılan işletmeler belirlenmiş ve bu işletmelerden kurumsal yönetim derecelendirme notları açıklananlar araştırma kapsamına alınmıştır.

ARAŞTIRMANIN STRATEJİSİ VE YÖNTEMİ

Hipotez: İşletmelerin kurumsal yönetim performanslarının iklim değişikliği değerlendirmeleri üzerinde istatistiksel açıdan anlamlı etkisi vardır.

İşletmelerin kurumsal yönetim performansının Karbon Saydamlık Projesi (CDP) kapsamında gerçekleştirilen iklim değişikliği değerlendirmeleri üzerindeki etkisinin incelendiği bu çalışmanın örneklemini, Borsa İstanbul'a kayıtlı ve Karbon Saydamlık Projesi değerlendirmeleri ile kurumsal

yönetim derecelendirme notuna sahip işletmeler oluşturmaktadır. Söz konusu örneklem kapsamında 15 adet işletmenin 2018-2022 yıllarına ilişkin verileri dengeli panel regresyon analizi gerçekleştirilerek incelenmiştir. Söz konusu modele ilişkin eşitlik aşağıda yer almaktadır.

$$\begin{aligned} \ll CDP_{i,t} = \beta_0 + \beta_1 PSN_{i,t} + \beta_2 KAN_{i,t} + \beta_3 MSN_{i,t} + \beta_4 YKN_{i,t} + \beta_5 DKUS_{i,t} + \beta_6 DKBUS_{i,t} + \beta_7 \\ AB_{i,t} \beta_8 IY_{i,t} + \beta_9 YKUS_{i,t} + \varepsilon_{i,t} \gg \end{aligned}$$

Çalışmada, kurumsal yönetim derecelendirme sisteminin dört unsuru olan; pay sahipleri (PSN), kamuyu aydınlatma (KAN), menfaat sahipleri (MSN) ve yönetim kurulu (YKN) notları bağımsız değişken olarak kullanılmıştır. Bu veriler, işletmelerin faaliyet raporları ve kurumsal yönetim derecelendirme raporlarından temin edilmiştir.

İklim değişikliği değerlendirmeleri (CDP), araştırma modelinde bağımlı değişken olarak kullanılmıştır. Söz konusu değişkene ilişkin veriler, CDP Türkiye İklim Değişikliği ve Su Raporlarından elde edilmiştir. Söz konusu raporlarda işletmelere ilişkin değerler; A, A-, B, B-, gibi harflendirilerek kullanılmıştır. Çalışma kapsamında bu harf değerleri 1-7 arası skorlandırılarak kullanılmıştır. Örneğin, A derecesi 7, A- derecesi 6, C derecesi 3 olarak modele dahil edilmiştir.

Öte yandan araştırma modelinde kontrol değişkenlerine de yer verilmiştir. Buna göre, yönetim kurulu üye sayısı (YKUS), denetim komitesi üye sayısı (DKUS), denetim komitesi kadın üye sayısı (DKBUS), aktif büyüklüğü (AB) ve işletme yaşı (IY) verileri araştırmada kontrol değişkenleri olarak kullanılmıştır.

BULGULAR ve TARTIŞMA

Borsa İstanbul'a kayıtlı ve iklim değişikliği ile kurumsal yönetim derecelendirme notuna sahip 15 adet işletmenin 2018-2022 verileri üzerinde gerçekleştirilen panel regresyon analizi sonucunda elde edilen bulgular, genel olarak kurumsal yönetim performansının iklim değişikliği performansı üzerinde istatistiksel açıdan anlamlı etkisinin olduğunu göstermektedir.

Tespit edilen bulgulara göre araştırma modelinin bir bütün olarak istatistiksel açıdan anlamlı olduğu görülmektedir (*p <0.01). Sonuçlara göre, pay sahipleri notunun (PSN) iklim değişikliği (CDP) değerlendirmeleri üzerinde negatif yönde istatistiksel açıdan anlamlı etkisinin olduğu tespit edilmiştir (**p <0.05). Bununla birlikte, kamuyu aydınlatma (KAN) ve yönetim kurulu (YKN) notlarının iklim değişikliği değerlendirmeleri üzerinde pozitif yönde istatistiksel açıdan anlamlı etkilerinin olduğu görülmektedir (**p <0.05; **p <0.05).

Öte yandan, araştırma modelinde kontrol değişkenleri olarak kullanılan yönetim kurulu üye sayısı (YKUS), denetim komitesi üye sayısı (DKUS) ve işletme yaşı (IY) değişkenlerinin iklim değişikliği değerlendirmeleri üzerinde pozitif yönde istatistiksel açıdan anlamlı etkilerinin olduğu tespit edilmiştir (**p <0.10). Ayrıca, denetim komitesi bayan üye sayısı (DKBUS) değişkeninin iklim değişikliği

değerlendirmeleri üzerinde ise istatistiksel açıdan negatif yönde anlamlı etkisinin olduğu görülmektedir (**p <0.10).

Kurumsal yönetimin farklı yönlerinin kullanılması, bu yönler ile çevresel performans ve açıklama arasında doğrudan bağlantılar kurulmasına yardımcı olabilir (Cong, & Freedman, 2011). Çevre ile ilgili kaliteli açıklamalar, bir şeffaflık sinyali sağlar ve yöneticilerin itibarını ve sosyal profilini geliştirir (Deegan ve diğerleri, 2006; Simnett ve diğerleri, 2009). Etkili kurumsal yönetim mekanizmalarının mevcudiyeti, çevresel raporlamanın kalitesiyle önemli ölçüde ilişkilidir çünkü yöneticiler, raporlanan mali bilgilerin ayrıntı seviyesi ve uygunluğuna karar verirler (Claessens & Yurtoglu, 2013). Ayrıca International Corporate Governance Network, yatırımcılar için bir şirketin değeri ve gelecekteki beklentileri ile fırsatlar ve riskleri değerlendirirken çevre hakkında bilgilendirici açıklamaların önemli olduğuna işaret etmiştir (Iatridis, 2013).

SONUÇ ve ÖNERİLER

İklim değişikliğinin, günümüzde toplumları, işletmeleri ve dünya düzenini etkileyen en önemli faktör olduğunu ifade etmek mümkündür. Bu durumun olumsuz etkilerini gözler önüne sermek ve azaltabilmek adına küresel boyutta çeşitli çalışmalar yürütülmektedir. Söz konusu çalışmalardan biri de Karbon Saydamlık Projesi'dir (CDP). CDP, iş dünyasının sebep olduğu çevresel ve doğal kaynak tahribatlarının iklim değişikliği üzerindeki etkilerini önlemek ve azaltmak amacıyla bu duruma ilişkin çeşitli faaliyetlerde bulunan ve teşvik eden uluslararası bir platformdur.

