

T.C.
TED UNIVERSITY
GRADUATE SCHOOL
ECONOMICS

**CLIMATE RELATED FINANCIAL DISCLOSURES:
THE CASE OF COMMERCIAL BANKS IN TÜRKİYE**

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ANKARA, 2024

CLIMATE RELATED FINANCIAL DISCLOSURES:
THE CASE OF COMMERCIAL BANKS IN TÜRKİYE

A Thesis Submitted To
The Graduate School
of
TED University

by

Turna Buse Ulu

In Partial Fulfillment of The Requirements
For
Master of Science
in
Economics

ANKARA, 2024

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ABSTRACT

CLIMATE RELATED FINANCIAL DISCLOSURES:

THE CASE OF COMMERCIAL BANKS IN TÜRKİYE

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August, 2024

This thesis evaluates climate-related financial disclosures of the banking sector in Türkiye in line with the recent developments in sustainability reporting standards. Our thesis is the first study to score banks' climate change reports in Türkiye using the Task Force on Climate-related Financial Disclosures (TCFD) criteria. Climate change poses significant risks and opportunities in the financial sector, and the scoring measures banks' awareness of this issue. The scoring is done manually using 2021 and 2023 data from 10 commercial banks. The findings are compared with the Carbon Disclosure Project (CDP) scores and banks' financial indicators. The scoring made with TCFD criteria is observed to have a strong and positive correlation with CDP scores. We also examine whether banks' capacity to manage climate change risks plays a decisive role

on financial performance indicators. A positive but weak relationship is found between the calculated TCFD scores and the banks' financial performance indicators.

Keywords: Climate Change Reporting, Sustainable Banking, Financial Performance, TCFD criteria, CDP scores



ÖZET

İKLİMLE İLGİLİ FİNANSAL AÇIKLAMALAR: TÜRKİYE'DEKİ TİCARİ BANKALARIN DURUMU

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Ağustos, 2024

Bu tez, Türkiye'deki bankacılık sektörünün iklimle ilgili finansal açıklamalarını, sürdürülebilirlik raporlama standartlarındaki tarihsel gelişmeler doğrultusunda değerlendirmektedir. Tezimiz, Türkiye'de bankaların iklim değişikliği raporlarını İklimle İlgili Finansal Açıklamalar Görev Gücü (TCFD) kriterlerini kullanarak puanlayan ilk çalışmadır. İklim değişikliği, finans sektöründe önemli riskler ve fırsatlar oluşturmaktadır ve bahsedilen puanlama bankaların bu konudaki farkındalığını ölçmektedir. Puanlama, 10 ticari bankanın 2021 ve 2023 verileri kullanılarak manuel olarak yapılmıştır. Bulgular Karbon Saydamlık Projesi (CDP) puanları ve bankaların finansal göstergeleri ile karşılaştırılmıştır. TCFD kriterleri ile yapılan puanlamanın CDP puanları ile güçlü ve pozitif bir korelasyona sahip olduğu görülmektedir. Ayrıca bankaların iklim değişikliği risklerini yönetme kapasitelerinin

finansal performans göstergeleri üzerinde belirleyici bir rol oynayıp oynamadığını inceliyoruz. Hesaplanan TCFD puanları ile bankaların finansal performans göstergeleri arasında pozitif ancak zayıf bir ilişki bulunmuştur.

Anahtar Kelimeler: İklim Değişikliği Raporlaması, Sürdürülebilir Bankacılık, Finansal Performans, TCFD kriterleri, CDP skoru



ACKNOWLEDGMENTS

Firstly, I would like to express my gratitude to my supervisor Prof. Dr. Erdem Başçı for his patience, guidance and support. His profound knowledge shed light on my graduate education and thesis writing process. Studying under his guidance to create this thesis was an honor and an unforgettable experience for me.

I am also grateful to Prof. Dr. Ayça Tekin Koru for the advice she gave me about my thesis and academic life. She never withheld her support throughout my graduate education.

I would like to thank my dear family for their patience, moral and financial support, who supported me in every way. As they have throughout my life, they have been my savior in every difficulty. I would especially like to thank my husband Ahmet Ulu during this process. He always believed in my success and motivated me. I believe that as long as they are behind me, my motivation will not decrease and I will be able to continue my academic career with determination.



To My Family...

TABLE OF CONTENTS

PLAGIARISM.....	iii
ABSTRACT.....	iv
ÖZET	vi
ACKNOWLEDGMENTS.....	viii
DEDICATION.....	ix
TABLE OF CONTENTS	x
LIST OF TABLES	xiii
LIST OF ABBREVIATIONS	xiv
LIST OF SYMBOLS	xvi
LIST OF FIGURES	xvii
CHAPTER	
1. INTRODUCTION	1
2. SUSTAINABILITY AND FINANCIAL REPORTING STANDARDS.....	3
2.1 Basic Concepts Related to Sustainability	3
2.1.1 Climate Change	3
2.1.2 Circular Economy.....	6
2.1.3 Biodiversity	7
2.1.4 Resource Efficiency	8
2.1.5 Responsible Consumption.....	9
2.2 Emission Control and Management	9
2.2.1 Major Greenhouse Gases and Carbon	9
2.2.2 Carbon Footprint Calculation Methodologies: GHG Protocol.....	12
2.2.3 Carbon Neutrality and Net-Zero.....	12
2.2.4 Carbon Pricing Mechanisms: Carbon Tax and Emissions Trading System.....	13
2.3 Basic Concepts and Principles in Corporate Sustainability Reporting.....	15
2.3.1 Driving Forces	15
2.3.2 Corporate Strategy and Sustainability	16
2.3.3 Prioritization Analysis	16
2.3.4 Materiality / Double Materiality.....	17

2.3.5	ESG	17
2.4	Introduction to Sustainability: Climate Change, Historical Perspective, and Pillars of Sustainability	18
2.4.1	UN Sustainable Development Goals	18
2.4.2	Paris Climate Agreement	20
2.4.3	European Green Deal.....	21
2.4.4	Fit for 55	22
2.4.5	Corporate Sustainability Due Diligence Directive (CSDDD).....	23
2.4.6	Corporate Sustainability Reporting Directive (CSRD)	23
2.4.7	European Sustainability Reporting Standards (ESRS).....	24
2.4.8	Border Carbon Adjustment Mechanism (CBAM).....	25
2.4.9	Emissions Trading System.....	25
2.4.10	U.S. Securities and Exchange Commission (SEC) Climate Disclosure Rules.....	26
2.5	Framework and Standards for Corporate Sustainability Reporting.....	28
2.5.1	Capital Markets Board CMB Sustainability Principles	28
2.5.2	Global Reporting Initiative (GRI).....	29
2.5.3	Carbon Disclosure Project (CDP).....	31
2.5.4	International Integrated Reporting Council (IIRC)	32
2.5.5	Task Force on Climate Related Financial Disclosures (TCFD)...	33
2.5.6	Sustainability Accounting Standards Board (SASB)	34
2.6	Türkiye Green Deal Action Plan	35
2.6.1	Emission Trading System	35
2.6.2	Border Carbon Adjustment.....	36
2.6.3	A Green and Circular Economy	36
2.6.4	Green Finance	37
2.7	Türkiye Sustainability Reporting Standards	37
2.7.1	TSRS 1 and TSRS 2.....	37
3.	REVIEW OF LITERATURE	40
4.	CLIMATE RELATED FINANCIAL DISCLOSURES OF BANKS IN TÜRKİYE	43
5.	COMPARISON OF TCFD AND CDP SCORES	70
6.	FINANCIAL PERFORMANCE INDICATORS AND TCFD	73
7.	CONCLUDING REMARKS	81

REFERENCES	83
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APPENDICES

A. The score cards of individual banks (2021)	91
B. The score cards of individual banks (2023)	92



LIST OF TABLES

TABLES

Table 4.1 TCFD Disclosure Scoring Criteria	45
Table 4.2 Decision Tree Criteria 1a	47
Table 4.3 Decision Tree Criteria 1b	48
Table 4.4 Decision Tree Criteria 2a	49
Table 4.5 Decision Tree Criteria 2b	50
Table 4.6 Decision Tree Criteria 3a	51
Table 4.7 Decision Tree Criteria 3b	52
Table 4.8 Decision Tree Criteria 4	53
Table 4.9 Decision Tree Criteria 5a	54
Table 4.10 Decision Tree Criteria 5b	55
Table 4.11 Decision Tree Criteria 6	56
Table 4.12 Decision Tree Criteria 7	57
Table 4.13 Decision Tree Criteria 8	58
Table 4.14 Decision Tree Criteria 9	59
Table 4.15 Decision Tree Criteria 10a	60
Table 4.16 Decision Tree Criteria 10b	61
Table 4.17 Decision Tree Criteria 11	62
Table 4.18 Decision Tree Criteria 12	63
Table 4.19 Decision Tree Criteria 13a	64
Table 4.20 Decision Tree Criteria 13b	65
Table 4.21 (QNB Finansbank, 2023)	67
Table 4.22 (Türkiye Halk Bankası, 2021)	68
Table 5.1 CDP Letter Scores and Their Equivalents in the 4-point System	70
Table 6.1 Return on Equity and Return on Assets of the Banks.....	74

LIST OF ABBREVIATIONS

TCFD	Force on Climate-related Financial Disclosures
CDP	Carbon Disclosure Project
WWF	World Wildlife Fund
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
CCS	Carbon Capture and Sequestration
GHG	Greenhouse Gas Protocol
ETS	Emission Trading System
CS	Corporate Sustainability
ESG	Environmental, Social and Governance
MDG	Millennium Development Goals
SDG	Sustainable Development Goals
EGD	European Green Deal
CSDDD	Corporate Sustainability Due Diligence Directive
CSRD	Corporate Sustainability Reporting Directive
ESRS	European Sustainability Reporting Standards
EFRAG	European Financial Reporting Advisory Group
CBAM	Border Carbon Adjustment Mechanism
SEC	Securities and Exchange Commission
CMB	Capital Markets Board

GRI	Global Reporting Initiative
IIRC	International Integrated Reporting Council
IFRS	International Financial Reporting Standards
FSB	Financial Stability Board
ISSB	International Sustainability Standards Board
CDSB	Climate Disclosure Standards Board
TSRS	Türkiye Sustainability Reporting Standards
BRSA	Banking Regulation and Supervision Agency

LIST OF SYMBOLS

<i>TCFD</i>	TCFD Scores of the Banks
<i>CDP</i>	CDP Scores of the Banks
ROE	Return on Equity
ROA	Return on Assets
CDP_Reporting	Variable Indicating Whether Banks Report CDP



LIST OF FIGURES

FIGURES

Figure 2.1.1.1 Changes in the Global Warming and Human Impact	4
Figure 2.1.1.2 Relationship Between Carbon Emissions and Global Warming.....	5
Figure 2.4.1.1 Change in implementation of 17 goals between 2019 and 2024.....	19
Figure 4.1 Average Reporting Quality of Each Section.....	68
Figure 5.1 Scatter graphs of TCFD and CDP (2021)	71
Figure 5.2 Scatter graphs of TCFD and CDP (2023)	71
Figure 5.3 Scatter graphs of TCFD and CDP (pooled data).....	72
Figure 6.1 Scatter Diagrams of Return on Equity and TCFD Disclosure Scores (2021).....	75
Figure 6.2 Scatter Diagrams of Return on Equity and TCFD Disclosure Scores (2023).....	75
Figure 6.3 Scatter Diagrams of Return on Assets and TCFD Disclosure Scores (2021).....	76
Figure 6.4 Scatter Diagrams of Return on Assets and TCFD Disclosure Scores (2023)	77
Figure 6.5 Scatter Diagrams of Return on Assets and TCFD Disclosure Scores (pooled data)	77
Figure 6.6 Scatter Diagrams of Return on Equity and TCFD Disclosure Scores (pooled data)	78



CHAPTER 1

INTRODUCTION

With the increasing sensitivity to sustainability and especially climate change, companies around the world have started to give more importance to preparing reports on their impact on climate change as well as the impact of climate change on their financial performance. Many large-scale companies in the world are preparing their own reports on sustainability. In this context, sustainability reporting has many advantages for both large and small-medium sized companies, but more notably for the banking sector. It is important for the firms and for the banks to be aware of the risks and opportunities that climate change may cause for their companies. By reporting and making these predictions concrete, companies can be prepared for risks and develop strategies. On the other hand, it should not be ignored that this situation may provide some opportunities for them. In order to be aware of these opportunities and not to miss the advantages it will provide, systematic sustainability reporting is necessary.

In many sectors in Türkiye, companies publish reports on sustainability and climate change. These companies are usually large companies that are likely to cause carbon emissions directly. In the finance sector, which can cause carbon emissions more indirectly, it is important to make these reports both for the banks' financial health, reputation as well as to reduce carbon emissions. Although it is common in the financial sector to publish reports on climate change, only a small number of banks in Türkiye care about preparing these reports and sharing them with the public. These reports are generally published annually on the banks' own websites under the name "Climate Change Report" according to the CDP reporting method. The purpose of this thesis is to calculate the disclosure scores of 10 banks in Türkiye that report on climate change according to the TCFD criteria and to examine the relationship between these scores and not only the scores published by the CDP but also some financial indicators of the banks.

The thesis is organized as follows. Chapter 2 summarizes the historical developments and the current status of sustainability and financial reporting standards. Chapter 3 introduces related literature. Chapter 4 includes the scoring and implementation of banks in Türkiye according to TCFD criteria, which is a study I conducted. Chapter 5 includes the comparison of the TCFD scores we created and the scores created by CDP. Chapter 6 includes a comparison of the scoring according to TCFD criteria and the financial performance indicators of banks. Chapter 7 is the concluding remarks of the thesis.



CHAPTER 2

SUSTAINABILITY AND FINANCIAL REPORTING STANDARDS

2.1 Basic Concepts Related to Sustainability

2.1.1 Climate Change

Climate change is caused by a complex interaction of various factors. The most fundamental causes of climate change are the burning of fossil fuels and deforestation caused by humans (Ghil & Lucarini, 2020). In other words, human-induced activities such as frequent use of fossil fuels, depletion of forests and emissions that may occur in industrial processes cause an increase in greenhouse gas emissions. (Casadiego, 2022). Although greenhouse gases such as carbon dioxide and methane, which have increased significantly in the atmosphere, allow sunlight to enter the atmosphere, they trap some of the heat and prevent it from being reflected back into space. As a result, the planet warms up and causes the greenhouse effect. Although volcanic eruptions and changes in solar radiation are some of the natural factors that can affect climate change, climate change is mainly caused by human activities (Ghil & Lucarini, 2020).

Furthermore, effective carbon reduction strategies are needed due to this effect of greenhouse gases on climate change. In summary, climate change is a problem driven by human-induced greenhouse gas emissions, natural factors and the complex dynamics of the Earth's climate system. Understanding these complex interactions is important to facilitate predicting future climate change trends and develop effective carbon emission reduction strategies (Ghil & Lucarini, 2020).

Changes in global surface temperature relative to 1850–1900

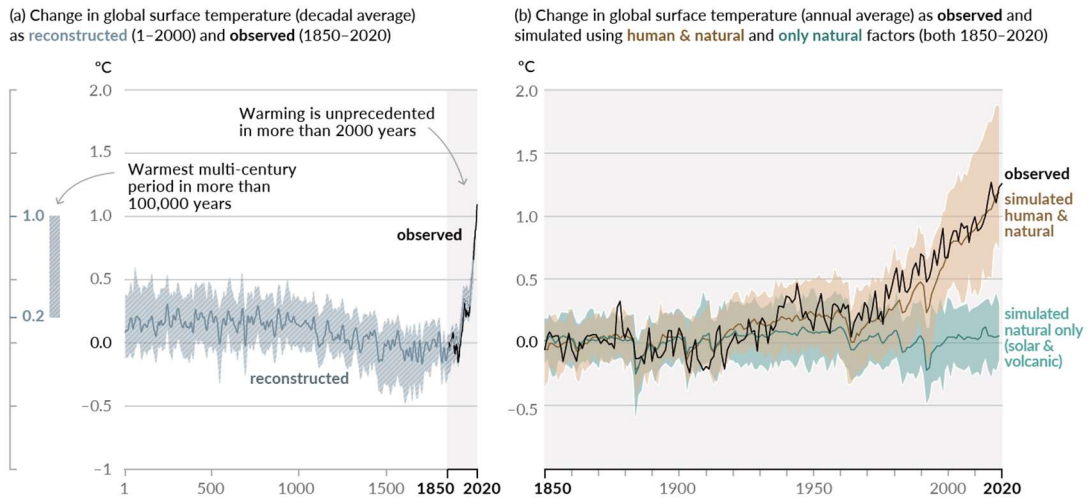


Figure SPM.1 | History of global temperature change and causes of recent warming

Panel (a) Changes in global surface temperature reconstructed from paleoclimate archives (solid grey line, years 1–2000) and from direct observations (solid black line, 1850–2020), both relative to 1850–1900 and decadal averaged. The vertical bar on the left shows the estimated temperature (very likely range) during the warmest multi-century period in at least the last 100,000 years, which occurred around 6500 years ago during the current interglacial period (Holocene). The Last Interglacial, around 125,000 years ago, is the next most recent candidate for a period of higher temperature. These past warm periods were caused by slow (multi-millennial) orbital variations. The grey shading with white diagonal lines shows the very likely ranges for the temperature reconstructions.

Panel (b) Changes in global surface temperature over the past 170 years (black line) relative to 1850–1900 and annually averaged, compared to Coupled Model Intercomparison Project Phase 6 (CMIP6) climate model simulations (see Box SPM.1) of the temperature response to both human and natural drivers (brown) and to only natural drivers (solar and volcanic activity, green). Solid coloured lines show the multi-model average, and coloured shades show the very likely range of simulations. (See Figure SPM.2 for the assessed contributions to warming).

[2.3.1; Cross-Chapter Box 2.3; 3.3; TS.2.2; Cross-Section Box TS.1, Figure 1a]

Figure 2.1.1.1 Changes in the Global Warming and Human Impact

(Intergovernmental Panel on Climate Change, 2021, p.6)

As can be seen from the Figure 2.1.1.1, although the increase in the temperature of the world's surface was stable until 1850, the warming started to increase significantly with the Industrial Revolution in the 1850s and continues to increase. Panel (b) shows that the biggest cause of this warming is humans. In other words, this warming does not occur naturally and spontaneously.

Global surface temperature increase since 1850–1900 (°C) as a function of cumulative CO₂ emissions (GtCO₂)

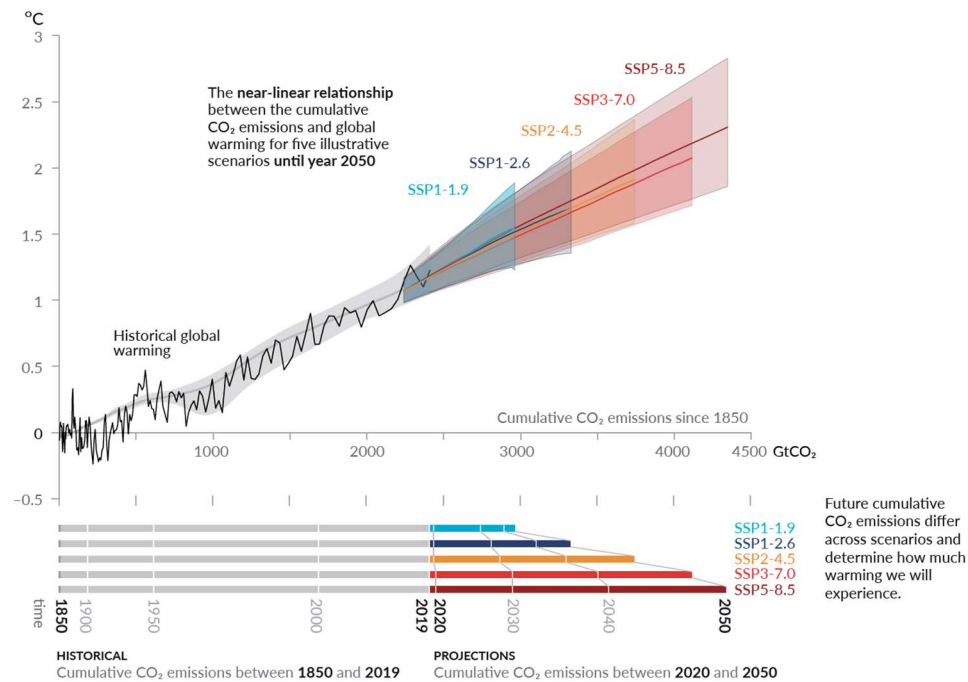


Figure SPM.10 | Near-linear relationship between cumulative CO₂ emissions and the increase in global surface temperature

Top panel: Historical data (thin black line) shows observed global surface temperature increase in °C since 1850–1900 as a function of historical cumulative carbon dioxide (CO₂) emissions in GtCO₂ from 1850 to 2019. The grey range with its central line shows a corresponding estimate of the historical human-caused surface warming (see Figure SPM.2). Coloured areas show the assessed *very likely* range of global surface temperature projections, and thick coloured central lines show the median estimate as a function of cumulative CO₂ emissions from 2020 until year 2050 for the set of illustrative scenarios (SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5; see Figure SPM.4). Projections use the cumulative CO₂ emissions of each respective scenario, and the projected global warming includes the contribution from all anthropogenic forcings. The relationship is illustrated over the domain of cumulative CO₂ emissions for which there is *high confidence* that the transient climate response to cumulative CO₂ emissions (TCRE) remains constant, and for the time period from 1850 to 2050 over which global CO₂ emissions remain net positive under all illustrative scenarios, as there is *limited evidence* supporting the quantitative application of TCRE to estimate temperature evolution under net negative CO₂ emissions.

Bottom panel: Historical and projected cumulative CO₂ emissions in GtCO₂ for the respective scenarios.

[Section 5.5, Figure 5.31, Figure TS.18]

Figure 2.1.1.2 Relationship Between Carbon Emissions and Global Warming (Intergovernmental Panel on Climate Change, 2021, p.28)

As can be seen in the Figure 2.1.1.2, some studies have proven the direct proportionality between global warming and carbon emissions. The regions shown in different colors represent possible scenarios from best (SSP1-1.9) to worst (SSP5-8.5).

2.1.2 Circular Economy

Circular economy can be defined as extending the process from the production of a product to its final usable state, keeping products in the cycle for as long as possible. In other words, circular economy is the reduction of waste, reduction of primary raw material and resource use, and continuous re-evaluation of parts and materials obtained from products within a closed system in order to provide social and environmental benefits (Morseletto, 2020).

All processes applied to extend the life of existing products, reduce or delay the production of new products by applying methods such as sharing, re-equipping, repairing, renting instead of buying, modifying them for different purposes contribute to the circular economy (European Parliament, 2023).

Another aspect of the circular economy is to transform old, unusable products into new resources and raw materials. If the product is unusable, it is broken down and kept in the cycle through processes such as the use of spare materials, recycling, and composting (Stahel, 2016). In other words, instead of a linear process such as buying a product, using it and then turning it into waste, the product is bought, used, recycled, used again and again, and is put into a circular process by utilizing the product to the last degree.

In addition to minimizing the use of natural resources with circular economy, it is also possible to protect biodiversity by destroying living spaces less. Moreover, it is also a good way to reduce greenhouse gas emissions because according to the EU Environment Agency, waste management provides approximately 3% of EU greenhouse gas emissions, while the use of petroleum and production processes provide approximately one tenth. Another benefit is that since new product production will decrease, the need for raw materials, which are already limited, will decrease and raw material dependency (especially in batteries and electric motors) will decrease, and it allows a transition to a new model in reducing the more than 2 billion tons of waste that the European Union produces every year. On the one hand, it is thought that it will narrow down some sectors because it will reduce production, but on the other hand, waste management can increase employment and competition in sectors such as

redesigning products in accordance with the circular economy (European Parliament, 2023).

2.1.3 Biodiversity

Biodiversity is all the different living species that can be found on earth. All living things that make up the natural world, such as animals, plants, fungi and even the microscopic bacteria and protists, are in a complex network to maintain the natural balance. Thanks to these complex relationship networks, humans can meet their basic needs such as food, clean water and shelter. However, while meeting these needs, humans put a lot of pressure on nature. It has been many years since this pressure has exceeded the point of disrupting ecosystem balances and disrupting biodiversity. According to the report published by WWF in 2022, there has been a population loss of nearly 70 percent in the vertebrate kingdom in the last 50 years (World Wildlife Fund, 2024).

The decrease in biodiversity is one of the most obvious results of climate change and global warming. For example, as a result of climate change, ocean acidity increases, pH decreases, and this increase in acidity is fatally dangerous for corals. On the other hand, the loss of nature and the decrease in diversity are also factors that accelerate climate change. A vicious circle emerges where they consume each other (Calice et al., 2023).

The rapidly increasing loss of diversity in recent years raises concerns about how it will be affected in all sectors. Such large-scale phenomena are also a potential source of risk for finance. The finance sector is in contact with nature through the companies it finances. The activities of financed companies can easily reduce biodiversity and lead to nature loss. For all these reasons, there is a "double materiality" relationship between biodiversity and the finance sector. The financial system can be affected by biodiversity and nature loss, which is more comprehensive: transition and physical risks. Physical risks arise due to the deterioration of nature's services that businesses benefit from. The great drought of nature services poses risks that will affect all global systems through the financial sector. Transition risks can be exemplified as consumer

preferences and policy sets that emerge to prevent activities that cause nature loss, global warming, and climate change. Today, central banks and scientists are becoming more aware of the risks that will arise from this nature loss and are beginning to produce policies. In order to manage these risks, practices such as injecting capital into the right channels and directing it to low-carbon emission investments are needed (Calice et al., 2023).

2.1.4 Resource Efficiency

The consumption of natural resources by the global economy is increasing. When current resource extraction and use methods are examined in terms of both cost-benefit and inequality in resource use, they are quite inadequate. This inadequacy causes livable conditions to be provided for many people, especially disadvantaged groups.

Resource efficiency becomes critical for eliminating these problems and for a more sustainable world. Resource efficiency is the necessity of reducing the amount of resources used and the negative effects on the resource while providing human welfare, needs and economic growth in general. In more clear terms, it is to obtain more products and services by using fewer resources. In a more technical expression, resource efficiency is the effort to obtain higher output with low inputs. It is very beneficial for both societies and companies for models such as the circular economy to take a more active role in order to maximize efficiency (United Nations Environment Programme, 2024).

When the development models of the European Union are examined, it is seen that they are seriously resource-intensive. The European Union also emphasizes that resource-intensive economic models should be changed and that economic models that focus on resource efficiency and circular economy and aim to be more productive while consuming less resources should be adopted (European Commission, 2017).

2.1.5 Responsible Consumption

Responsible consumption and production aim to leave usable resources for future generations by using more sustainable production and consumption patterns while using the world's resources. By changing consumption habits, for example, choosing durable products that can be used over and over again instead of disposables, reducing food waste, and reducing fossil fuel use, more responsible consumers can be made. The savings obtained by changing these habits can be spent on technological development, infrastructure construction, and education. In addition, reducing waste production and encouraging the transition to a circular economy are among the most important responsibilities that governments must fulfill. If these changes are not made, it is certain that we will soon have to compromise on our living standards, considering that resources are being consumed rapidly and the population is also increasing rapidly. If a responsible consumption model is not adopted, two new worlds will be needed to sustain today's lifestyles in 2050 (United Nations, 2024c).

2.2 Emission Control and Management

2.2.1 Major Greenhouse Gases

The gases that increase in the atmosphere and increase the heat, in other words, trap heat, are called "greenhouse gases". The main ones are carbon dioxide, methane, nitrogen oxide and fluorinated gases (U.S. Environmental Protection Agency, 2022).

Carbon dioxide is generally produced by fossil fuels such as coal, natural gas and oil, as well as by the combustion of some solid fuels or biological materials. In addition, some reactions such as those in cement production also release carbon dioxide. Since plants perform photosynthesis by converting carbon dioxide into oxygen, increasing vegetation is a natural and effective way to prevent excess carbon dioxide (U.S. Environmental Protection Agency, 2022).

Methane is a greenhouse gas that is mostly produced by the combustion or transportation of coal, natural gas and oil. Methane gas can also be released by some agricultural or animal husbandry practices. Furthermore, the decay of organic waste in

solid waste storage areas also causes methane gas to be released (U.S. Environmental Protection Agency, 2022).

Nitrogen oxide, like others, can be produced by the combustion of fossil fuels and solid fuels; and by some agricultural and industrial practices. On the other hand, nitrogen oxide gas can also be released during the treatment of wastewater (U.S. Environmental Protection Agency, 2022).

Fluorinated gases are powerful and synthetic greenhouse gases that can originate from commercial or various industrial processes. Examples of these gases include “hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride and sulfur hexafluoride”. Although fluorinated gases are less emitted than the other greenhouse gases mentioned, they are quite powerful. Their heat trapping capacity is much greater than that of carbon dioxide (U.S. Environmental Protection Agency, 2022).

These gases can remain in the atmosphere for a few years or thousands of years. In order to measure the potential of each greenhouse gas to cause global warming, the effect of each is determined according to the effect of carbon, and this is called the Global Warming Potential (GWP). GWP is used by the Intergovernmental Panel on Climate Change (IPCC). GWP is a measure of how much energy the emissions of 1 ton of gas will absorb compared to the emissions of 1 ton of carbon dioxide (CO₂), usually over a 100-year period. Gases with higher GWP values hold more energy per ton emitted, and as a result contribute more to warming the Earth (U.S. Environmental Protection Agency, 2022).

Carbon dioxide is defined as “1 GWP” for comparison. Carbon dioxide can persist in the climate system for thousands of years. Methane has a GWP of 27-30 over a 100-year period, but it remains in the atmosphere for a much shorter time of 10 years compared to carbon dioxide. As can be understood from the higher GWP value of methane, its energy-holding capacity is higher than carbon dioxide, meaning it causes more heat gain. Nitrous oxide, on the other hand, has a very high GWP value of 273 over a 100-year period. Nitrous oxide can remain in the atmosphere for about 100 years. Finally, fluorinated gases have GWP values in the thousands or even tens of

thousands. Their heat-holding capacity is very high, and that is why they are also called "high GWP gases" (U.S. Environmental Protection Agency, 2022).

The reason why carbon dioxide is particularly focused on in climate change and global warming is that it is the greenhouse gas emitted the most by human activities. In other words, the emission rate usually varies according to human activities. On the other hand, it is the greenhouse gas found in the highest amount in the atmosphere. Carbon dioxide is naturally present in nature and is part of a natural cycle, but as a result of human activities, the amount of carbon dioxide becomes more than it should be, and this natural cycle is broken. Carbon dioxide emissions can be caused by fossil fuels burned by vehicles used for transportation and electricity generation, as well as by iron, steel and cement production in the industrial sector, and also by land use affecting vegetation, which reduces the carbon dioxide rate (U.S. Environmental Protection Agency, 2022).

Energy efficiency and savings should be ensured to prevent this excessive carbon dioxide emission. The type of fuel used can be replaced with alternatives with less carbon content. Furthermore, carbon capture and sequestration (CCS) methods can be tried. For example, while a combustion process that causes carbon dioxide emission is carried out, carbon dioxide can be captured from the chimney before it mixes with the atmosphere. Besides, changes can be made in land use management practices to prevent the reduction of vegetation (U.S. Environmental Protection Agency, 2022).

On the other hand, methane gas emissions, one of the greenhouse gases, can be reduced or prevented by various methods. Preventing leaks by developing equipment used in oil and natural gas production and capturing methane gas from coal mines and using it for energy production can be effective methods. Similarly, methane gas emerging from the combustion of landfills can be captured and converted (U.S. Environmental Protection Agency, 2022).