Bu bağlamda, hazırlanan çalışmada işletmelerin kurumsal yönetim performansının Karbon Saydamlık Projesi (CDP) kapsamında gerçekleştirilen iklim değişikliği değerlendirmeleri üzerindeki etkisi incelenmiştir. Literatürde, iklim değişikliği kapsamında yapılan değerlendirmeler ile işletmelerin kurumsal yönetim başarıları arasındaki ilişkiyi ele alan ulusal nitelikte herhangi bir çalışmaya rastlanılmamıştır. Daha önce yapılan çalışmalar genellikle kurumsal yönetimin karbon emisyonu, finansal performans ve karlılık üzerindeki etkisine odaklanmaktadır (Gürbüz ve diğerleri, 2024; Kurt, 2024; Çetenak ve diğerleri, 2023; Arslan & Yağcılar, 2023; Kulalı, 2022). Dolayısıyla, bu çalışmanın literatüre bu yönü ile katkı sağlayacağı düşünülmektedir.

Sonuçlara göre, kurumsal yönetim derecelendirme sisteminin unsurlarından olan pay sahipleri, yönetim kurulu ve kamuyu aydınlatma notlarının işletmelerin iklim değişikliği açıklamaları üzerinde istatistiksel açıdan anlamlı olmakla birlikte, sırasıyla, negatif, negatif ve pozitif etkilerinin olduğu tespit edilmiştir. Öte yandan, denetim komitesi üye sayısı, denetim komitesi bayan üye sayısı, aktif büyüklüğü ve işletme yaşının iklim değişikliği açıklamaları üzerinde istatistiksel açıdan anlamlı etkilerinin olduğu görülmüştür.

Son olarak, hazırlanan bu çalışmanın bazı kısıtları bulunmaktadır. Örneklem ve zaman boyutu söz konusu kısıtlardandır. Buna göre sonraki çalışmalarda gerek sektörel çeşitlendirme gerekse işletme

sayısı ve yıl aralığı artırılarak karşılaştırmalı sonuçlar tespit edilebilir. Ayrıca, araştırma modeline işletmelere özgü farklı değişkenler dahil edilerek değişkenler arasındaki ilişki farklı açılardan tartışılabilir.

1. INTRODUCTION

Efforts must be exerted promptly at international, national, and regional levels in politics, economics, and sociocultural domains to mitigate the effects of climate change, one of today's most pressing environmental crises (Peker et al., 2019). Corporate strategic measures to address global warming and other environmental challenges often do not rank high among corporate governance priorities. In the short term, such decisions are frequently inconsistent with executive incentives and are not viewed as profit-maximizing (Aggarwal & Dow, 2012). The prevailing normative frameworks in corporate governance are generally short-term, resulting in a temporal misalignment between corporate governance and climate change (Benjamin & Andreadakis, 2019). Social and environmental externalities have recently gained more attention, albeit limited, due to issues such as pollution caused by industrial development, natural resource scarcity, habitat loss, environmental degradation, and social inequality (Hummels & Argyrou, 2021).

In 2015, the 1992 UN Framework Convention on Climate Change signatories adopted the Paris Climate Agreement to combat climate change and ensure a low-carbon, resilient, and sustainable future. The Paris Agreement aims to limit the global temperature increase, which causes climate change, to below 2°C compared to the pre-industrial era (Özerhan & Sultanoğlu, 2020).

Reducing a company's carbon footprint may lead to cost reductions, ultimately increasing profits (Granade et al., 2009). Indeed, research suggests that numerous measures to lessen environmental impacts often lead to cost savings (Aggarwal & Dow, 2012).

The Carbon Disclosure Project (CDP), a London-based non-profit organization, began its operations in 2000 to assist public companies, cities, states, and regions in measuring and addressing climate change consequences and dangers, water security, and other environmental impacts. This initiative responds to the demands of investors, customers, and city stakeholders. The organization operates a global disclosure system and conducts annual surveys to measure the environmental impacts of organizations. The results are then disclosed in annual reports on their official website (CDP Turkey, 2023).

This study aims to examine whether corporate governance performance of a firm affects climate change ratings. To achieve this, the study first identifies firms that consistently participated in the climate change survey conducted by CDP between 2018 and 2022. Subsequently, the corporate governance rating scores of these firms are gathered. We use balanced panel regression analysis to

explore how corporate governance ratings influence climate change ratings. While existing literature has explored the relationships between climate change and board of directors' structure, financial performance, and audit committee structure aspects of corporate governance, to the best of our knowledge, no domestic or national study has specifically examined the impact of corporate governance performance on climate change ratings. Previous research mainly focuses on the impact of corporate governance on carbon emission performance, financial performance, and profitability (Gürbüz et al., 2024; Kurt, 2024; Çetenak et al., 2023; Arslan & Yağcılar, 2023; Kulalı, 2022). This research aims to fill this gap and contribute to literature in this regard.

2. THEORETICAL FOUNDATION AND HYPOTHESIS

Global financial crises have significantly heightened the importance of boards of directors and corporate governance in risk management (Mueller, 2006). Corporate governance, when narrowly defined, revolves around the relationship between companies and their shareholders. In its broader definition, it encompasses the relationship between companies and society (Önder, 2012). Corporate governance serves as the system involving various stakeholders in decision-making processes within a company, with stakeholders ranging from shareholders and managers to employees. Due to information costs and its asymmetric distribution among stakeholders, agency costs arise, making the quality and structure of corporate governance crucial in practice (Aggarwala & Dow, 2012). At the heart of corporate governance lies the separation of "ownership" and "control" in management (Bhasa, 2004), leading to agency problems. These problems arise when the interests of managers (agents) conflict with mechanisms aimed at eliminating informational asymmetries between managers and shareholders (Ceran, 2017). The conflict of interest between managers and shareholders often results in informational asymmetry, allowing managers to potentially use financial information for personal gain to the detriment of shareholders (Jensen & Meckling, 1976). Corporate governance mechanisms act as safeguards for shareholder interests amid competing stakeholder interests (Kumar & Zattoni, 2013), positioning corporate governance as a response to the agency problems (Celayir, 2020). The success of companies' activities is achieved through adherence to desired corporate governance principles such as transparency, fairness, accountability, and responsibility (Dizgil & Reis, 2021).

Simultaneously, concerns about sustainability, not only in the environmental sense but also generally in life, have increased due to environmental erosion, industrialization, and global climate change (Turguttopbaş, 2020). Research indicates that the quality of corporate governance influences a firm's decision to disclose voluntary carbon emission information and the quality of the disclosed information (Ben-Amar & McIlkenny, 2015). The challenge of climate change compels companies worldwide to consider and rapidly implement environmental strategies (Kolk & Pinkse, 2005; Hoffman, 2005; Lash

& Wellington, 2007). The policies developed to combat climate change often necessitate significant investments, making the attitude and effectiveness of a company's board of directors crucial. Independent committees, a well-structured leadership team, regular meetings, executive involvement, and independence all contribute to the effectiveness of a board of directors (Van den Berghe & Levrau, 2004). According to Galbreath (2010), the composition of the board of directors influences how corporations allocate resources to address climate change risks and opportunities and develop specific practices for managing these risks. Studies on the relationship between the effectiveness of the board of directors and climate change disclosure indicate a positive relationship, suggesting that firms with larger boards, separate CEO and chairman roles, number of meetings, and a higher percentage of internal executives perform better in governance practices related to climate change (Galbreath, 2010; Amran et al., 2014).