Nitrogen oxide, another greenhouse gas with a high GWP value, can also be reduced from being released into the atmosphere. Nitrogen oxide emissions are generally caused by the use of nitrogen fertilizers. Reducing the use of nitrogen fertilizers or

developing alternative methods can yield effective results (U.S. Environmental Protection Agency, 2022).

The emission of fluorinated gases, called high GWP gases, is usually released from coolers used in businesses and personal residences. Technological improvements can be made to reduce emissions and fluorinated gas capture methods can be used. In addition, sulfur hexafluoride, one of the fluorinated gases, is an important gas used in electricity transmission in networks, so its release into the atmosphere can be prevented by frequently detecting and repairing leaks. Since Hydrofluorocarbons, another fluorinated gas, originate from leaks in vehicle air conditioners, emissions can be prevented by using alternative cooling systems (U.S. Environmental Protection Agency, 2022).

2.2.2 Carbon Footprint Calculation Methodologies: GHG Protocol

The Greenhouse Gas Protocol (GHG) enables companies and cities to prepare greenhouse gas inventories more accurately and comprehensively. This makes it easier for them to achieve their goals. Emission calculations consist of many different steps. If these steps are followed correctly and control issues are taken into account, an accurate and useful inventory can be created. Companies can use the "Corporate Accounting and Reporting Standard" created by GHG to guide them through the inventory process. GHG can help companies by providing comprehensive step-by-step guidance (Greenhouse Gas Protocol, 2024).

2.2.3 Carbon Neutrality and Net-Zero

Carbon neutrality and net-zero are both important concepts that aim to prevent climate change. The net-zero target is mentioned in Article 4 of the Paris Agreement. The agreement emphasizes that the aim is to reduce the temperature increase to below 2 degrees or even 1.5 degrees in the long term. Countries also announced ambitious net-zero targets at COP 26 (Allen et al., 2022). Türkiye is one of these countries with its 2053 target. The majority of the world economy has started to adopt these targets.

Allen et al. (2022) argues that the concept of net zero refers to the balance between the amount of greenhouse gases released into the atmosphere and the amount removed from the atmosphere. In other words, a decrease is expected in the amount of increase in the amount of carbon in the atmosphere.

Although carbon neutrality seems to be a directly related concept, carbon neutrality addresses a wide range of greenhouse gases such as methane and nitrous oxide, as well as carbon. It is important to make this distinction correctly because the strategies implemented to achieve the net zero target and to achieve carbon neutrality may differ. Both concepts are quite necessary to prevent climate change (Allen et al., 2022).

2.2.4 Carbon Pricing Mechanisms: Carbon Tax and Emissions Trading System

In order to protect against the harmful effects of climate change, countries have been taking many preventive policies, especially in recent decades. Although the number of "net zero" commitments, one of these, is increasing rapidly, it is not enough to eliminate the harmful effects of carbon generated by economic activities. The most critical step that needs to be taken for these commitments to achieve their goal is carbon pricing. Carbon pricing is a policy that puts a price on the greenhouse gas released. Carbon pricing is an extremely cost-effective policy tool in challenging greenhouse gas emissions. Carbon pricing can significantly reduce the cost of combating carbon emissions, but the necessary incentives and regulatory changes must be implemented for this. The two most important elements of carbon pricing are the carbon tax and the emissions trading system (World Bank, 2021).

A carbon tax is a direct tax imposed on companies on the goods or services they produce because they cause greenhouse gas emissions during their activities. There are similar taxes applied in some countries, although they are not directly mentioned as greenhouse gases. For example, a tax has been imposed on coal in India and its name is the Clean Environment Tax. Another example can be given from Mexico, where there is a similar tax in the country where each fossil fuel used is charged according to the carbon content and quality. The carbon tax, which was first imposed by Finland in

1990, was later adopted by the Scandinavian countries. In 2017, it was implemented in 25 different states or countries around the world (World Bank, 2017).

Carbon tax is a tax directly tied to CO₂ emissions and is an economic tool that encourages emission reduction. By setting a price for each ton of greenhouse gas, it aims to direct companies that cause emissions to less carbon-intensive methods, thereby reducing emissions (World Bank, 2014).

The tax rate is determined by governments and updated over time. It is taxed on the amount determined and reported or declared. It is regulated by the Ministry of Finance.

Another pricing method is the Emission Trading System. In this system, there is an upper limit for emissions. Companies can sell the emission rights they have or buy the rights that other companies do not use when needed. In addition, there is the opportunity to store the emissions they do not use during the year and use them in other years. In case the upper limit is exceeded, the emission right for the exceeded amount must be purchased. The price is determined by the market. (World Bank, 2021).

As of 2021, 29 jurisdictions worldwide are implementing the ETS. While many countries have similar practices to emissions taxes, 35 jurisdictions have taken action to impose a carbon tax. Many jurisdictions are implementing both systems together.

In the Emissions Trading System, emission outputs are final because the emission cap is set. There is no such sharp limit in taxation, taxes are paid as much as the emission metric. In addition, ETS forces companies to cooperate with each other. On the one hand, the taxation method provides a predictable income, on the other hand, in ETS, the market is more decisive, and it is more difficult to predict the income because it is not fixed like taxes.

Although they have different advantages and disadvantages, both regulations are cost effective and provide regional benefits (World Bank, 2021).

2.3 Basic Concepts and Principles in Corporate Sustainability Reporting

2.3.1 Driving Forces

Corporate sustainability (CS) has recently become a must for companies. Companies are now aware that they need to focus on CS to achieve long-term success. Therefore, understanding the motivations that drive CS is also very important. The way industries and companies define drivers often differs. Corporate sustainability has 5 main drivers. These drivers are social responsibility, organizational factors, environmental responsibility, compliance issues and corporate reputation (Ramchandani & Singh, 2022).

- **Environmental Responsibility:** Environmental concerns form the basis of the sustainability movement. Bansal & Roth (2000) define competition, legitimacy and ecological responsibility, define clean technology and pollution prevention as the most important elements of the sustainable value framework. Many other studies also emphasize that environmental responsibility plays an important role in CS practices (Ramchandani & Singh, 2022).
- **Social Responsibility:** Meeting the social needs of employees and stakeholders, such as ensuring their motivation, protecting human rights, ethical behavior, and ensuring their health and safety, is an important driver for companies to adopt CS practices (Ramchandani & Singh, 2022).
- **Corporate Reputation:** Various studies emphasize the connection between CS and corporate reputation. Companies' ability to adopt proactive sustainability strategies positively affects their reputation (Ramchandani & Singh, 2022).
- **Compliance Issues:** Complying with legal regulations related to sustainability, especially in certain sectors such as oil and automotive, can be a challenging process for managers. The obligation to provide legal compliance is one of the important driving forces for companies to adopt CS practices. This situation enables institutions to adopt sustainability practices to prevent legal risks (Ramchandani & Singh, 2022).
- **Organizational Factors:** Top management support and attitude, leadership, corporate culture and values are important for easier adoption of CS practices.

These factors create a driving force for companies to implement sustainability strategies (Ramchandani & Singh, 2022).

2.3.2 Corporate Strategy and Sustainability

Although sustainability strategies are on the agenda, many organizations still fail to integrate sustainability strategies into their corporate strategies. Sustainable business practices should be created, and these should be included in management processes (Rodrigues & Franco, 2019). The concept of strategy has entered an evolutionary process with the spread of issues such as sustainability and globalization. Strategy is the determination of long-term goals and the preparation of plans and actions to achieve them. In addition, creating sustainable strategies for companies can provide competitive advantage. At the same time, thanks to sustainable strategies, companies do not miss environmental opportunities and minimize possible risks. Both creating and implementing sustainable strategies are very important for managers and companies (Rodrigues & Franco, 2019).

2.3.3 Prioritization Analysis

Sustainability reporting has recently started to play a decisive role in the consumer decision-making process. A company's efforts to create and sustain environmental and social value outside of the economy for its shareholders, environment and society and its reporting of this have become quite remarkable. Since these reports are not as quantitative as financial reports, prioritization is sometimes difficult. Prioritization plays a critical role in companies' self-evaluation and allows them to realize what they need to pay more attention to. For example, if we consider PepsiCo, cheap water supply is of vital importance to this company. However, if sustainable water resources decrease in the regions where the company procures its water, it may be subject to pressure from its stakeholders with whom it shares water, and its profitability may decrease dramatically. As seen in this example, if prioritization is applied correctly in sustainability reporting, companies can find important clues for both a sustainable

world and the continuity of the company. In addition to these, the path to be followed in prioritization: First, the basic problems should be determined, and the approaches of the stakeholders should be examined. Then, data should be collected from the stakeholders and finally, the problems should be prioritized according to the data and approaches obtained (Whelan & Fink, 2016).

2.3.4 Materiality / Double Materiality

Materiality and double materiality are concepts used in the field of sustainable finance and corporate reporting. Materiality refers to the importance or relevance of information for the process, especially in financial reporting and decision making (Chiu, 2022). On the other hand, the concept of double materiality covers not only the impacts on the company itself, but also the broader environmental and social impacts of the company's operations.

2.3.5 ESG

ESG criteria are a set of practices that process “environmental, social and governance” factors in order to ensure sustainability and many human values and are taken into account in company evaluations. Taking these three factors together as a guide in company management increases the accuracy and benefit of the analyses made for society and nature as well as the economy. The governance dimension covers principles such as internal justice, leadership, competence of the management team, effectiveness of the board of directors, transparency, prevention of corruption, openness, rights and responsibilities of stakeholders, and accountability. The environmental dimension includes adopting principles that will minimize the harmful effects of the company on the environment such as greenhouse gas emissions, responsible consumption, efficient use of resources, carbon footprint, and increasing applications that will support the circular economy. Another dimension of ESG is the social dimension. The social dimension focuses on the interaction of the company with all the people it interacts with during its field of activity. It also addresses the implementation of gains such as gender equality, occupational health and safety, human rights, social benefit, opportunity and wage equality, prevention of racism, and

social responsibility projects in society. ESG criteria can significantly affect the perspective of consumers, stakeholders, and investors during the evaluation of the company. General management, environmental, and social values together with ESG create a positive perception for employees, customers, and investors, and even credit financiers in developed and developing countries. In addition, the extent to which the company complies with the principles suggested by ESG and its environmental and social aspects can provide an idea about whether the company is sustainable or not. A company receiving a high score in the evaluation according to ESG criteria indicates that the company is more responsible towards nature and society, sustainable, reliable, and transparent (de Souza Barbosa et al., 2023).

2.4 Introduction to Sustainability: Climate Change, Historical Perspective, and Pillars of Sustainability

As the impact of climate change increases day by day, sustainability has become an even more important concept to address the challenges of carbon emissions and environmental degradation. In this context, sustainability involves balancing economic development with the conservation of natural resources and the reduction of carbon footprints, ensuring that current actions consider the environmental health and well-being of future generations.

2.4.1 UN Sustainable Development Goals

The Sustainability Development Goals, which were accepted by the member states of the United Nations in 2015, include 17 goals. These goals are based on the work of the United Nations for many years. At the World Summit held in Brazil in 1992 and attended by approximately 180 countries, Agenda 21, which included the creation of a common action plan for sustainability, was accepted. 8 years later, the members accepted the Millennium Declaration. The Millennium Declaration includes eight Millennium Development Goals (MDGs) created to reduce extreme poverty by 2015.

In addition, an "Open Working Group" consisting of 30 members was created in 2013 to develop proposals regarding the Sustainable Development Goals. As a result, the 2030 Agenda, which includes 17 SDGs, was accepted at the UN Sustainable Development Summit in September 2015.

17 SDGs: "no poverty; zero hunger; good health and well-being; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; reduced inequalities; sustainable cities and communities; responsible consumption and production; climate action; life below water; life on land; peace, justice and strong institutions; partnerships for the goals". Moreover, 2015 can be considered a turning point because many more agreements were adopted and the Paris Climate Agreement is one of them (United Nations, 2024d).

Figure 3. Proportion of countries or areas with available data (at least two data points since 2015), comparing the 2019 database and 2024 database, by Goal (percentage)

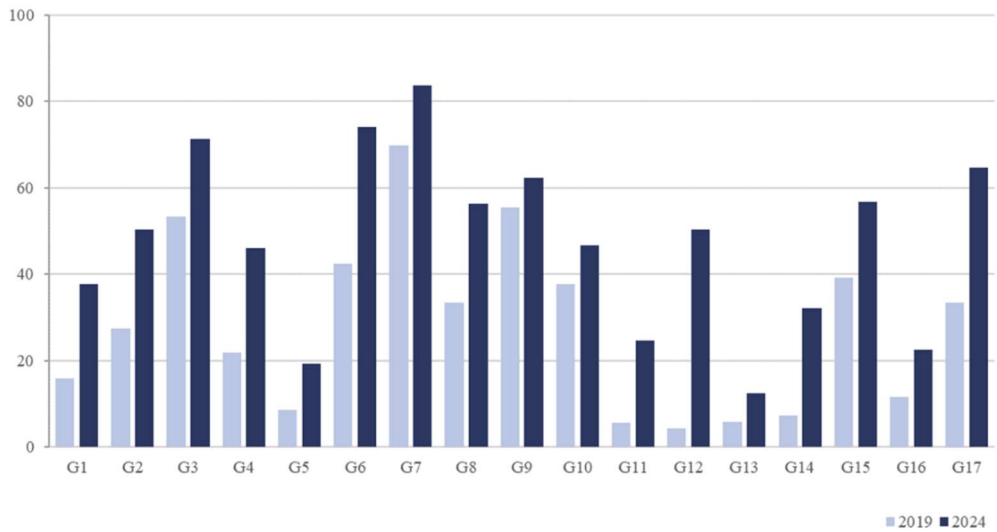


Figure 2.4.1.1 Change in implementation of 17 goals between 2019 and 2024 (United Nations, 2024b, p. 5)

As you can see in Figure 2.4.1.1, there has been an increase in the implementation rate and impact of each of the SDG goals from 2019 to 2024.

2.4.2 Paris Climate Agreement

Following the Sustainable Development Goals announced in September, the Paris Climate Agreement was also signed in December. Indeed, the frequent mention of issues such as human rights, sustainable production and consumption at COP 21 demonstrates the strong relationship between the Paris Agreement and the Sustainable Development Goals. One of the most important features of this agreement is its inclusiveness, as it concerns both developed and developing countries. The aim is to intensify efforts aimed at keeping the global temperature increase well below 2°C, ideally 1.5°C, compared to before the industrial revolution (Sabuncu, 2015). On the other hand, it was decided to direct the flow of financing in a way that supports low-emission and climate-resistant development. The aim was to improve the ability of countries and companies to adapt to the effects of climate change and to increase resilience (Sabuncu, 2015).

The first international agreement to reduce greenhouse gas emissions was the Kyoto Protocol. However, since this protocol only defined targets for developed countries, its impact was limited and it also became weaker when the US did not participate. The failure to reach an agreement on a climate agreement that also aimed to impose responsibilities on developing countries at the Copenhagen Conference in 2009 was an important turning point in the fight against climate change. On the other hand, the Paris Agreement came to the agenda thanks to this process (Bölgesel Çevre Merkezi REC Türkiye, 2015).

Unlike the Kyoto Protocol, the Paris Agreement aims to keep the global temperature increase below 2°C and even encourages a target of 1.5°C. The comprehensive aspect of the agreement is that it places responsibilities on all countries; while developed countries take the lead, developing countries are encouraged to increase their efforts over time (Bölgesel Çevre Merkezi REC Türkiye, 2015).

With the Paris Agreement, developed countries are required to provide financial support to developing countries in the fight against climate change. With this fund called the Green Climate Fund, developed countries are planned to contribute

approximately 100 billion dollars annually starting from 2020. This amount is planned to be updated according to needs after 2025. However, the current situation can keep the temperature increase at 3°C. Therefore, the targets are planned to be re-evaluated in 2023 and every 5 years thereafter. The Paris Agreement makes it mandatory for the public and private sectors to take climate impacts into account, accelerates R&D and increases the focus on renewable energy. If countries do not keep their promises, the sanction will be "being exposed" (Bölgesel Çevre Merkezi REC Türkiye, 2015).

Other important issues that came to the fore during COP 21 were the evaluation of targets, carbon pricing, carbon leakage and border regulations (Sabuncu, 2015).

2.4.3 European Green Deal

In line with the goals of the Paris Agreement, the European Green Deal was designed to guide the EU in achieving its sustainability goals. The agreement aims to reduce emissions to zero by 2050 and make Europe the first continent to become climate neutral (European Commission, 2024). The Covid-19 pandemic affected the world in 2020, and that year was one of the hottest in recent times. With the economic recession, there was a temporary decrease in carbon emissions, which led to the need for long-term changes in the economic system (Fetting, 2020). In other words, the Covid crisis has been seen as an opportunity to achieve the goals of the Green Deal, the 2030 Agenda and the Paris Agreement (Fetting, 2020).

The European Green Deal (EGD) includes initiatives and laws aimed at the fair and sustainable transformation of Europe (Fetting, 2020). Thanks to this recovery after the pandemic, the opportunity to accelerate the transformation has been seized. The Green Deal includes eight main areas:

- “1) Increasing the EU’s climate ambition for 2030 and 2050
- 2) Supplying clean, affordable, secure energy
- 3) Mobilizing industry for a clean and circular economy
- 4) Building and renovating in an energy and resource efficient way

- 5) A zero pollution ambition for a toxic-free environment
- 6) Preserving and restoring ecosystems and biodiversity
- 7) Farm to Fork: a fair, healthy and environmentally friendly food system
- 8) Accelerating the shift to sustainable and smart mobility” (Fetting, 2020)

2.4.4 Fit for 55

The European Council has introduced some suggestions, targets and obligations to reduce greenhouse gas emissions in the European Union member states. The Council has implemented many legislative changes and concrete measures such as setting new rules for this purpose. One of the most comprehensive of these is the Fit for 55 package. This package is briefly many legislative changes and legislative proposals that will reduce greenhouse gas emissions of the European Union member states and bring them to a climate-neutral state. Within the scope of this package, it is aimed for the member states to decrease greenhouse gas emissions by at least 55 percent below the levels of the 1990s by 2030.

The package briefly includes the following: Reducing greenhouse gas emissions in almost all sectors, increasing carbon sinks that provide natural carbon elimination, setting a price on pollution, providing necessary investments in green transformation, and economically supporting the public and small businesses in this transformation. The package also aims to be climate-neutral by 2050. The package includes sanctions that will affect almost all economic sectors. It even covers smaller sectors not covered by the EU Emission Trading System in order to reduce member countries' emissions. For example, it includes broad binding regulations for road transport, agriculture, construction, and small industries. A fund of 55 billion euros has been allocated to countries with a higher dependence on fossil fuels and to finance groups such as SMEs that will be at a disadvantage in order to achieve the goal of this package (Council of the European Union, 2024).

2.4.5 Corporate Sustainability Due Diligence Directive (CSDDD)

CSDDD requires large companies to identify and act on human rights and environmental impacts in their own activities, their subsidiaries and the chains of activity of their business partners. In line with the OECD Guidance, companies should integrate the due diligence process into their policies and management systems, prevent the negative impacts they identify, evaluate the effectiveness of their practices and openly share the necessary information with the public. Furthermore, they should adopt and implement a transition plan to combat climate change. The CSDDD encourages companies to develop a business model that is compatible with the climate neutrality goals of the European Union. Member States must integrate this directive into their domestic law by 2026. Companies must comply with the regulations on dates that may vary depending on the number of employees and turnover (Corporate Sustainability Due Diligence Directive, 2024).

2.4.6 Corporate Sustainability Reporting Directive (CSRD)

CSRD entered into force on January 5, 2023. This directive updates and strengthens the rules regarding the social and environmental information that companies must report. With this directive, it is aimed to provide sustainability reporting to large companies and SMEs listed on the stock exchange. In addition, it was decided that some non-EU companies that generate more than €150 million in revenue in the EU market will also be included in this scope (European Commission, 2022).

It is planned to provide access to the information that companies may need to assess their impact on people and the environment and to understand the financial risks and opportunities arising from sustainability issues, especially climate change, by investors and other stakeholders. In addition, this can reduce reporting costs in the medium and long term (European Commission, 2022).

Furthermore, the CSRD also requires companies to audit sustainability-related information and to create a digital taxonomy for sustainability information (European Commission, 2022).

2.4.7 European Sustainability Reporting Standards (ESRS)

The laws of the European Union require all large-scale and public companies to disclose to the public the risks they take, opportunities they seize and investments they make, and all kinds of activities that will affect the environment, social life and people. These mandatory disclosures allow civil society organizations, customers, consumers and investors to understand the sustainability perspective of the companies and to evaluate their sustainability performance. However, in the absence of a standard, the possibility of the disclosures being incomplete, manipulative or disinformation is high. It is shown that important information is generally omitted. However, using this limited and manipulative information disclosed makes it almost impossible to compare companies and makes the situation difficult for investors and consumers. These problems create a need for standard sustainability reporting standards (European Commission, 2023).

The European Union, which is looking for a common standard that will prevent investors and consumers from being victimized and companies can more easily evaluate and explain their sustainability performance, has accepted the implementation of a directive consisting of 12 standards (ESRS) in line with the recommendations of European Financial Reporting Advisory Group (EFRAG). EFRAG, which prepared some drafts before the directive was adopted, optimized the drafts for both companies and other stakeholders over time. The draft was submitted to the commission in November 2022 (European Commission, 2023).

The European Commission also made some changes to the draft and accepted it. The standards in the adopted directive make it possible to examine and evaluate all aspects of the sustainability theme. Companies must publish their reports according to these standards between 2025 and 2029, depending on their size and type. ESRS adopts a "double materiality" perspective; in other words, it obliges companies to report on both how they affect people and the environment, and what kind of financial risks and opportunities social and environmental issues create for the company. ESRS 1 ("General Requirements") determines the general requirements to be applied when preparing the report. ESRS 2 ("General Disclosures") determines the basic information that must be disclosed regardless of the sustainability theme addressed. ESRS 2 is

mandatory for all companies within the scope of the CSRD Corporate Sustainability Reporting Directive (European Commission, 2023).

2.4.8 Border Carbon Adjustment Mechanism (CBAM)

The European Union Emission Trading System (ETS), established in 2005, sets an upper limit for emissions and allows industrial companies to trade emissions. However, some sectors exposed to international competition receive free permits to prevent carbon leakage. Free permits allow companies to gain the right to emit a certain amount of greenhouse gas free of charge. The aim of doing this is to prevent excessive increases in the costs of sectors exposed to international competition and at risk of carbon leakage. At the same time, this method aims to prevent sectors from shifting their production to countries with lower environmental standards and costs. On the other hand, this application can also make emission reduction incentives less effective (Bellora & Fontagné, 2023).

A carbon price application (CBAM) has been proposed at the EU border to compensate for the carbon content caused by these imports. To avoid a competitive disadvantage with countries in the European Union that are exempt from carbon prices or have lower carbon prices, CBAM aims to impose a carbon price on products imported into the EU. CBAM will come into force in 2023 and will be fully implemented between 2026 and 2034 (Bellora & Fontagné, 2023).

2.4.9 Emissions Trading System

The European Union ETS, the first phase of which was put into effect in 2005, is briefly trying to design a greener world and trade system with two basic principles. One of these and the most important one is "cap". "Cap" is the limit that determines the upper limit of the total amount of greenhouse gas that all facilities and businesses supervised by the system can emit into the atmosphere during their commercial activities. With this limit, businesses are given a one tonne CO₂ emission permit per year. Businesses can sell this permit, keep it for future use or, if they find the limit insufficient, they can purchase an additional limit through an auction. The upper values of these limits are reduced every year in line with the European Union climate targets.

Thus, the greenhouse gas emission permitted by businesses is seriously restricted every year. The fact that the results of this restriction are working is shown by the fact that the emission from industrial and energy facilities in Europe has decreased by approximately half compared to 2005. Companies within the system must monitor and report their emissions.

Penal sanctions are imposed on companies that do not have enough limits to meet their annual limits. The revenues from these penalties are mostly transferred to the national budgets of the members, and the member states are obliged to use these budgets for more environmentally friendly projects such as energy efficiency, sustainability and renewable energy. The ETS covers emissions from the electricity and heat production, industrial manufacturing and aviation sectors, which constitute approximately 40% of the total greenhouse gas emissions in the EU. It also continues to expand its scope by including emissions from maritime transport in 2024.

In short, with this regulation, companies that cause excessive emissions are financially penalized and the revenue obtained from this creates a budget for green transformation and reduces greenhouse gas emissions. The revenue obtained from the emission limit auction has exceeded 150 billion dollars since 2013 (European Commission, 2024).

2.4.10 U.S. Securities and Exchange Commission (SEC) Climate Disclosure Rules

The risks posed by climate on companies and the measures and responses companies take against these risks critically affect the company's future and current financials and position in the sector. Therefore, investors or investment advisors who guide them want to be informed about the risks that may arise related to climate. In order to meet this need, the commission requires that the registrants provide information that will enlighten the investor about all climate-related risks that will or may affect their business plans, financial situations and strategies. With this information to be provided, investors can take positions (buy, sell, hold) on the stocks or securities in their portfolios. Currently, these climate risks are disclosed by many companies in their year-end reports (Securities and Exchange Commission, 2024).

In fact, when the companies in the Russell 100 index are examined, almost all of them provide public information about climate. More than half of these companies also make statements about greenhouse gas emissions. Although most companies make statements, these statements are found by the council to be inconsistent, not easily understood by investors and not comparable. Investors also demand information that facilitates the analysis of companies with reliable standards. Companies sometimes voluntarily use reporting frameworks shaped by third parties. However, these voluntary reports are not always continuous and can be manipulated through partial disclosures. In this context, it has been requiring the disclosure of specific environmental issues for the last half century with the goals of increasing the reliability of the disclosures to be made, providing investors with a broad perspective on companies, and protecting investors, and in 2010, it published guidance on requiring the disclosure of climate-related risks using these existing legislations. The feedback obtained from this guidance shows that although the guidance requires the disclosure of many information, investors stated that a standard on the subject has not yet been established and that the guidance needs to be developed. Taking these criticisms into account, new rules that are more consistent, comparable and will enable investors to make more accurate decisions have been announced with updates (Securities and Exchange Commission, 2024).

In summary, the SEC announced its new guidance, valid as of 2024, to close the gaps in the guidance announced in 2010 and to ensure that public companies manage climate-related risks and present the actions and strategies they take in a comprehensive and understandable report. According to the content of the guide, the final rules of the report to be disclosed include the disclosure of all climate-related risks that the company will be materially affected by, the management of these risks, the role of the board of directors, the company's climate-related goals and how these goals affect its financial statements. In addition, large-scale companies are required to disclose Scope 1 and Scope 2 emissions, proving that it is a reliable report. "Scope 1: Emissions from sources directly owned or controlled by the company. Scope 2: Indirect emissions released during the production of energy imported or supplied domestically by the company." (Securities and Exchange Commission, 2024)

2.5 Framework and Standards for Corporate Sustainability Reporting

A variety of frameworks and standards have emerged to help organizations, industries, and countries describe their sustainability efforts, increase comparability, and help stakeholders assess corporate impacts on society and the environment.

2.5.1 Capital Markets Board (CMB) Sustainability Principles

The Sustainability Principles Compliance Framework explains the basic principles that public companies should take into account when carrying out their Environmental, Social and Corporate Governance (ESG) activities. Although the implementation of these principles is not mandatory, since there is an “Apply or Explain” principle, it is mandatory to report whether or not they are implemented (Sermaye Piyasası Kurulu, 2022).

The main principles of this strategy are as follows:

- Strategy, Policy and Goals: The Board of Directors should determine the priority issues related to ESG, create policies in this direction and announce them to the public. In addition, it should report its short- and long-term goals in this context and announce this information.
- Implementation and Monitoring: Units responsible for the implementation of ESG policies should be established and these units should report the activities they carry out to the board of directors at least once a year.
- Reporting: Transparency and reliability should be at the forefront in these reports that companies will carry out at least once a year.
- Verification: Performance measurements carried out or verified by independent third parties should also be made transparent to the public.

Environmental Principles:

Companies should publicize their environmental management systems, policies, environmental impacts and targets in this context. In addition, the company's data on greenhouse gas emissions, energy consumption and water use should be reported at regular intervals.

Social Principles:

Companies should report their policies on human rights and share them with the public. They should prioritize ensuring equality and women's employment, creating humane working conditions and employee satisfaction.

Corporate Governance Principles:

Companies should comply with corporate governance principles and integrate sustainability into their general strategies. They should also develop policies for tax integrity and combating corruption and report to the public.

This framework was created to ensure that companies improve their sustainability performance and increase transparency when reporting these (Sermaye Piyasası Kurulu, 2022).

2.5.2 Global Reporting Initiative (GRI)

GRI was founded in Boston in 1997, inspired by the social reaction that emerged as a response to the environmental disaster of the Exxon Valdez oil accident in 1989. The purpose of its establishment was to determine the principles that companies would be responsible and accountable for their environmental impacts and to ensure their implementation. This purpose was later expanded to the economic, social and management areas. In 2000, it first presented the global infrastructure and scheme that determined the general outlines of sustainability reporting to the public, this scheme was called G1. In the following years, the contents of these schemes were updated and improved (Global Reporting Initiative [GRI], 2024b).

Their latest updated versions in 2021 are summarized as follows:

GRI 1 (Foundation 2021) explains the basic principles and how to apply the principles. It includes the requirements that must be followed for organizations that want to report in accordance with GRI standards. It also addresses issues such as verifiability, balance and accuracy, which are essential for a well-prepared report.

GRI 2 (General Disclosures 2021) includes general disclosures about the organization. It provides detailed information to shareholders about the areas in which the organization operates, its employees, management methods, strategies, and policies. With the information provided by GRI 2, it is possible to have an opinion about the profile, dimensions, and impact of the reported organization.

GRI 3 (Material Topics 2021) examines more material topics compared to GRI 1 and 2. It explains how to determine the most relevant, important, and critical issues related to the organization's activities. Moreover, it explains how to determine, list, report, and manage the issues that should be prioritized. It also informs how to use sector standards. To be more specific, it guides how to determine the topics that constitute the organization's main impact.

Especially with the rapid increase in industrialization, environmental pollution and industrial pollution have begun to be followed more carefully and with concern by governments, regulators, and the public in almost all countries except underdeveloped countries. Consumers now pay attention to the perspectives of companies on social and environmental issues and whether they take precautions against these issues when making their choices. Although consumers and lawmakers try to pay attention, social and environmental challenges in the 21st century are complex and complicated. This complex and complicated situation forces non-profit organizations, the public, governments and companies to work together. One of the most trusted institutions when evaluating sustainability performance is "GRI" because it includes economic, environmental and social issues together and is globally adopted. The application of GRI is very facilitating in obtaining information about the environmental, economic and social characteristics of a business. The most important power that facilitates the implementation and dissemination of GRI standards in developed countries is governments. Although governments in these countries impose the implementation of GRI standards, this situation is not valid in underdeveloped and some developing

countries where the main purpose is only to attract direct investors (Halkos & Nomikos, 2021).

GRI enables organizations to convey their impacts on people and nature during their activities in a clear, consistent, comprehensive and common language. This opportunity is very important for companies to transparently explain their contributions to sustainable development to the public and shareholders (SustainCase, 2020).

The interest and use of sustainability reporting guidelines has been increasing recently. GRI has been preferred by more than 14,000 companies in more than 100 countries for reporting and has regional offices spread across many different parts of the world (Global Reporting Initiative [GRI], 2024a).

As mentioned above, although GRI is quite popular and frequently used today, it has been subject to many criticisms to date and it has been claimed that it is not very useful and needs many innovative moves and updates to become widespread. The reasons for its non-use were initially stated as companies not realizing the importance of reporting, reporting costs, the complexity of reporting and low incentives. It has also been claimed that GRI does not have the necessary flexibility to be suitable for different sectors and that standard indicators in one sector are insufficient for others (del Mar Alonso-Almeida et al., 2013).