Legitimacy theory posits that companies tend to justify their activities through voluntary disclosure to influence their public image (Cho & Patten, 2007). In line with legitimacy theory, the board of directors strives to meet the information needs of stakeholders regarding climate change issues (Comyns, 2016). Research conducted by Choi et al. (2013) and Rankin et al. (2011) suggests that the extent to which Australian companies disclose voluntary carbon emissions is influenced by the quality of their corporate governance. The board of directors is responsible for the strategy and reporting of greenhouse gas emissions, necessitating well-structured boards with the ability to manage emissions and other climate-related hazards (Tauringana & Chithambo, 2015). Adhering to emission reductions can prompt companies to seek improved production efficiencies, positively affecting the company's value (Aggarwal & Dow, 2012).

Climate change studies highlight the effects of certain governance aspects, such as proactive participation of female executives (Tingbani et al., 2020). Gender diversity is believed to increase the likelihood of voluntary disclosure of information about climate change, as studies suggest that women are more sensitive to environmental issues than men (Ben-Amar et al., 2017). Hollindale et al. (2017) find that having multiple female executives on the boards of companies listed on the stock exchange significantly and positively impacts the quantity and quality of greenhouse gas emission disclosures in Australia.

Firm size is also positively correlated with disclosure quality, and larger and more widely owned firms tend to make voluntary environmental disclosures (Kouloukoui et al., 2019; Ciocirlan & Pettersson, 2012; Brammer & Pavelin, 2006). This can be explained by larger firms finding environmental disclosure costs more manageable.

Independent audit committees are likely to work independently and objectively, free from the influence of management (Bédard & Gendron, 2010). Therefore, independent audit committees play a

significant role in disclosing all kinds of information about companies, including carbon emission information (Chariri et al., 2018). Studies examining how audit committee structures affect climate change disclosures suggest that independent audit committees, audit committee expertise, and audit committee meetings all positively influence carbon emission disclosures (Salleh et al., 2022; Chariri et al., 2018).

Considering various aspects of corporate governance can establish direct connections between these aspects and environmental performance and disclosure (Cong & Freedman, 2011). Quality environmental disclosures act as transparency signals, enhancing managers' reputations and social profiles (Deegan et al., 2006; Simnett et al., 2009). Effective corporate governance mechanisms are significantly associated with environmental reporting quality because managers decide on the level and appropriateness of reported financial information (Claessens & Yurtoglu, 2012). The International Corporate Governance Network has also emphasized the importance of informative disclosures about the environment when evaluating a company's value, future expectations, and opportunities and risks for investors (Iatridis, 2013). Corporate governance mechanisms can resolve the divergence of interests between managers and stakeholders, bringing the interests of managers closer to those of stakeholders and encouraging them to meet stakeholders' environmental demands (Kock et al., 2012). According to Jaffar et al. (2018), a positive relationship exists between firms' corporate governance mechanisms and environmental performance because companies with good governance have a clear strategic direction that assesses and improves companies' environmental performance to align with stakeholders' demands. Research on corporate governance and sustainability in Turkey holds significant relevance in the literature. For instance, Kardeş Selimoğlu and Yazıcı (2021) conduct a comprehensive analysis of the influence of corporate governance procedures on sustainability. The authors find that corporate governance regulations in Turkey have enhanced business environment. In addition, effective corporate governance positively influences business sustainability and subsequently affects organizational innovation. Moreover, the study emphasizes that the board of directors, commission members, and audit committees in Turkey are associated with effective corporate governance. Consequently, leadership and management initiatives are of paramount significance.

The sample period from 2018 to 2022 encompasses a pivotal phase for the mitigation of the climate issue and the repercussions of the COVID-19 epidemic on the global economy. The pandemic has profoundly affected the operational frameworks and sustainability initiatives of enterprises.

The COVID-19 pandemic significantly influences the comprehension of firms' environmental performance. Previous studies highlight that the epidemic has heightened carbon declarations and environmental initiatives among enterprises (Lee et al., 2015; Alsaifi et al., 2020). The significance of board structures and environmental disclosures is more pronounced during crises (Haque, 2017).

Regarding Turkey, Gürbüz et al. (2024) and Kurt (2024) indicate that the epidemic has enhanced the openness and reliability of carbon emission disclosures while examining the impact of company governance measures on these disclosures. Furthermore, research by Arslan and Yağcılar (2023) and Kulalı (2022) highlights the impact of environmental, social, and corporate governance (ESG) scores on financial sustainability. In Turkey, reporting platforms like CDP promote uniformity in corporate environmental disclosures, serving as a crucial instrument in the fight against climate change (Sultanoğlu & Özerhan, 2020).

Based on the above mentioned theoretical and empirical background, the following hypothesis is developed:

Hypothesis: Firms' corporate governance performance has a statistically significant effect on climate change assessments.

3. MATERIALS & METHODS

3.1. Data Set and Sample

This study aims to investigate the impact of corporate governance performance on climate change assessments within the Carbon Disclosure Project Turkey (CDP) framework. The sample for this study is comprised of firms listed on Borsa Istanbul, which have undergone evaluations in the CDP Turkey Climate Change and Water Reports, as well as possessing Corporate Governance Rating Scores. A sample of 15 firms are examined through a balanced panel regression analysis during a sample period spanning from 2018 to 2022. The decision to commence the dataset in 2018 is primarily to maximize the number of observations.

The data is obtained from the CDP Turkey Climate Change and Water Reports and Activity and Corporate Governance Rating Reports, which were publicly disclosed by the businesses within the sample period 2018-2022. Information from these reports was gathered from the Public Disclosure Platform (KAP), the official website of CDP Turkey, and the corporate websites of the relevant businesses.

15 sample firms are strategically significant for Turkey's carbon emission reduction objectives and sustainability regulations. Firms in the industry, energy, finance, and food sectors significantly enhance Turkey's environmental performance (TÜİK, 2023; Gürbüz et al., 2024). For instance, Arçelik and Vestel's energy efficiency initiatives and renewable energy investments significantly contribute to Turkey's green transformation process. In addition, firms in the financial sector promote the dissemination of ESG norms by financing sustainable initiatives (Arslan & Yağcılar, 2023).

Table 1 provides a listing of the sample firms:

Table 1. Sample Firms

No	Firm	BIST Ticker
1	ARÇELİK A. Ş.	ARCLK
2	ANADOLU EFES BİRACILIK VE MALT SANAYİİ A.Ş.	AEFES
3	ALBARAKA TÜRK KATILIM BANKASI A.Ş.	ALBRK
4	MİGROS TİCARET A.Ş.	MGROS
5	T. SİNAİ KALKINMA BANKASI A.Ş.	TSKB
6	ASELSAN ELEKTRONİK SANAYİ VE TİCARET A.Ş.	ASELS
7	TOFAŞ TÜRK OTOMOBİL FABRİKASI A.Ş.	TOASO
8	T. GARANTİ BANKASI A.Ş.	GARAN
9	VESTEL ELEKTRONİK SANAYİ VE TİC. A.Ş.	VESTL
10	T. ŞİŞE VE CAM FABRİKALARI A.Ş.	SISE
11	ŞEKERBANK T.A.Ş.	SKBNK
12	TÜRK TELEKOMÜNİKASYON A.Ş.	TTKOM
13	YAPI VE KREDİ BANKASI A.Ş.	YKBNK
14	PINAR ENTEGRE ET VE UN SANAYİİ A.Ş.	PETUN
15	PINAR SÜT MAMULLERİ SANAYİİ A.Ş.	PNSUT