GRI has become widespread and has managed to falsify these criticisms by constantly updating itself and expanding its scope. For example, since 2019, it has extensively updated standards on topics such as energy resources and mining, agriculture, fishing, waste management and taxes (Global Reporting Initiative [GRI], 2024b).

2.5.3 Carbon Disclosure Project (CDP)

The Carbon Disclosure Project (CDP) was established in 2000 and asked companies to disclose their climate impacts (CDP, n.d.). It later expanded its scope to include deforestation and water security, and expanded its reach to smaller states. In 2013, they shortened their name to "CDP." Through CDP, more than 23,000 companies worldwide have reported on climate change, water security and deforestation. At

least 1,100 states, cities and territories have also reported on their environmental performance through CDP (CDP, 2024).

The main purpose of CDP is to ensure that companies report on their climate management, to access more climate-related data and to share it with the public. CDP sends a "Request for Information" to companies every year, asking them to report on their greenhouse gas emissions, their emission reduction targets, the risks of climate change for them, and their management strategies and improvement opportunities. CDP believes that the reporting process benefits both the companies reporting and those using these reports. It also believes that those reporting benefit because it enables companies to become more aware of themselves and to determine their internal strategies accordingly (Andrew & Cortese, 2011).

In addition, it provides the advantage of developing strategies to manage and reduce emissions. CDP can help widespread mandatory regulatory regimes related to carbon emissions. Furthermore, the information collected by CDP can also be used as an important source of information for policy makers, investors, creditors, educators and academics. A carefully constructed transparent information system can make markets work better and enable more effective steps to be taken to reduce greenhouse gas emissions. Additionally, since CDP is entirely voluntary, companies are free to report on their carbon emissions and climate. They can report all or part of the information requested by CDP, or they have the freedom to refuse to participate entirely (Andrew & Cortese, 2011).

2.5.4 International Integrated Reporting Council (IIRC)

IIRC was a global coalition of investors, companies, regulators, standard setters, academia and also NGOs. They argued that communicating about value creation and preservation was the next important step in corporate reporting. To address this important need, the IIRC developed the "International Integrated Reporting Framework" (International Financial Reporting Standards [IFRS] Foundation, 2022).

Integrated reporting can contribute to more efficient management of capital, thereby ensuring financial stability and sustainable development. Integrated reporting

techniques bring together different reporting areas and take into account the factors that affect companies' ability to create value over time. This model aims to make integrated reporting the standard in corporate reporting over time, replacing divided, chaotic, and static reporting with a more comprehensive approach (International Financial Reporting Standards [IFRS] Foundation, 2022).

2.5.5 Task Force on Climate Related Financial Disclosures (TCFD)

Climate change is a subject that needs to be examined in particular because it can completely change the strategies, services and plans of companies. Despite this, the financial effects of climate change have not been considered for many years. In order to address this issue, in 2017, the G20's Financial Stability Board (FSB) established the Task Force on Climate-related Financial Disclosures (TCFD). It investigated the effects of climate change on financial performance and the risks it may cause and made various recommendations (Friedrich et al., 2022). Furthermore, in recent years, research on this subject has increased and has become more prominent. The guidelines prepared by TCFD on this subject are one of the most important reporting standards on climate at the international level. The fact that TCFD reports are referred to in both ISSB standards and EU reports shows their importance (Friedrich et al., 2022).

On the other hand, it is crucial for investors to be able to measure and evaluate the impacts of emissions in a simple way, because they can predict the financial impacts of climate risks and plan their investments accordingly. In other words, the primary goal of the TCFD is to better explain the impact of climate-related risks and opportunities on financial situations, enabling investors and creditors to make more sensible financial decisions.

The Task Force on Climate-Related Financial Disclosures (TCFD) provides climate-related financial disclosure recommendations to ensure transparency and more accurate capital allocation. These recommendations categorize companies' activity elements into four main areas: "governance, strategy, risk management and metrics and targets." These four recommendations are completely interrelated. They focus on analyzing how organizations view their climate-related risks and opportunities (Task Force on Climate-related Financial Disclosures [TCFD], 2024).

“Following the publication of the TCFD recommendations, the Financial Stability Board (FSB) requested the Task Force promote adoption of the TCFD framework, providing further guidance, supporting educational efforts, monitoring climate-related financial disclosure practices in terms of their alignment with the TCFD recommendations, and preparing annual status reports through 2023.” (Task Force on Climate-related Financial Disclosures [TCFD], 2024)

Immediately after the publication of the 2023 status report on 12 October 2023, the TCFD completed its mission and was disbanded. The task of ensuring the control of companies' climate-related reports was taken over by International Financial Reporting Standards (IFRS) at the request of the FSB (Task Force on Climate-related Financial Disclosures [TCFD], 2024).

2.5.6 Sustainability Accounting Standards Board (SASB)

The Sustainability Accounting Standards Board (SASB) was established in 2011 to investigate the financial impacts of sustainability and to develop a common language between businesses and investors on this subject. Corporate sustainability reporting has become increasingly complex. As a result, The International Integrated Reporting Council (IIRC) and SASB announced their decision to merge in 2020. These two organizations, which aim to create corporate value, have tried to simplify reporting by being integrated (International Financial Reporting Standards [IFRS] Foundation, 2024).

SASB helps companies make their sustainability data transparent in the right way. SASB standards are suitable for 77 sectors (International Financial Reporting Standards [IFRS] Foundation, 2024).

Furthermore, IFRS announced in 2021 that they will establish the International Sustainability Standards Board (ISSB) to meet the information needs of investors and to establish global, high-quality sustainability disclosure standards. As of August 2022, the International Sustainability Standards Board (ISSB), which was established

by IFRS, will take over SASB's duties. ISSB has committed to maintaining and improving the standards that SASB has previously used (International Financial Reporting Standards [IFRS] Foundation, n.d.). ISSB leverages and brings together the work of market and investor-focused reporting initiatives, including:

- “SASB Standards
- Task Force for Climate-related Financial Disclosures (TCFD) Recommendations
- Integrated Reporting Framework
- Climate Disclosure Standards Board (CDSB) Framework” (International Financial Reporting Standards [IFRS] Foundation, 2024)

2.6 Türkiye Green Deal Action Plan

2.6.1 Emission Trading System

It is planned to conduct some studies for the Evaluation of the Suitability of the Emissions Trading System (ETS) in Türkiye. Within the scope of this activity, it was decided to carry out the following:

- Examine the design parameters of the ETS and transform them into different scenarios that may be suitable for Türkiye.
- Evaluate how the ETS will interact with other existing and planned energy and climate policies in Türkiye.
- Detect the deficiencies in the institutional and legal infrastructure in Türkiye and recommend the necessary actions to address these deficiencies.
- With all these findings, prepare an implementation guide or action plan for the establishment of the ETS in Türkiye (T.C. Çevre ve Şehircilik Bakanlığı, 2019).

2.6.2 Border Carbon Adjustment

In order to prevent the high costs that European industry will face as a result of the European Green Deal, a "border carbon adjustment mechanism" has been considered. As mentioned before, border carbon adjustment is important in order to prevent production and investment targets from shifting from European Union countries to countries with lower emission reduction targets. Border Carbon Adjustment includes pricing products imported to Europe according to their carbon content and will cover sectors that significantly affect carbon emissions such as "iron and steel, cement, aluminum, electricity, fertilizer". In addition, Türkiye plans to take similar steps with the EU and establish and implement a carbon pricing mechanism in order to prevent this situation from becoming a barrier to trade. Furthermore, it has been stated that the necessary studies will be carried out in Türkiye to reduce, control and report greenhouse gas emissions (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2022).

2.6.3 A Green and Circular Economy

The green economy is an economic model that aims to provide social welfare by reducing environmental risks and scarcity. The circular economy, on the other hand, describes the reuse and recycling of resources and materials in order to minimize the amount of waste. Since both approaches overlap with plans to reduce greenhouse gases and climate change, they can be addressed in an integrated manner. In order to achieve this, priority sectors should be determined, and it has been stated that projects such as "green OSB" and "green industrial zones" can be implemented to develop industrial symbiosis. Industrial symbiosis means that by-products or wastes generated in production in a certain sector are used as raw materials in the production phase of another sector. In addition to these, it is aimed to focus on R&D and innovation and to support environmentally friendly technologies. In terms of water, it is planned to purify and reuse wastewater and conduct analyses regarding water footprint because efficient use of water resources is very important for agriculture (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2022).

2.6.4 Green Finance

Providing financing is essential to effectively combat climate change and ensure a transition to a green economy. In this way, countries can also maintain their economic competitiveness. Türkiye also plans to increase access to climate financing in order to comply with the Green Deal Action Plan and implement emission reduction strategies. In order to support the realization of energy efficiency investments in Türkiye and the formation of green financing in this direction, it is planned to strengthen the ecosystem and re-examine the national incentive system in detail. In addition, green bonds and sustainable banking will be focused on. Green bonds are bonds used only for environmental projects such as renewable energy, energy efficiency, water management, and sustainable agriculture. In addition, accessing EU financing opportunities and benefiting from international financing are among Türkiye's most important goals in this regard. In order to achieve these goals, the necessary legislative arrangements, incentives and some information activities will be on the agenda (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2022).

2.7 Türkiye Sustainability Reporting Standards

2.7.1 TSRS 1 and TSRS 2

The Turkish Sustainability Reporting Standards are explained in two stages as TSRS 1 and TSRS 2.

TSRS 1 aims to help investors make the right decision in their decision-making processes by presenting reports in which sustainability-related financial data, information and sustainability-related opportunities and risks are explained. The standards require the transparent and accurate explanation of all beneficial or harmful factors that may affect the financial well-being of the company, such as costs, access to financing and cash flow, which may strongly affect its financial situation in the short, medium and long term. In this context, the report should be explained in a comprehensive manner regarding sustainability; the management process of the company, the strategy of the company showing its perspective on risks and

opportunities, how to manage encountered or possible risks, and all metrics and targets that the company must achieve. All information to be explained must be comparable, verifiable, explained on time and understandable (Kamu Gözetimi, Muhasebe ve Denetim Standartları Kurumu, 2023a).

TSRS 2 is a report standard that includes how businesses will manage the risks and opportunities that arise or will arise from climate change during their activities, strategy and decision-making processes, and targets to be explained metrically. In addition, the report should also explain "Climate Resilience", which includes how prepared they are for adverse scenarios, uncertainties and risks that may arise with climate change and how much they can resist them (Kamu Gözetimi, Muhasebe ve Denetim Standartları Kurumu, 2023b).

One of the types of information requested to be explained metrically is the amount of gross greenhouse gas released during the reporting period. These emissions are divided into three scopes. Scope 1 is the emission created from the resources that the business has direct control over or owns. Scope 2 describes the indirect greenhouse gas emissions resulting from the production of energy purchased or acquired by the business. Scope 3 is the indirect greenhouse gases that occur during the entire production process of goods or services of the business, such as business travel, transportation of employees, processing and use of products sold, investments, and many indirect emissions such as waste released (provided that they remain outside of Scope 2) (Kamu Gözetimi, Muhasebe ve Denetim Standartları Kurumu, 2023b).

- What Commercial Banks Must Disclose in Reporting

Scope 1-2-3 emission values by asset class.

Gross risk amounts and credit commitments by asset class.

Greenhouse gas emissions to arise from financial activities.

The company's revenues, assets, depreciation, and liabilities.

Emissions and risk ratios financed by the company.

TSRS will be published for the first time in 2025 and the report will use 2024 data. TSRS is mandatory for many companies under the supervision of the Capital Markets Board and many companies such as banks under the Banking Regulation and Supervision Agency (BRSA).

In addition, companies that meet at least two of the following conditions for two consecutive years are also required to disclose a report.

Total assets exceeding 500 million TL

Number of employees exceeding 250.

Annual net sales revenue exceeding 1 billion TL (Kamu Gözetimi, Muhasebe ve Denetim Standartları Kurumu, 2023b).

CHAPTER 3

REVIEW OF LITERATURE

The seminal paper by Friedrich et al. (2022) provides an in-depth analysis of European banks' climate reporting practices, their compliance with climate issues and the extent to which they implement the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). The study observes a positive development in the quality of climate-related disclosures over time. On the other hand, it highlights that there are still significant gaps in areas such as strategy, governance and setting targets for climate risks and opportunities. Furthermore, it is noteworthy that information such as "scenario analyses", which are of great importance for assessing the long-term impacts of climate change on banks' financial stability and operations, is still lacking (Friedrich et al., 2022).

This study also discusses the importance of legitimacy theory in understanding the motivations behind banks' climate reporting. According to this theory, banks make climate disclosures in response to social expectations because they see it as an important tool to strengthen their corporate image and gain social legitimacy. While this gives the impression that banks are aware of the importance of climate reporting, it may not be done to truly integrate climate risks into their core business strategies. In other words, this importance may also be given to ensure strategic image management aimed at meeting external expectations (Friedrich et al., 2022).

Friedrich et al., (2022) also emphasizes the critical need to include climate-related risks in banks' overall risk management strategies. Effective risk management should not only aim to identify and mitigate immediate risks. Effective risk management should also include scenario analysis, which is a forward-looking approach to assess and analyze future climate-related challenges. In addition, the study discusses the importance of providing detailed and quantitative information on emission limitations, resilience strategies, and how these elements are integrated into corporate strategies (Friedrich et al., 2022).

Moreover, the study discusses how regulatory frameworks can shape climate reporting practices. The study also compares TCFD recommendations with Global Reporting Initiative (GRI) standards. While TCFD focuses on the financial impact of climate risks, GRI offers a broader perspective focusing more on social and environmental impacts, indicating that these frameworks have different priorities (Friedrich et al., 2022).

In conclusion, the study reveals the extent to which climate reporting has developed in European banks. While significant progress has been made in the quality of transparent reporting, there are still challenges in terms of providing comprehensive and forward-looking information that fully integrates climate risks into overall risk management processes. The study argues that climate reporting should not be done solely to meet stakeholder expectations. It emphasizes that climate reporting is also very important to increase the overall transparency, resilience and sustainability of banking operations and that it would be more appropriate to report with this motivation. Addressing these gaps is of great importance for banks to effectively navigate a complex and rapidly changing environment, respond to societal demands and secure their legitimacy in the face of increasing climate-related challenges (Friedrich et al., 2022).

There is a large body of literature examining Environmental, Social and Governance (ESG) factors and their financial impacts. Apergis et al. (2022) discusses how higher ESG scores are associated with lower cost of debt. On the other hand, the discrepancy in ESG ratings is a significant issue. Avramov et al. (2022), Billio et al. (2021), Becker et al. (2022), and Berg et al. (2022) explore the uncertainties and discrepancies surrounding ESG ratings.

Furthermore, ESG integration is not limited to these, but has also spread to areas such as fixed income securities and sovereign debt. Ben Slimane et al. (2019) argue for the importance of incorporating ESG factors into fixed income investments, and Martellini and Vallée (2021) discuss measuring and managing ESG risks in sovereign bond portfolios. Højbel (2022) notes that investors are increasingly taking these risks into account.

Boffo and Patalano (2020) argue for the need to improve ESG investment practices and reporting. Gerard (2019) discusses socially responsible investors and highlights the complexity of linking investment strategies to ESG principles. Matos (2020) similarly examines global trends in environmentally responsible institutional investing. Sætra (2021) offers a different perspective by linking AI and ESG. Eccles et al. (2020) takes a historical approach to the investment and ESG nexus. Friede et al. (2015) made a significant contribution to the topic by showing, with findings from more than 2000 empirical studies, that ESG performance generally has a positive impact on financial performance.

Armstrong McKay et al. (2022) explain that the climate trigger point can be triggered by exceeding the 1.5°C global warming limit and mentions the heat reduction policies that can be used. Cointe and Guillemot (2023) discuss the historical development of the 1.5°C target, while Meinshausen et al. (2022) discuss whether the affect of the Paris agreement to keep warming below 2 degrees.

Callendar's (1938) early studies on the effect of CO₂ on temperature increase and Charney et al.'s (1979) assessments of carbon dioxide and climate provide a scientific and old perspective.

In addition, Ben Slimane et al. (2023) and Ben Slimane et al. (2020) mention net zero investment portfolios, sustainable finance mechanisms, and green bond premiums. Krueger et al. (2020) emphasize that climate risks are an important factor that can guide institutional investors. On the other hand, Joppa et al. (2021) provide a literature on net zero targets. In addition, Ben Slimane et al. (2023) and Ben Slimane et al. (2020) discuss net zero investment portfolios, sustainable finance mechanisms, and green bond premium.

CHAPTER 4

CLIMATE RELATED FINANCIAL DISCLOSURES OF BANKS IN TÜRKİYE

The study focuses on the analysis of reports archived by Turkish banks on their websites. Some Turkish banks have recently started to publish annual sustainability reports. These reports generally include information and targets based on scope 1, scope 2 and scope 3. A standard catalogue was used for the analysis of the components in the texts, thus increasing objectivity. Thanks to the repeatability of this TCFD scoring method, new reports can easily be reported with the same system. A 3-stage scoring scale was used depending on the intensity of the information. While the criteria containing two scoring segments as risks and opportunities are scored as "0= no reporting, 0.5= incomplete reporting, 1= intensive reporting", the scoring for single-segment criteria is as "0= no reporting, 1= incomplete reporting, 2= intensive reporting". The criteria in the critical catalogue are grouped under 4 main headings. These headings are "Governance" with 2 criteria, "Strategy" with 3 criteria, "Risk Management" with 4 criteria and "Metrics and Targets" with 4 criteria (See Table 4.1). The maximum score that companies that receive full scores from all criteria can receive is 28.

A total of 10 banks in Türkiye were scored manually in this study. The sustainability reports published annually by these 10 banks were examined. Since these reports have only recently been prepared in Türkiye, the years 2021 and 2023 were scored. In order to make a comparison with the CDP scoring, only banks scored by the CDP were selected. These banks include private and foreign capital deposit banks, private banks, public banks and participation banks. This variation also provides an advantage in terms of data diversity. The names of the banks that have been subject to sustainability scores are as follows:

- QNB Finansbank
- Halkbank

- Akbank
- Yapı Kredi
- Albaraka
- Türkiye İş Bankası
- Türkiye Vakıflar Bankası T.A.O
- Türkiye Garanti Bankası A.Ş.
- Şekerbank T.A.Ş.
- ICBC Turkey Bank A.Ş.



Table 4.1 TCFD Disclosure Scoring Criteria

No.	Rationale for evaluating the general TCFD recommendations and the bank-specific recommendations	Point range
1	Governance	0-4
1.1	General: “Describe the board’s oversight of climate-related risks and opportunities” Risks 0 = no reporting, if the bank does not publish information on the board’s oversight of climate aspects related to risks 0.5 = incomplete reporting, if the bank explains the board’s oversight related to climate-related risks 1 = intensive reporting, if the bank reports comprehensively on the board’s oversight on climate-related risks and may designate various individuals or bodies responsible for climate risks Opportunities 0 = no reporting, if the bank does not publish information on the board’s oversight of climate aspects related to opportunities 0.5 = incomplete reporting, if the bank explains the board’s oversight related to climate-related opportunities 1 = intensive reporting, if the bank reports comprehensively on the board’s oversight on climate-related risks and may designate various individuals or bodies responsible for climate opportunities	0-2
1.2	General: “Describe the management’s role in assessing and managing climate-related risks and opportunities” Risks 0 = no reporting, if the bank does not provide any information on how the management is dealing with climate-related risks 0.5 = incomplete reporting, if the bank provides information on how management manages climate-related risks but not how management assesses them 1 = intensive reporting, if the bank provides disclosures on how management manages and assesses climate-related risks. Opportunities 0 = no reporting, if the bank does not provide any information on how the management is dealing with climate-related opportunities 0.5 = incomplete reporting, if the bank provides information on how management manages climate-related opportunities but not how management assesses them 1 = intensive reporting, if the bank provides disclosures on how management manages and assesses climate-related opportunities	0-2
2	Strategy	0-8
2.1	General: “Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term” Risks 0 = no reporting, if the bank does not report any time horizon in identifying climate-related risks. 0.5 = incomplete reporting, if the bank identifies climate-related risks and only considers two of the three time horizons (e.g., short- and medium-term risks) 1 = intensive reporting, if the bank comprehensively identifies and reports short-, medium-, and long-term climate risks Opportunities 0 = no reporting, if the bank does not report any time horizon in identifying climate-related opportunities 0.5 = incomplete reporting, if the bank identifies climate-related opportunities and only considers two of the three time horizons (e.g., short- and medium-term opportunities) 1 = intensive reporting, if the bank comprehensively identifies and reports short-, medium-, and long-term climate opportunities	0-2
2.2	Bank-specific: Significant concentrations of credit exposure to carbon-related assets and information about climate-related risk (transition and physical) in their lending and other financial intermediary business activities 0 = no reporting, if the bank reports on transition and physical risks, but in doing so does not relate them to lending and other financial intermediary activities and does not address significant concentrations of credit exposures to carbon-related assets 1 = incomplete reporting, if the bank reports on transition and physical risks, relating them to lending and other financial intermediary activities, but does not address significant concentrations of credit exposures to carbon-related assets 2 = intensive reporting, if the bank reports on transition and physical risks, relating them to lending and other financial intermediary activities, and addresses significant concentrations of credit exposures to carbon-related assets	0-2
3	Risk Management	0-8
3.1	General: “Describe the organization’s processes for identifying and assessing climate-related risks” 0 = no reporting, if the bank neither describes how it identifies climate risks nor how it assesses them 1 = incomplete reporting, if the bank describes the process for identification but not the process for assessment 2 = intensive reporting, if the bank describes the process for identifying and assessing climate-related risks	0-2
3.2	Bank-specific: Characterizing climate-related risk in the context of traditional banking risk categories such as credit risk, market risk, liquidity risk, and operational risk and describing any risk classification framework used 0 = no reporting, if the bank’s report does not identify a link between climate-related risks and traditional risk categories and does not explain the risk categories used 1 = incomplete reporting, if the bank relates climate-related risks to traditional risk categories but does not explain the risk categories used 2 = intensive reporting, if the bank relates climate-related risks to traditional risk categories and explains the risk categories used	0-2
3.3	General: “Describe the organization’s processes for managing climate-related risks” 0 = no reporting, if the bank does not report how climate risks will be managed or only mentions potential climate risks 1 = incomplete reporting, if the bank discloses climate risks and describes how climate risks are managed in general but does not report how specific climate risks are managed 2 = intensive reporting, if the bank reports how it manages climate risks in general and how it manages specific climate risks (e.g., with reference to quantitative key figures)	0-2
3.4	General: “Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization’s overall risk management” 0 = no reporting, if the bank does not integrate any process or only integrates the identification process for climate-related risks into the organization’s overall risk management 1 = incomplete reporting, if the bank integrates the identification and management process for climate-related risks into the organization’s overall risk management but not the assessment process 2 = intensive reporting, if the identification, assessment, and management processes have been integrated by the bank into the organization’s overall risk management	0-2

(Continues)

No.	Rationale for evaluating the general TCFD recommendations and the bank-specific recommendations	Point range
4	Metrics and Targets	0-8
4.1	General: "Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management processes" Risks 0 = no reporting, if the metrics used by the bank are not used to assess climate risks and are not in line with their strategy and risk management processes 0.5 = incomplete reporting, if the metrics used by the bank to assess climate risks are not in line with its strategy or risk management processes 1 = intensive reporting, if the bank uses metrics to assess climate-related risks and these are in line with its strategy and risk management processes Opportunities 0 = no reporting, if the metrics used by the bank are not used to assess climate opportunities and are not in line with their strategy and risk management processes. 0.5 = incomplete reporting, if the metrics used by the bank to assess climate opportunities are not in line with its strategy or risk management processes. 1 = intensive reporting, if the bank uses metrics to assess climate-related opportunities and these are in line with its strategy and risk management processes	0-2
4.2	Bank-specific: Providing the metrics used to assess the impact of (transition and physical) climate-related risk on their lending and other financial intermediary business activities in the short, medium, and long term and the amount and percentage of carbon-related assets relative to total assets as well as the amount of lending and other financing connected with climate-related opportunities 0 = no reporting, if the bank uses metrics to assess (transitional and physical) risks but does not apply them to its short-, medium-, and long-term lending activities 1 = incomplete reporting, if the bank uses metrics to assess (transitional and physical) risks and applies them to its short-, medium-, and long-term lending, but does not set the amount and percentage of carbon-related assets relative to total assets 2 = intensive reporting, if the bank makes ratios to assess (transitional and physical) risks and applies them to its short-, medium-, and long-term lending and sets the amount and percentage of carbon-related assets relative to total assets	0-2
4.3	General: "Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions and related risks" 0 = no reporting, if the bank has published scopes 1, 2, and 3 but has not related them to its risks 1 = incomplete reporting, if the bank has published scopes 1 and 2 and related them to its risks 2 = intensive reporting, if Scopes 1, 2, and 3 have been published and related to risks	0-2
4.4	General: "Describe the targets used by the organization to manage climate-related risks and opportunities and their performance against targets" Risks 0 = no reporting, if the bank does not describe targets that do not address how they will manage climate-related risks and does not provide information on performance against those targets 0.5 = incomplete reporting, if the bank describes specific climate targets to manage climate-related risks but does not report performance to meet those targets 1 = intensive reporting, if the bank describes specific climate targets to manage climate-related risks and reports performance to meet those targets Opportunities 0 = no reporting, if the bank does not describe targets that do not address how they will manage climate-related opportunities and does not provide information on performance against those targets 0.5 = incomplete reporting, if the bank describes specific climate targets to manage climate-related opportunities, but does not report performance to meet those targets 1 = intensive reporting, if the bank describes specific climate targets to manage climate-related opportunities and reports performance to meet those targets	0-2
Total		28

In order to answer the first criteria 1.1 (see table 4.1), I searched the word of “board” in the text. If the word “board” was not mentioned, I gave 0 point. If the words “risk” or “opportunity” were not mentioned in the section about board, I gave 0 point to this bank for this criterion. If positive or negative facts were mentioned more than once within the scope of risk and opportunity, 1 gave full point. If they were mentioned only once, I gave 0.5 points. This method was applied separately for risk and opportunity.

Table 4.2 Decision Tree Criteria 1a

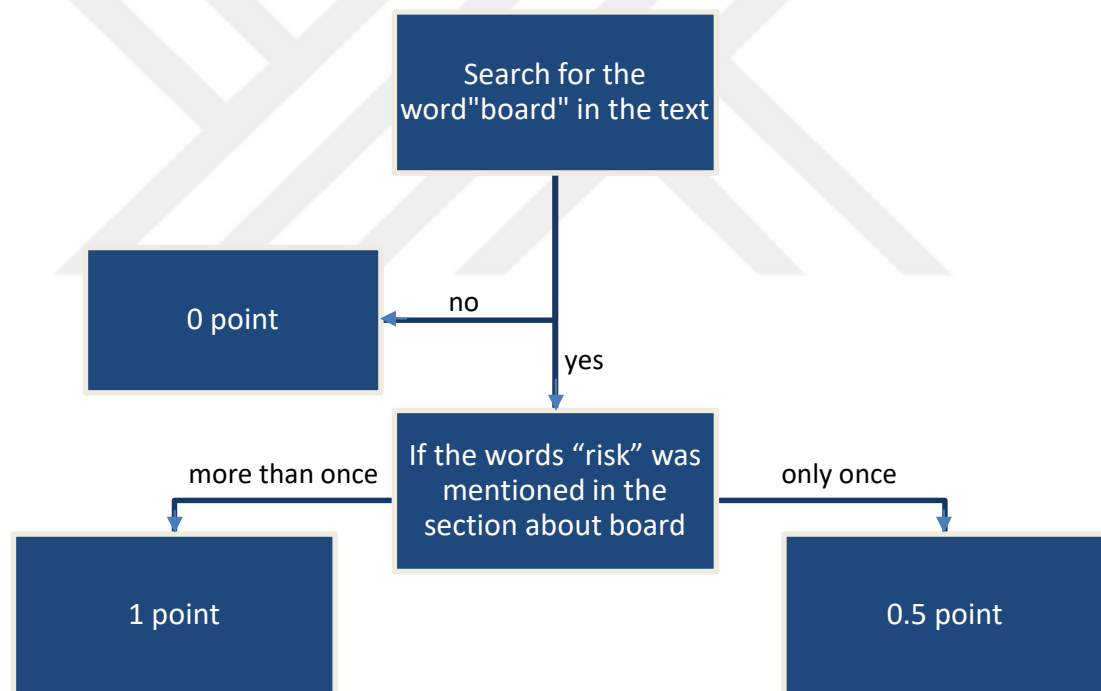
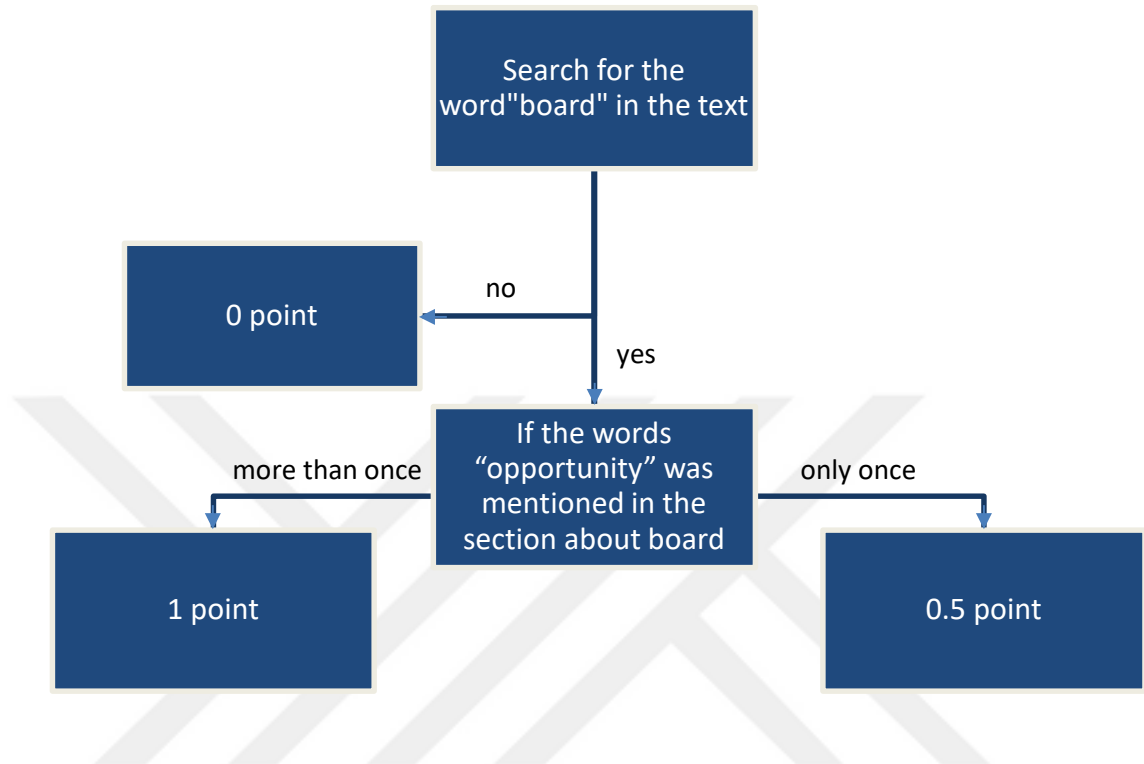


Table 4.3 Decision Tree Criteria 1b



For the criterion 1.2, I searched the word “management” in the text. If the word “management” was not mentioned, I gave 0 point. If the words “risk or “opportunity” were not mentioned in the section about management, I gave 0 points. If positive or negative facts were mentioned more than once within the scope of risk and opportunity, I gave 1 full point. If it was mentioned only once, I gave 0.5 points. I applied this separately for risk and opportunity.