3.2. Definition of Variables and Methodology

Firms in Borsa Istanbul that have a corporate governance rating and Carbon Disclosure Project assessments comprise the sample of this study. We analyze 15 firms over the 2018-2022 sample period by performing a balanced panel regression analysis. The model formulated is given below:

$$CDP_{i,t} = \beta_0 + \beta_1 SHR_{i,t} + \beta_2 PD_{i,t} + \beta_3 STH_{i,t} + \beta_4 BoD_{i,t} + \beta_5 ACM_{i,t} + \beta_6 FEM_{i,t} + \beta_7 AS_{i,t} + \beta_8 AGE_{i,t} + \beta_9 BoDM_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where, the four elements of the corporate governance rating system, shareholders (SHR), public disclosure (PD), stakeholders (STH), and board of directors (BoD) ratings, are the independent variables. This data is retrieved from the firms' annual and corporate governance rating reports. Climate change assessment (CDP) is the dependent variable in the model. Data on this variable is obtained from CDP Turkey Climate Change and Water Reports. The firms' values in these reports are scored as A, A-, B, B-, etc. Within the scope of the study, these letter values are converted into numerical scores between 1-7. For example, A is scored as 7, A-, as 6, and C, as 3. Although no studies have converted letter scores into numeric ones regarding CDP, there are studies in which corporate governance ratings or credit ratings are converted into numerical scores. In particular, it is a common approach to conduct panel data analysis by converting letter grades given by credit rating agencies into numerical values. Previous research has inspired us to take letter grades as an ordinal scale and analyze them using panel

data regression (Ederington, 1985; Hoover & Fafatas, 2016; Kılıç & Kuzey, 2018; Oktay et al., 2021). We have selected the control variables based on previous literature (Alsaifi et al., 2019; Giannarakis et al., 2017; Bui et al., 2020; Elsayih et al., 2018; Ben-Amar et al., 2017). The number of board members (BODM), number of audit committee members (ACM), number of female audit committee members (FEM), asset size (AS), and firm age (AGE) are the control variables.

The structure of the audit committee, the number of committee members, and the diversity of the committee (including gender) might have an impact on the quality of corporate governance.

Some prior studies show that firms with more women on audit committees are likely to improve corporate transparency and governance quality. More stringent governance practices may result from the female members' unique viewpoints and awareness of the need for risk management. According to Velte (2023), boards with a critical mass of female directors perform better because they contribute varied perspectives and create an inclusive decision-making atmosphere. Female directors are also more likely to be ethical and open with shareholders, which helps reduce agency conflicts and boosts the quality of governance (Pandey et al., 2019). The significance of gender diversity in corporate governance has been further demonstrated by the correlation between female representation on boards and enhanced financial performance and stakeholder interactions (Matlani, 2020; Freitas et al., 2022).

Asset size is often linked to a company's resources and market power. Larger companies are generally subject to more regulation and tend to adopt better governance practices (Adams & Ferreira, 2009). Hence, asset size may affect the quality of corporate governance practices.

Firm age is associated with experience and maturity. While newer organizations are more likely to embrace innovative governance techniques, older companies may have an easier time integrating corporate governance standards over time. (Klapper & Love, 2004). Moreover, older firms tend to have more experienced boards. Therefore, older firms tend to enhance decision-making processes and reduce agency problems (Pandey et al., 2019).

Board composition also might affect corporate governance performance. For instance, the number of independent directors and board diversity enhance the quality of corporate governance (Brown & Caylor, 2006). Furthermore, disclosure and transparency ratings provide valuable insight into the openness of corporate governance systems and investor communication practices. It is possible that stakeholder confidence and corporate governance performance are both boosted by higher evaluations of transparency and disclosure. A company's dedication to openness and responsibility is demonstrated by its public disclosure scores. Higher levels of public disclosure are associated with improved corporate governance practices, as they enhance stakeholder trust and facilitate informed decision-making (Duyen, 2023). Shareholder activism and engagement are crucial for holding management accountable and ensuring that corporate decisions align with shareholder interests (Mallin & Melis, 2010). In addition,

these elements can have a multiplicative impact on corporate governance when they interact with one another. For example, better governance outcomes are more likely to occur in firms that have a diverse board with female directors and higher public disclosure scores (Dănescu & Popa, 2022).

Table 2. Variable Definitions and Sources

Variable	Type of Variable	Source	Measurement of Variable
Climate Change Assessments (CDP)	Dependent	CDP Turkey Climate Change and Water Reports	The assessments are measured as A, A-, B, B-, etc. These letter values are transformed to numeric scores between 1-7. For example, A is included in the model as 7, A- as 6, and C as 3.
Shareholders' Note (SHR)	Independent	Annual and Corporate Governance Rating Reports of Firms.	Log transformed
Public Disclosure (PD)	Independent		Log transformed
Stakeholders' Note (STH)	Independent		Log transformed
Board of Directors Note (BoD)	Independent		Log transformed
Number of Board of Directors Members (BODM)	Control Variable	Annual Reports	Log transformed
Number of Audit Committee members (ACM)	Control Variable	Annual Reports	Log transformed
Number of female members in audit committee (FEM)	Control Variable	Annual Reports	Log transformed
Asset size (AS)	Control Variable	Annual Reports	Log transformed
Firm's Age (AGE)	Control Variable	Public disclosure platform	Date of First Listing on the Stock Exchange- Base Year

Table 2 provides summary definitions of the variables in the model. The calculation of the values of the dependent, independent, and control variables are also included in the table.

4. RESULTS & DISCUSSION

This section presents tests related to the panel regression analysis and the empirical findings. Investigating the assumptions regarding autocorrelation, heteroscedasticity, and inter-unit correlation issues in the panel data model is crucial. The predicted results would be inconsistent if these assumptions do not hold (Ün, 2018). Statistical testing of these assumptions is thus required prior to analysis.

Table 3. Autocorrelation, Heteroscedasticity, and Inter-Unit Correlation Tests Results

Test Type	Test Value		
Modified Bhargava et al., Durbin-Watson	1.796		
Levene, Brown, and Forsythe Test "	W0:0.032	W50: 0.900	W10: 0.032
Pesaran CD test	0.380		

Table 3 displays the results of the model assumptions tested. First, we test autocorrelation by using the Modified Bhargava et al. Durbin-Watson test. Since test values are less than 2 (Tatoğlu, 2016), the model has an autocorrelation problem. Subsequently, we examine heteroscedasticity with the Levene, Brown, and Forsythe test. We find that there is also heteroscedasticity problem in the above model (the Beck-Katz (1995) robust estimator is used to tackle these two problems as discussed below). Finally, we perform the Pesaran CD test to check the hypothesis of inter-unit correlation, and we find no inter-unit correlation in the model.