Table 4.4 Decision Tree Criteria 2a

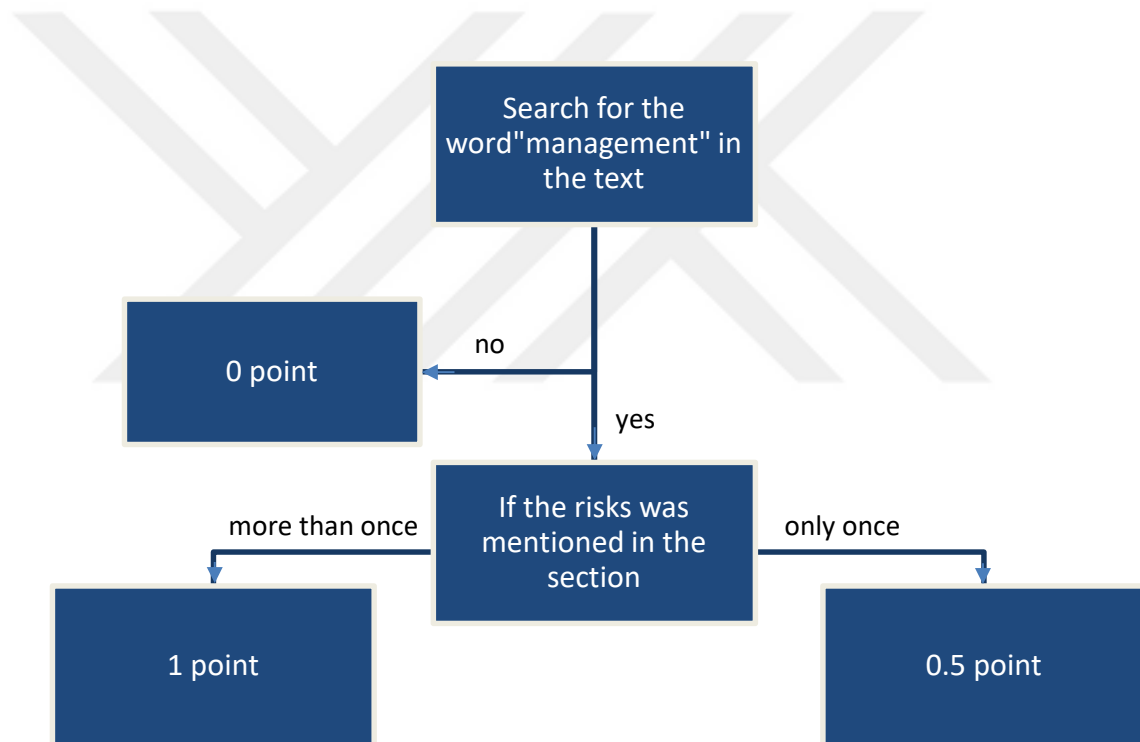
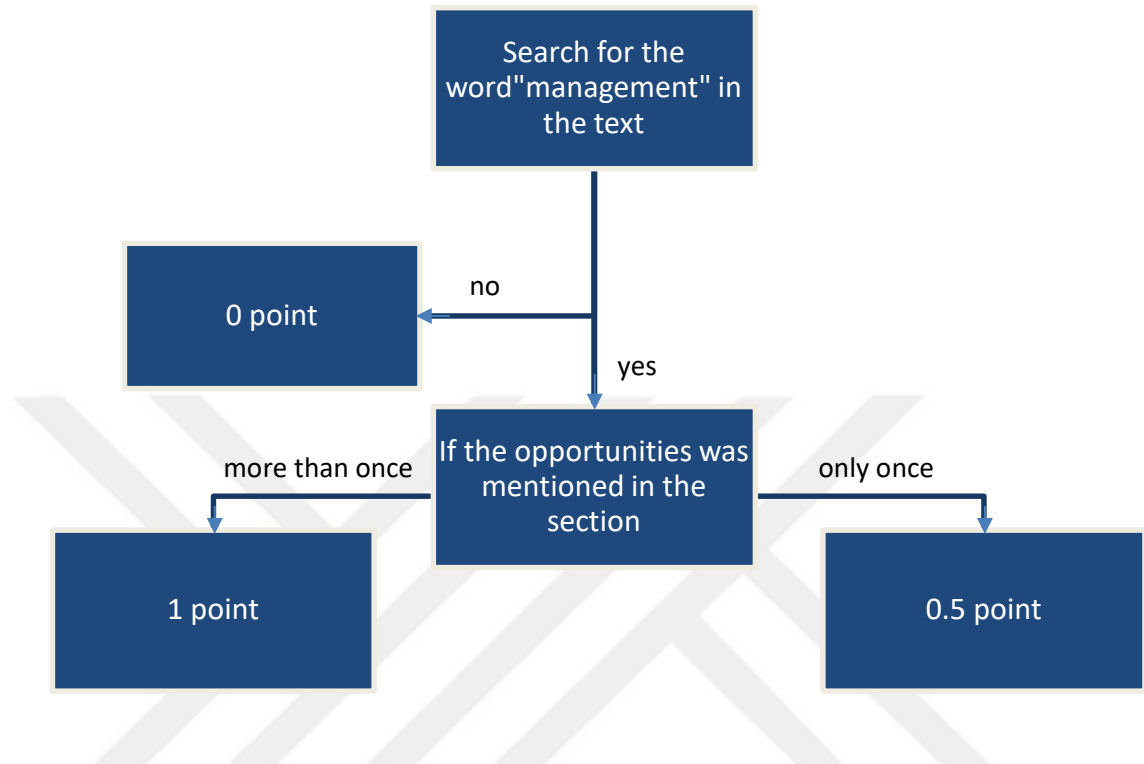


Table 4.5 Decision Tree Criteria 2b



To score the criterion 2.1, I searched for the words short, medium, and long term in the text. If none of them were mentioned, I gave 0 points. If these words were mentioned but no mention was made of the opportunities or risks in the region, I gave 0 points. If 1 or 2 of these time horizons were mentioned in the text, I gave 0.5 points. If all three were mentioned, I gave 1 (full point). I applied this separately for risk and opportunity.

Table 4.6 Decision Tree Criteria 3a

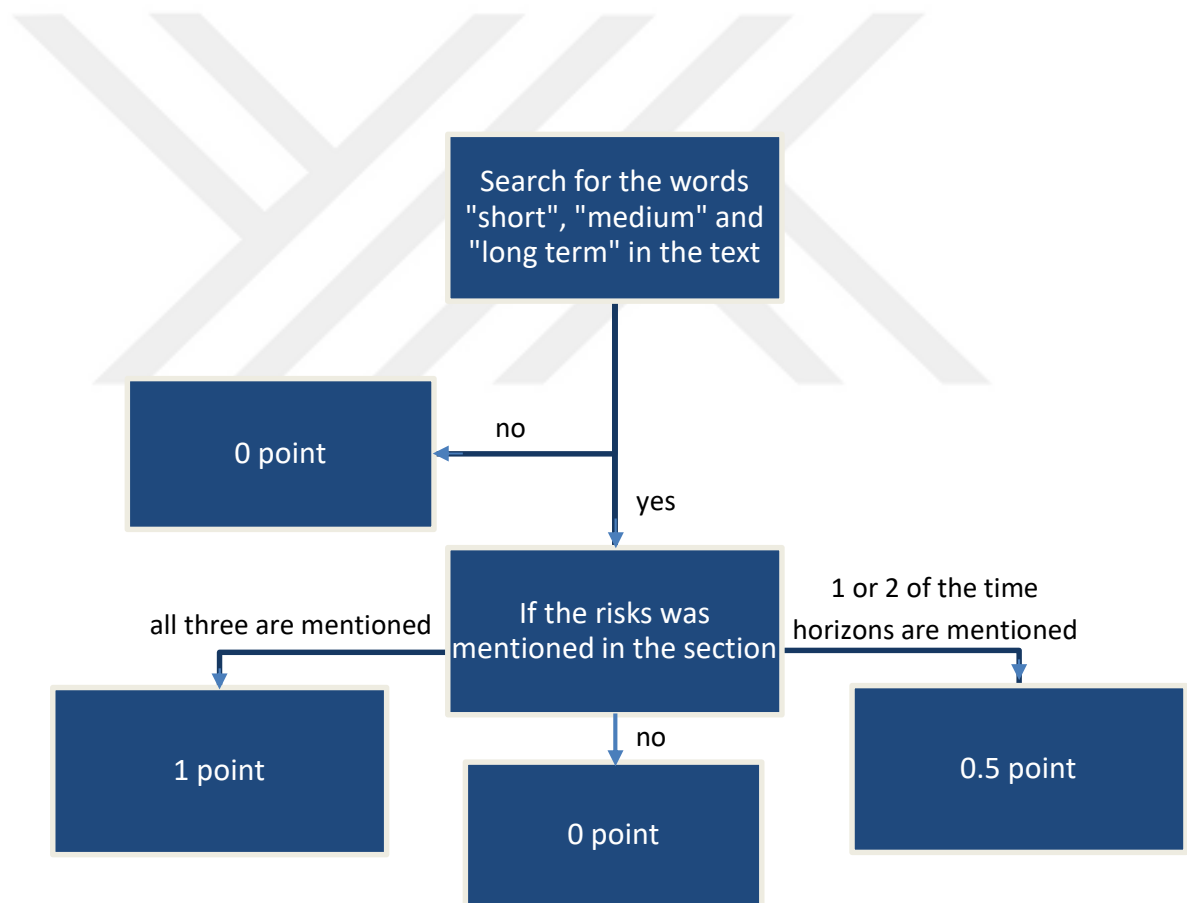
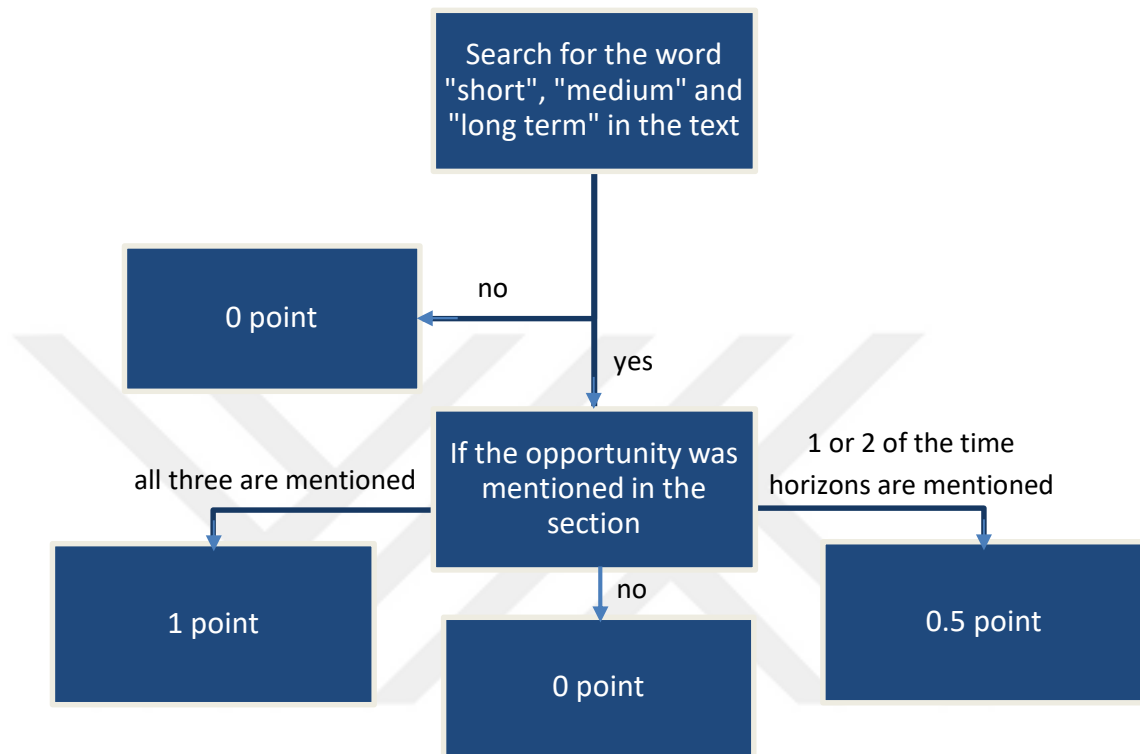
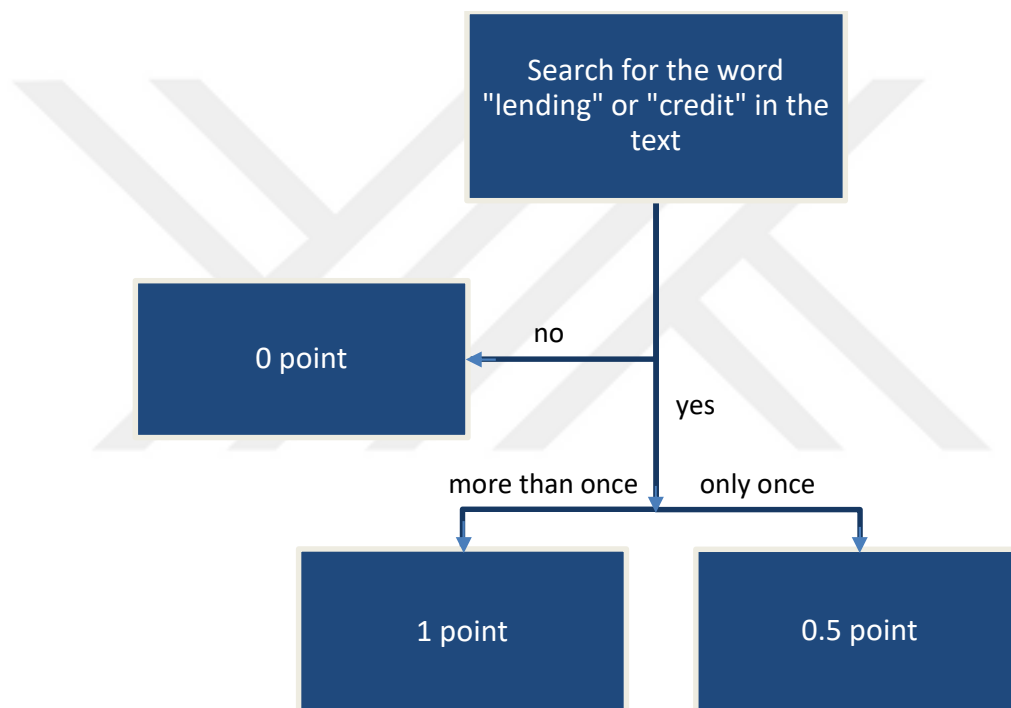


Table 4.7 Decision Tree Criteria 3b



In order to score the criterion 2.2, I searched for the words "lending" and "credit" in the text. The reason I searched for these words directly was that these texts of the banks were written only about "climate change". If the words were not mentioned at all, I gave 0 points. If the related words were mentioned once, I gave 1 point, and if they were mentioned more than once, I gave 2 (full points).

Table 4.8 Decision Tree Criteria 4



For the criterion 2.3, I searched for the words "organization's businesses", "strategy", and "financial planning" separately in the text. I checked whether the words risk and opportunities were mentioned where these words were. If only one of these three was mentioned or none of them were mentioned, I gave 0 points. If two of them were mentioned, I gave 0.5 points. If all three were mentioned, I gave 1 (full) point. I applied this separately for risk and opportunity.