Table 4. VIF Values

Variable	VIF Value
SHR	1.91
PD	3.24
STH	3.37
BoD	1.96
ACM	1.49
FEM	2.33
BoDM	1.88
AS	3.45
AGE	2.21

A VIF (Variance Inflation Factor) value higher than 4 indicates a multicollinearity problem in the model (Açıkgöz-Uygurtürk et al., 2015). Table 4 shows no variable with a VIF value above 4. Therefore, there is no multicollinearity problem in the model.

Table 5. Regression Results

Variable	P> t	Coefficient
SHR	0.073***	-2.074
PD	0.036 **	4.889
STH	0.250	-2.886
BoD	0.074***	3.274
ACM	0.013**	0.499
FEM	0.016**	-0.207
BoDM	0.026**	0.529
AS	0.106	-0.053
AGE	0.002**	0.365
Cons.	0.273	-14.491
R ² = 0.30 Wald chi2 (7) = 41.38 Prob > chi2 = 0.0000		

Note: * $p < 0.01$, ** $p < 0.05$, *** $p < 0.10$.

Table 5 presents the results of the standard error-corrected panel regression analysis (PCSE) proposed by Beck and Katz (1995). This study employs the Beck-Katz (1995) robust estimator for the regression analysis since it generates statistically meaningful results when heteroscedasticity and autocorrelation problems exist. (Tatoğlu, 2016). Panel data regressions where the dependent variable is categorical come with their own assumptions: no endogeneity, no perfect multicollinearity, homoscedasticity, no serial correlation, and unobserved heterogeneity (Tatoğlu, 2016). Therefore, the Beck and Katz (1995) PCSE approach is an effective choice for small panel datasets, especially when addressing heteroscedasticity and cross-sectional correlation. It offers a straightforward and efficient method to enhance the dependability of standard errors while preserving OLS estimation for the coefficients. This approach is particularly advantageous in situations where conventional GLS approaches may underperform because of limited sample sizes or panel-specific heterogeneity. Although the Arellano- Bond method would also be a good method for robustness, it deals with small cross-sectional but longer time dimensions. Hence, we did not apply this method in our analysis.

The findings show that the entire model is statistically significant (* $p < 0.01$). Accordingly, shareholders' rating (SHR) has a statistically significant negative effect on climate change (CDP) assessments (** $p < 0.05$). On the other hand, public disclosure (PD) and board of directors (BoD) ratings have statistically significant positive effects on climate change assessments (** $p < 0.05$; ** $p < 0.05$).

Regarding the control variables, the number of board members (BoDM), the number of audit committee members (ACM), and the age of the company (AGE) have a statistically significant positive effect on climate change assessments (** $p < 0.10$). In addition, the number of female audit committee members (FEM) has a statistically significant negative effect on climate change assessments (** $p < 0.10$). This outcome is plausible due to the monitoring role of the board's independent female directors. However, the relationship necessitates a critical mass of female directors, as the effect is amplified if at least a "critical mass" of about 30% women serving on the board (Joecks et al., 2013).

5. CONCLUSION

Climate change is the most critical factor affecting today's societies, businesses, and world order. To reveal and mitigate the adverse effects of this problem, various studies are carried out on a global scale. One of these efforts is the Carbon Disclosure Project (CDP). CDP is an international platform that engages in and promotes various activities to prevent or mitigate the effects of environmental and natural resource destruction caused by the business world.

In this context, this study examines the impact of firms' corporate governance performance on climate change assessments conducted within the scope of the Carbon Disclosure Project (CDP). The literature has no national or domestic study on the relationship between climate change assessments and enterprises' corporate governance performance in Türkiye. Therefore, this study contributes to literature in this respect.

The study analyzes 15 firms in Borsa Istanbul with reported climate change and corporate governance ratings from 2018 to 2022. The findings of the panel data regression analysis show that, in general, corporate governance performance has a statistically significant effect on climate change performance. Specifically, shareholders, board of directors, and public disclosure ratings, which are the elements of the corporate governance rating system, have statistically significant, negative, positive and positive effects on firms' climate change disclosures, respectively. Furthermore, the number of audit committee members, the number of female audit committee members, and the firm's age also have statistically significant effects on climate change disclosures. Our results might be interpreted as follows:

Carbon disclosure performance is negatively impacted by the shareholder score, which is statistically significant. Assuring shareholders is a primary goal of corporate governance. One possible explanation for the negative impact may be that the managers are not seeking shareholders' best interests. Climate change performance is not seen as an adequate return due to the asymmetric information between the managers and shareholders (Kanca et al., 2021; Jensen & Meckling, 1976).

Consistent with previous research, firms' climate change performance has improved after public disclosure. Businesses are more likely to improve their carbon performance if they disclose their emissions to the public and the government, which can then use this information to keep tabs on the firms' emissions. (Siddique et al., 2021; Lee et al., 2013; Lu et al., 2021). Carbon disclosure by businesses also encourages recycling, which benefits both customer actions and the environment (Martin et al., 2022). Also, the voluntary disclosure of climate change risks is enhanced by shareholder activism on climate change disclosure, particularly when commenced by institutional investors (Flammer et al., 2021).

Additionally, there is a significantly positive effect of the board of directors score on climate change performance. The board of directors score determines how well corporate governance mitigates agency conflicts between shareholders and management (Akhtaruddin et al., 2009). Firms' climate change efforts and carbon emission disclosures benefit from having independent directors on the board. The first expectation is that independent directors will effectively oversee management to increase long-term value and maintain transparency (Jizi et al., 2014). Furthermore, by discouraging an emphasis on short-term gains, independent directors increase sensitivity to societal demands (Yunus et al., 2016). According to stakeholder theory, a positive correlation exists between the board of directors score and climate change performance, since external directors, in contrast to their internal counterparts, are less likely to be subject to pressure from shareholders and managers (Hussain et al., 2016).

Better accountability and transparency for organizations would result from an audit committee comprised entirely of independent and external directors. The audit committee significantly improves carbon emission disclosure (Appuhami & Tashakor, 2017; Rifai & Siregar, 2021; Wahyuningrum et al., 2022). The information gap between management and stakeholders can be narrowed with the help of a well-functioning audit committee. Financial reporting issues and the disclosure of non-financial information, such as CSR disclosure, are better addressed when there is a higher number of members in audit committees (Khoiriyah et al., 2022).

Among the many responsibilities of a company's upper management are the creation of long-term plans for its operations, the oversight of its assets to ensure they are being used wisely, and the disclosure and close monitoring of any significant environmental risks (Ben-Amar et al., 2017; Jizi et al., 2014). Having additional directors on the board may improve its capacity to oversee operations and encourage value-creating initiatives (Akhtaruddin et al., 2009). Therefore, companies with larger boards may be more motivated to address carbon emission disclosure issues in order to increase their firm's value.

Our research further finds that a firm's climate disclosure suffers when there are more female board members, which is intriguing. This finding may appear contentious at first glance. However, critical mass theory states that a certain percentage of board members must be female to reap the benefits of a

more diverse board. Our research indicates that a critical mass of 30% female board representation is necessary to disprove tokenism on boards (Joecks et al., 2013; Lefley & Jancek, 2023; Haque, 2017). Our findings also corroborate those of recent studies by Konrad et al. (2008), Konrad and Kramer (2006), and Torchia et al. (2011), suggesting that a critical mass of three women in the boardroom is the "magic" number. Our study's managerial implications include: (1) For a more gender-diverse board to improve climate performance, the amount of diversity must be substantial. (2) boards with a critical level of female representation will have performance that surpasses that of male-dominated boards. At low gender diversity levels, increasing diversity may actually be associated with worse company performance (less than 10% female representation).

As with any business, a bank's age—the number of years it has been in operation—may affect the breadth of its voluntary corporate disclosures (Hamid, 2004). According to legitimacy theory, a positive correlation exists between a company's longevity and reputation. This theory is based on the idea that a company's good name is built up over the years (Hamid, 2004; Kılıç & Kuzey, 2019; Menassa, 2010). A company's CSR record and public standing improve as it grows older (Kılıç & Kuzey, 2019). This line of reasoning suggests that older companies are more likely to prioritize reputation when making business decisions than younger companies. As a result, they are more likely to adopt carbon management practices (Yunus et al., 2016).

Finally, this study has some limitations. In this context, small sample size and time dimension are among these limitations. In addition, manual data collection is time-consuming and might lead to mistakes. Future studies may obtain comparative results by increasing sectoral diversification, the number of firms and the year range. In addition, the relationship between variables might be discussed from different perspectives by including different business-specific variables in the research model.

YAZARLARIN BEYANI

Bu çalışma hazırlanırken araştırma yayın ve etiğine uyulmuş olup, herhangi bir çıkar çatışması bulunmamaktadır. Çalışma için finansal destek alınmamıştır.

AUTHORS' DECLARATION

This paper complies with Research and Publication Ethics, has no conflict of interest to declare, and has received no financial support.

YAZARLARIN KATKILARI

Çalışma Konsepti/Tasarım- BG, EY; Yazı Taslağı- BG, EY, EB; İçeriğin Eleştirel İncelemesi- BG, EY, EB; Literatür İncelemesi- EY, BG; Metodoloji- BG, Sonuç ve Öneriler- EB, BG; Son Onay ve Sorumluluk- BG, EY, EB.

AUTHORS' CONTRIBUTIONS

Conception/Design of Study- BG, EY; Drafting Manuscript- BG, EY, EB; Critical Revision of Manuscript- BG, EY, EB; Literature Review- EY, BG; Methodology- BG, Results and Recommendations- EB, BG; Final Approval and Accountability- BG, EY, EB.

REFERENCES

- Açıkgöz, E., Uygurtürk, H., & Korkmaz, T. (2015). Analysis of factors affecting growth of pension mutual funds in Turkey. *International Journal of Economics and Financial*, 5(2), 427-433.
- Adams, R. B., & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, 94(2), 291-309.
- Aggarwal, R., & Dow, S. (2012). Corporate governance and business strategies for climate change and environmental mitigation. *The European Journal of Finance*, 18(3-4), 311-331.
- Aguilera, R., Jackson, G. (2003). The Cross-national Diversity of Corporate Governance: Dimensions and determinants. *Academy of Management Review*, 28(3), 447-465.
- Akhtaruddin, M., Hossain, M.A., Hossain, M. and Yao, L. (2009). Corporate governance and voluntary disclosure in corporate annual reports of Malaysian listed firms, *Journal of Applied Management Accounting Research*, 7(1), pp. 1-19.
- Alsaifi, K., Elnahass, M., & Salama, A. (2020). Carbon disclosure and financial performance: UK environmental policy. *Business Strategy and the Environment*, 29(2), 711-726.
- Amran A, Periasamy V, Zulkafli AH (2014). Determinants of climate change disclosure by developed and emerging countries in Asia Pacific. *Sustainable Development*, 22(3),188–204.
- Appuhami, R. and Tashakor, S. (2017). The impact of audit committee characteristics on CSR disclosure: an analysis of Australian firms. *Australian Accounting Review*, 27(4), 400-420. <https://doi.org/10.1111/auar.12170>
- Arslan, Z., & Yağcılar, G. G. (2023). Sürdürülebilir finans kapsamında çevresel, sosyal ve kurumsal yönetim (ESG) ile banka kârlılığı arasındaki ilişki üzerine uluslararası bir araştırma. *Süleyman Demirel Üniversitesi Vizyoner Dergisi*, 14(40), 1236-1263.
- Ben-Amar W, McIlkenny P. (2015). Board effectiveness and the voluntary disclosure of climate change information. *Business Strategy and the Environment*, 24(8), 704–719.
- Ben-Amar, W., Chang, M. and McIlkenny, P. (2017). Board gender diversity and corporate response to sustainability initiatives: evidence from the Carbon Disclosure Project, *Journal of Business Ethics*, 142(2), 369-383.
- Benjamin, L., & Andreadakis, S. (2019). Corporate Governance and Climate Change: Smoothing Temporal Dissonance to a Phased Approach. *Business Law Review*, 40(4).
- Bhasa, M.P. (2004). Global Corporate Governance: Debates and Challenges, Corporate Governance. *The International Journal of Business in Society*. 4(2), 5-17.
- Brammer, S., & Pavelin, S. (2006). Voluntary environmental disclosures by large UK companies. *Journal of Business Finance & Accounting*, 33(7-8), 1168-1188.
- Brown, L.D., & Caylor, M.L. (2006). Corporate governance and firm performance. *Journal of Accounting and Public Policy*, 25(4), 409-434.
- Bui, B., Houqe, M.N., & Zaman, M. (2020). Climate governance effects on carbon disclosure and performance. *The British Accounting Review*, 52(2).

- CDP Turkey. Carbon Disclosure Project 2010 Turkey 50 Report. <https://cdpturkey.sabanciuniv.edu/tr/content/cdp-2010-turkiye-50-raporu> [25.03.2022].
- Celayir, D. (2020). Kurumsal yönetim açısından sürdürülebilirlik raporlarının güvencesi ve Borsa İstanbul (BIST) Sürdürülebilirlik Endeksi üzerinde bir inceleme, *BMIJ*, 8(1), 20-44. doi: <http://dx.doi.org/10.15295/bmij.v8i1.1375>
- Ceran, E.B. (2017). Kurumsal sürdürülebilirlik kavramı ve ölçümüne ilişkin bir ön çalışma. *İstanbul Üniversitesi İşletme Fakültesi Dergisi*, 46(Special Issue).
- Çetenak, E.H., Aytaç, A., & Yağlı, İ. (2023). Çevresel, sosyal ve kurumsal yönetim (ESG) değerlerinin banka performansı üzerine etkisi: ABD bankaları örneği. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 32(2), 424-434.
- Chariri, A., Januarti, I., & Yuyetta, E. N. A. (2018). Audit committee characteristics and carbon emission disclosure. In *E3S Web of Conferences*, 73, 02001.
- Cho, C., & Patten, D. (2007). The role of environmental disclosures as tools of legitimacy: a research note. *Accounting, Organizations and Society*, 32(7–8), 639–647.
- Choi, B.B., Lee, D. and Psaros, J. (2013). An analysis of Australian company carbon emission disclosures, *Pacific Accounting Review*, 25(1), 58-79.
- Ciocirlan, C., & Pettersson, C. (2012). Does workforce diversity matter in the fight against climate change? An analysis of Fortune 500 companies. *Corporate Social Responsibility and Environmental Management*, 19(1), 47-62.
- Claessens, S., & Yurtoglu, B.B. (2013). Corporate governance in emerging markets: A survey. *Emerging Markets Review*, 15, 1–33. <https://doi.org/10.1016/j.ememar.2012.03.002>
- Comyns, B. (2016). Determinants of GHG reporting: an analysis of global oil and gas companies. *Journal of Business Ethics*, 136, 349-369.
- Dănescu, T., & Popa, M. (2022). The role of female executives on corporate governance conformity: a cross-sectional analysis in an emergent market. *Journal of Business Economics and Management*, 23(5), 1084-1105. <https://doi.org/10.3846/jbem.2022.17164>
- Dizgil, E., & Reis, G. (2021). Kurumsal yönetimin sermaye yapısına Etkisi: BIST Kurumsal Yönetim Endeksi üzerine bir araştırma. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (42), 83. doi: 10.30794/pausbed.644110
- Duyen, C. (2023). The impact of corporate governance and ownership structure on the level of corporate social responsibility disclosure of listed manufacturing companies on the Ho Chi Minh stock exchange – Vietnam. *Journal of Law and Sustainable Development*, 11(12), e2189. <https://doi.org/10.55908/sdgs.v11i12.2189>
- Ederington, L.H. (1985). Classification models and bond ratings. *The Financial Review*, 20(4), 237-262.
- Elsayih, J., Tang, Q., & Lan, Y. C. (2018). Corporate governance and carbon transparency: Australian experience. *Accounting Research Journal*, 31(3), 405-422.
- Flammer, C., Toffel, M.W., & Viswanathan, K.G. (2021). Shareholder activism and firms' voluntary disclosure of climate change risks. *Strategic Management Journal*, 42(10), 1850-1879. <https://doi.org/10.1002/smj.3313>
- Galbreath J. 2010. Corporate governance practices that address climate change: an exploratory study. *Business Strategy and the Environment*, 19, 335–350
- Giannarakis, G., Zafeiriou, E., & Sariannidis, N. (2017). The impact of carbon performance on climate change disclosure. *Business Strategy and the Environment*, 26(8), 1078-1094.

- Granade, H.C., Creyts, J., Derkach, A., Farese, P., Nyquist, S., & Ostrowski, K. (2009). *Unlocking energy efficiency in the US economy*. McKinsey & Company.
- Gürbüz, C., Köse, E., & Bekci, İ. (2024). Kurumsal yönetim özelliklerinin emisyon performanslarına etkisi üzerine bir araştırma. *Anadolu Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 25(2), 443-458.
- Hamid, F.Z.A. (2004). Corporate social disclosure by banks and finance companies: Malaysian evidence. *Corporate Ownership and Control*, 1(4), 118-130.
- Haque, F. (2017). The effects of board characteristics and sustainable compensation policy on carbon performance of UK firms. *The British Accounting Review*, 49(3), 347-364.
- Hoffman, A.J. 2005. Climate change strategy: the business logic behind voluntary greenhouse gas reductions. *California Management Review*, 47, 21-46.
- Hollindale, J., Kent, P., Routledge, J., & Chapple, L. (2019). Women on boards and greenhouse gas emission disclosures. *Accounting & Finance*, 59(1), 277-308.
- Hoover, S., & Fafatas, S. (2018). Political environment and voluntary disclosure in the US: Evidence from the Carbon Disclosure Project. *Journal of Public Affairs*, 18(4), e1637.
- <https://cdpturkey.sabanciuniv.edu/tr>
- Hummels, H., & Argyrou, A. (2021). Planetary demands: Redefining sustainable development and sustainable entrepreneurship. *Journal of Cleaner Production*, (30), 1025-1041.
- Hussain, N., Rigoni, U., & Orij, R.P. (2016), "Corporate governance and sustainability performance: analysis of Iatridis, G. E. (2013). Environmental disclosure quality: Evidence on environmental performance, corporate governance, and value relevance. *Emerging Markets Review*, 14, 55-75.
- J. Bédard, & Gendron, Y. (2010). Strengthening the Financial Reporting System: Can Audit Committees Deliver? *International Journal of Auditing*, 14, (2), pp. 174-210.
- Jaffar, R., Aziendeh, R.R., Shukor, Z.A., & Rahman, M.R.C.A. (2018). Environmental Performance: Does Corporate Governance Matter? *Jurnal Pengurusan*, 52, 133-143.
- Jensen, M., and W. Meckling. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, *Journal of Financial Economics*, 3, 305-360.
- Jizi, M.I., Salama, A., Dixon, R., & Stratling, R. (2014). "Corporate governance and corporate social responsibility disclosure: evidence from the US banking sector," *Journal of Business Ethics*, 125 (4), 601-615.
- Joecks, J., Pull, K., & Vetter, K. (2013). Gender Diversity in the Boardroom and Firm Performance: What Exactly Constitutes a "Critical Mass?", *Journal of Business Ethics*, 118, 61-72. <https://doi.org/10.1007/s10551-012-1553-6>
- Johnson, J., & Powell, P. (1994). Decision Making, Risk and Gender: Are Managers Different? *British Journal of Management*, 5, 123-138.
- Kanca, S., Çankaya, F., & Dinç, E. (2021). Kurumsal yönetim uygulamalarının finansal performansa etkisi: BIST şirketlerinde bir uygulama. *Karadeniz Teknik Üniversitesi Sosyal Bilimler Enstitüsü Sosyal Bilimler Dergisi*, 11(22), 203-225.
- Kardeş Selimoğlu, S., & Yazıcı, R. (2021). Türkiye’de kurumsal yönetim ve sürdürülebilirlik. *The Journal of Accounting and Finance*, 113-136. <https://doi.org/10.25095/mufad.982425>
- Karğın, M. (2010). *Muhasebe Verileri Olarak Finansal Oranlar ve İstatistiksel Özellikleri*. Ankara: Gazi Kitabevi.

- Khoiriyah, M., Zarefar, A., Afifah, U., & Oktari, V. (2022). The role of the audit committee in corporate sustainability disclosure. *Akurasi: Jurnal Studi Akuntansi Dan Keuangan*, 5(2), 167-179. <https://doi.org/10.29303/akurasi.v5i2.243>
- Kılıç, M., & Kuzey, C. (2018). The effect of corporate governance on carbon emission disclosures: Evidence from Turkey. *International Journal of Climate Change Strategies and Management*, 11(1), 35-53.
- Kılıç, M., & Kuzey, C. (2019). Determinants of climate change disclosures in the Turkish banking industry. *International Journal of Bank Marketing*, 37(3), 901-926.
- Klapper, L.F., & Love, I. (2004). Corporate governance, investor protection, and performance in emerging markets. *Journal of Corporate Finance*, 10(5), 703-728.
- Kock, C.J., Santaló, J., & Diestre, L. (2012). Corporate governance and the environment: what type of governance creates greener companies? *Journal of Management Studies*, 49(3), 492-514.
- Kolk, A., & Pinkse, J. (2005). Business responses to climate change: identifying emergent strategies. *California Management Review*, 47, 6–20.
- Konrad, A.M., & Kramer, V.W. (2006). How many women do boards need? *Harvard Business Review*, 84(12), 22.
- Konrad, A.M., Kramer, V., & Erkut, S. (2008). The impact of three or more women on corporate boards. *Organizational Dynamics*, 37(2), 145-164.
- Kouloukoui, D., de Oliveira Marinho, M. M., da Silva Gomes, S. M., Kiperstok, A., & Torres, E.A. (2019). Corporate climate risk management and the implementation of climate projects by the world's largest emitters. *Journal of Cleaner Production*, 238, 117935.
- Kulalı, G. (2022). Çevresel, sosyal ve kurumsal yönetim (ESG) performansının piyasa değeri üzerindeki etkisi: Firma büyüklüğünün rolü. *Eskişehir Osmangazi Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 17(3), 787-809.
- Kurt, Y. (2024). Karbon muhasebesi bağlamında kurumsal yönetim kalitesinin karbon emisyon açıklamaları üzerindeki etkisi. *Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi*, 26(3), 1259-1274.
- Lash, J., & Wellington, F. (2007). Competitive advantage on a warming planet. *Harvard Business Review*, 85, 94–102.
- Lee, K.H., Cin, B.C., & Lee, E.Y. (2015). Environmental responsibility and firm performance: The application of an environmental, social, and governance model. *Business Strategy and the Environment*, 25(4), 213-223.
- Lee, S., Park, Y., & Klassen, R.D. (2013). Market responses to firms' voluntary climate change information disclosure and carbon communication. *Corporate Social Responsibility and Environmental Management*, 22(1), 1-12. <https://doi.org/10.1002/csr.1321>
- Lefley, F., & Janeček, V. (2023). Board gender diversity, quotas, and critical mass theory. *Corporate Communications: An International Journal*. 29 (2), 139-151
- Li, X., & Li, Y. (2020). Female independent directors and financial irregularities in Chinese listed firms: From the perspective of audit committee chairpersons, *Finance Research Letters*, 32.
- Liao, L., Luo, L., & Tang, Q. (2015). Gender diversity, board independence, environmental committee, and greenhouse gas disclosure, *The British Accounting Review*, 47(4), 409-424
- Lu, W., Zhu, N., & Zhang, J. (2021). The impact of carbon disclosure on financial performance under low carbon constraints. *Energies*, 14(14), 4126. <https://doi.org/10.3390/en14144126>

- Mallin, C., & Melis, A. (2010). Shareholder rights, shareholder voting, and corporate performance. *Journal of Management & Governance*, 16(2), 171-176. <https://doi.org/10.1007/s10997-010-9138-1>
- Martin, Y., Teng, Y., & Deng, Z. (2022). Does firms' carbon disclosure increase consumers' recycling willingness and firms' recycling performance? *Business Strategy and the Environment*, 32(4), 2451-2470. <https://doi.org/10.1002/bse.3258>
- Menassa, E. (2010). Corporate social responsibility: An exploratory study of the quality and extent of social disclosures by Lebanese commercial banks. *Journal of Applied Accounting Research*, 11(1), 4-23.
- Mueller, D.C. (2006). The Anglo-Saxon Approach to corporate governance and its applicability to emerging markets. *Corporate Governance: An International Review*, 14(4), 207-219.
- Oktay, S., Bozkurt, S., & Yazıcı, K. (2021). The relationship between carbon disclosure project scores and global 500 companies: a perspective from national culture. *SAGE Open*, 11(2), 21582440211014521.
- Pandey, R., Biswas, P., Ali, M., & Mansi, M. (2019). Female directors on the board and cost of debt: evidence from Australia. *Accounting and Finance*, 60(4), 4031-4060. <https://doi.org/10.1111/acfi.12521>
- Peker, K., Kan, M., & Nadeem, M. (2019). Corporate governance of climate change adaptation. *J. Glob. Innov. Agric. Soc. Sci*, 7(1), 1-5.
- Raj, Aggarwal & Sandra Dow (2012). Corporate governance and business strategies for climate change and environmental mitigation, *The European Journal of Finance*, 18(3-4), 311-331.
- Rankin, M., Windsor, C., & Wahyuni, D. (2011). An investigation of voluntary corporate greenhouse gas emissions reporting in a market governance system: Australian evidence, *Accounting, Auditing & Accountability Journal*, 24(8), pp. 1037-1070.
- Rifai, M., & Siregar, S.V. (2021). The effect of audit committee characteristics on forward-looking disclosure. *Journal of Financial Reporting and Accounting*, 19(5), 689-706. <https://doi.org/10.1108/jfra-05-2019-0063>
- Salleh, Z., Seno, R., Alodat, A., & Hashim, H.A. (2022). Does the audit committee's effectiveness influence the reporting practice of GHG emissions in Malaysia? *Journal of Sustainability Science and Management*, 17(1), 204-220.
- Siddique, A., Akhtaruzzaman, M., Rashid, A., & Hammami, H. (2021). Carbon disclosure, carbon performance, and financial performance: international evidence. *International Review of Financial Analysis*, 75, 101734. <https://doi.org/10.1016/j.irfa.2021.101734>
- Sultanoğlu, B., & Özerhan, Y. (2020). İklim değişikliği raporlaması: Türkiye'deki işletmelerin gönüllü karbon saydamlık projesi (CDP) açıklamaları, *Muhasebe Bilim Dünyası Dergisi*, 22(Özel Sayı), 176 - 194.
- Tatoğlu, F.Y. (2016). *Panel veri ekonometrisi*, İstanbul: Beta Yayın.
- Tauringana, V., & L. Chithambo. (2015). The effect of DEFRA guidance on greenhouse gas disclosure, *The British Accounting Review*, 47, 425-444.
- Tingbani, I., Chithambo, L., Tauringana, V., & Papanikolaou, N. (2020). Board gender diversity, environmental committee, and greenhouse gas voluntary disclosures. *Business Strategy and the Environment*, 29(6), 2194-2210.
- Torchia, M., Calabrò, A., & Huse, M. (2011). Women directors on corporate boards: From tokenism to critical mass. *Journal of Business Ethics*, 102, 299-317.
- Turguttopbaş, N. (2020). Sürdürülebilirlik, yeşil finans ve ilk yeşil Türk tahvil aracı. *Finansal Araştırmalar ve Çalışmalar Dergisi*, 12(22), 268.

- Türkiye İstatistik Kurumu. (2023). *Sera gazı emisyon istatistikleri*, 2021. <https://data.tuik.gov.tr/Bulten/Index?p=Sera-Gazi-Emisyon-Istatistikleri-1990-2021-49672&dil=1>
- Van den Berghe, L. A., & Levrau, A. (2004). Evaluating boards of directors: what constitutes a good corporate board? *Corporate Governance: an International Review*, 12(4), 461-478.
- Velte, P. (2023). Sustainable board governance and environmental performance: European evidence. *Business Strategy and the Environment*, 33(4), 3397-3421. <https://doi.org/10.1002/bse.3654>
- Yunus, S., Elijido-Ten, E., & Abhayawansa, S. (2016). Determinants of carbon management strategy adoption: Evidence from Australia's top 200 publicly listed firms. *Managerial Auditing Journal*, 31(2), 156-179.