Table 4.9 Decision Tree Criteria 5a

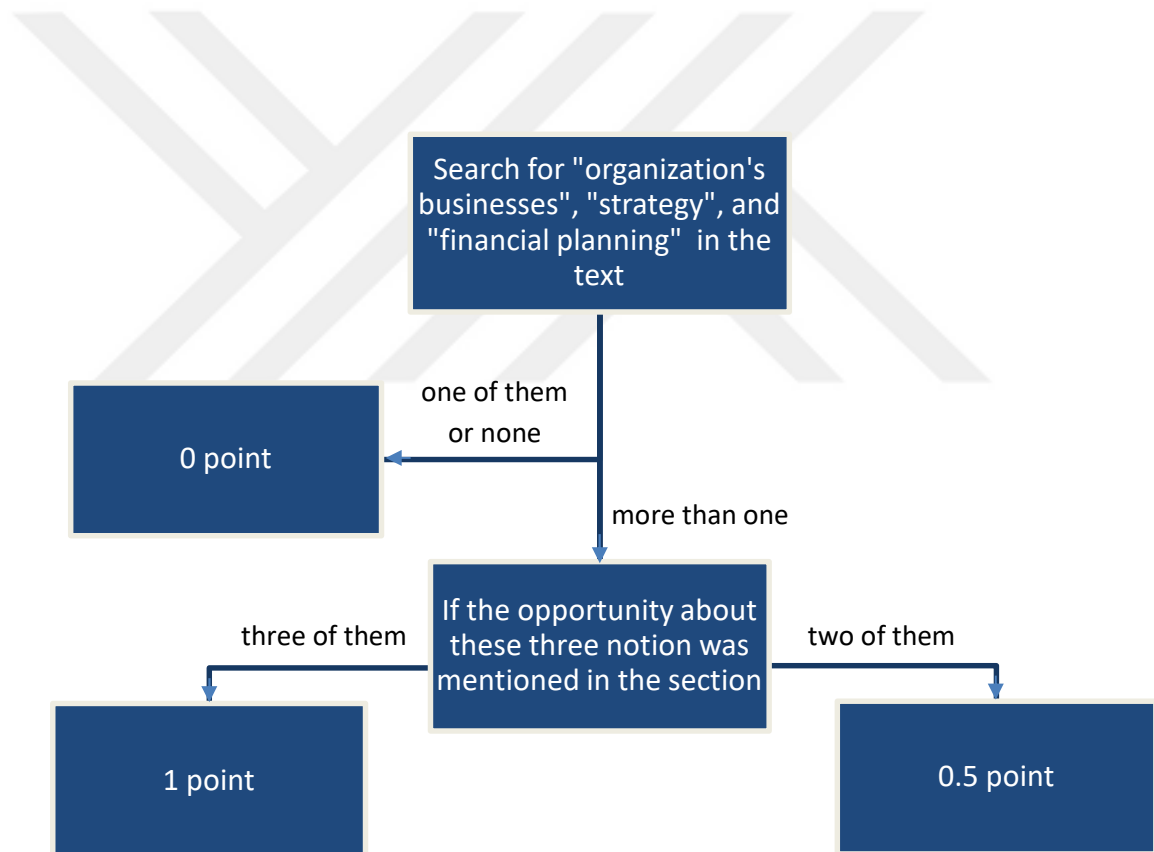
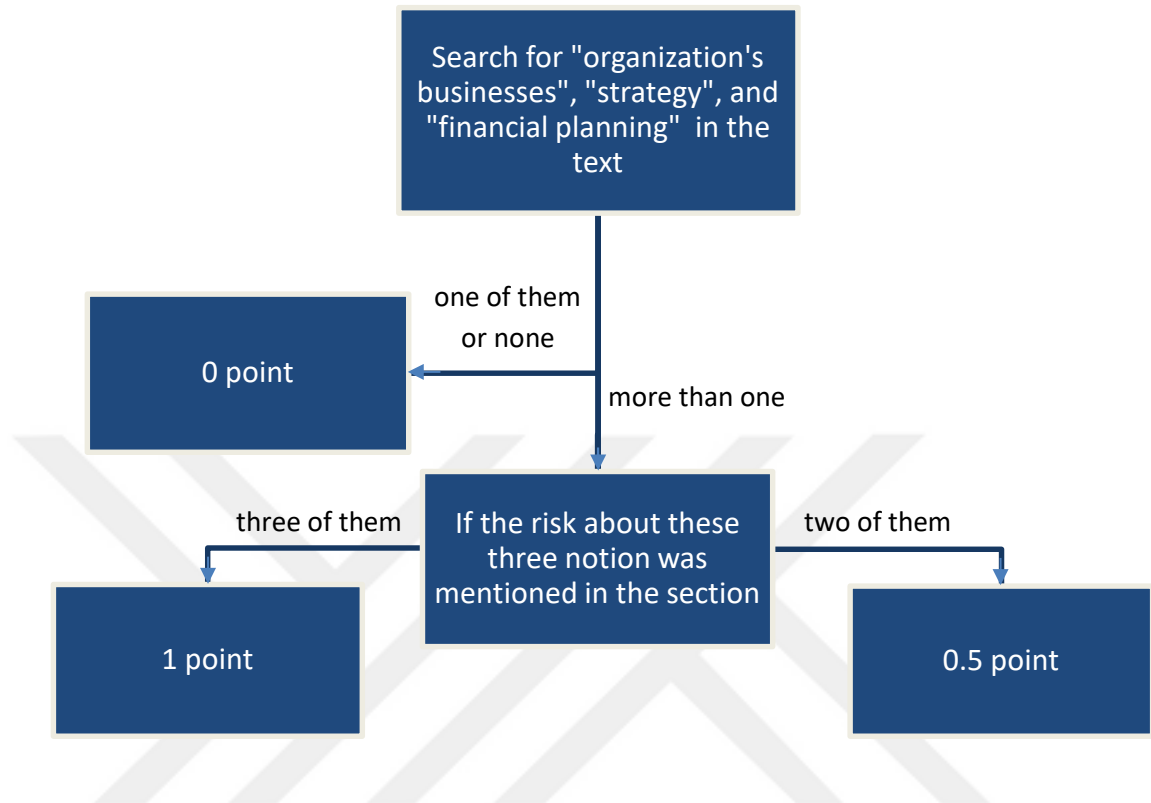
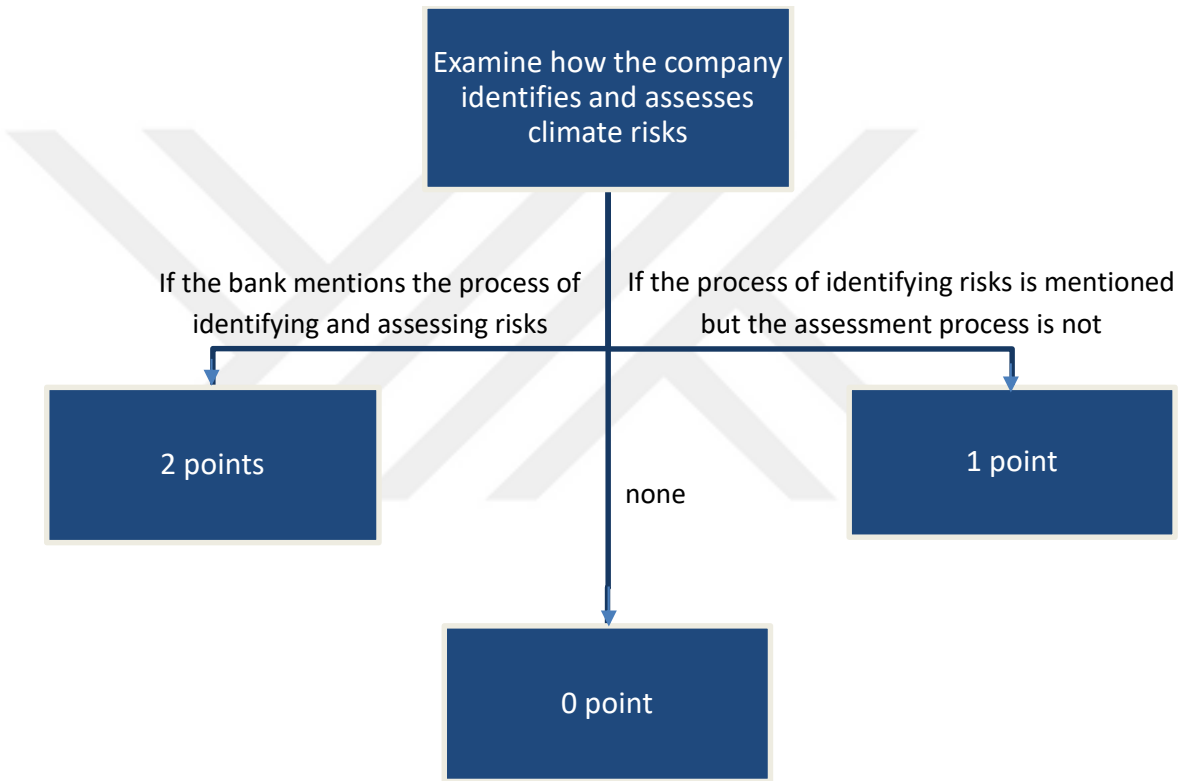


Table 4.10 Decision Tree Criteria 5b



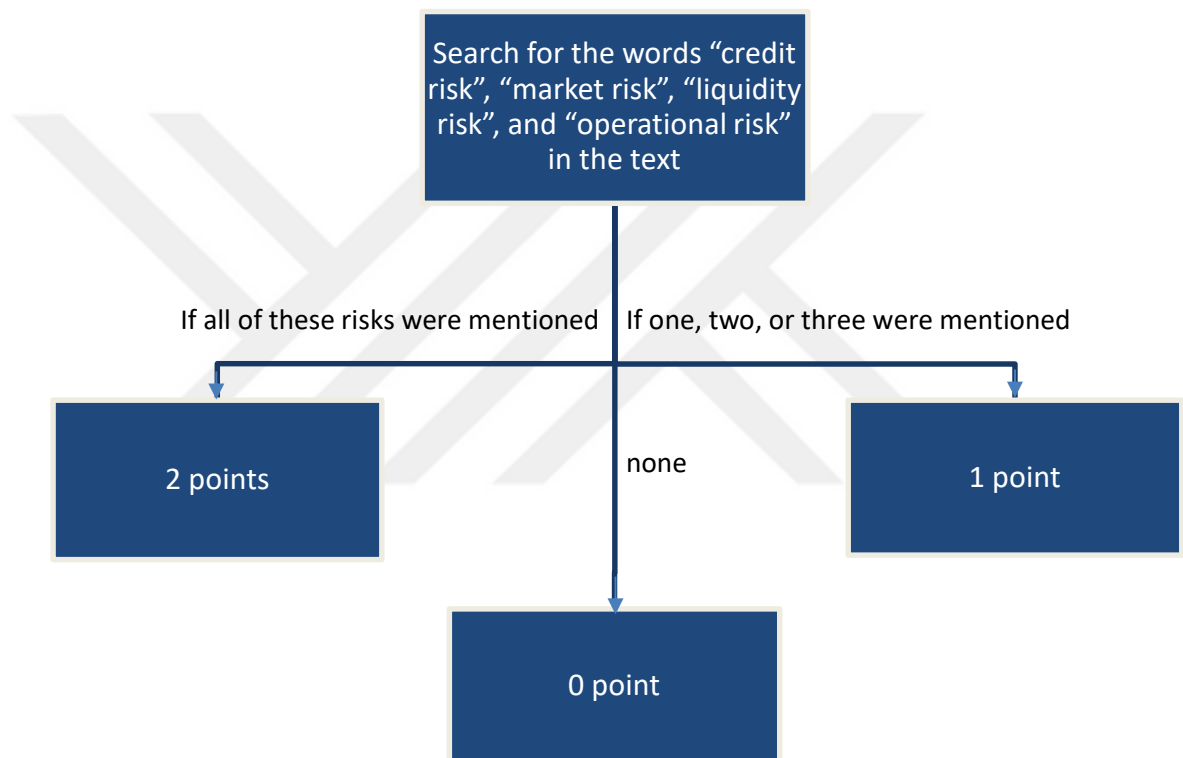
To evaluate the criterion 3.1, I examined how the company identifies and assesses climate risks. If none were mentioned, I gave 0 points. If the process of identifying risks was mentioned but the assessment process was not, I gave 1 (half) point. If the bank mentioned the process of identifying and assessing risks, I gave 2 (full) points.

Table 4.11 Decision Tree Criteria 6



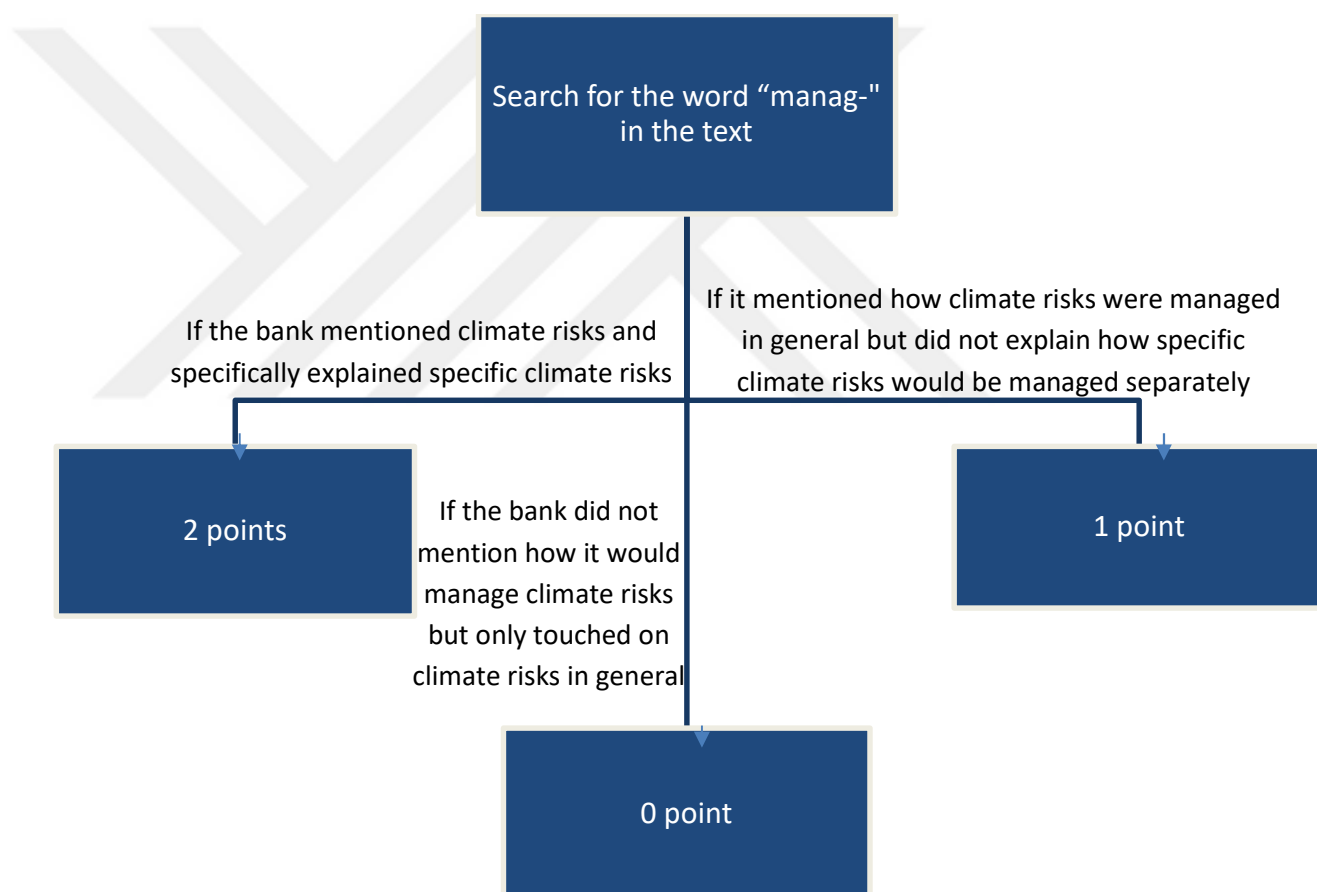
For the criterion 3.2, I searched for the words “credit risk”, “market risk”, “liquidity risk”, and “operational risk” in the text. If none were mentioned, I gave 0 points. If one, two, or three were mentioned, I gave 1 (half) point. If all of these risks were mentioned in the text, I gave 2 (full) points.

Table 4.12 Decision Tree Criteria 7



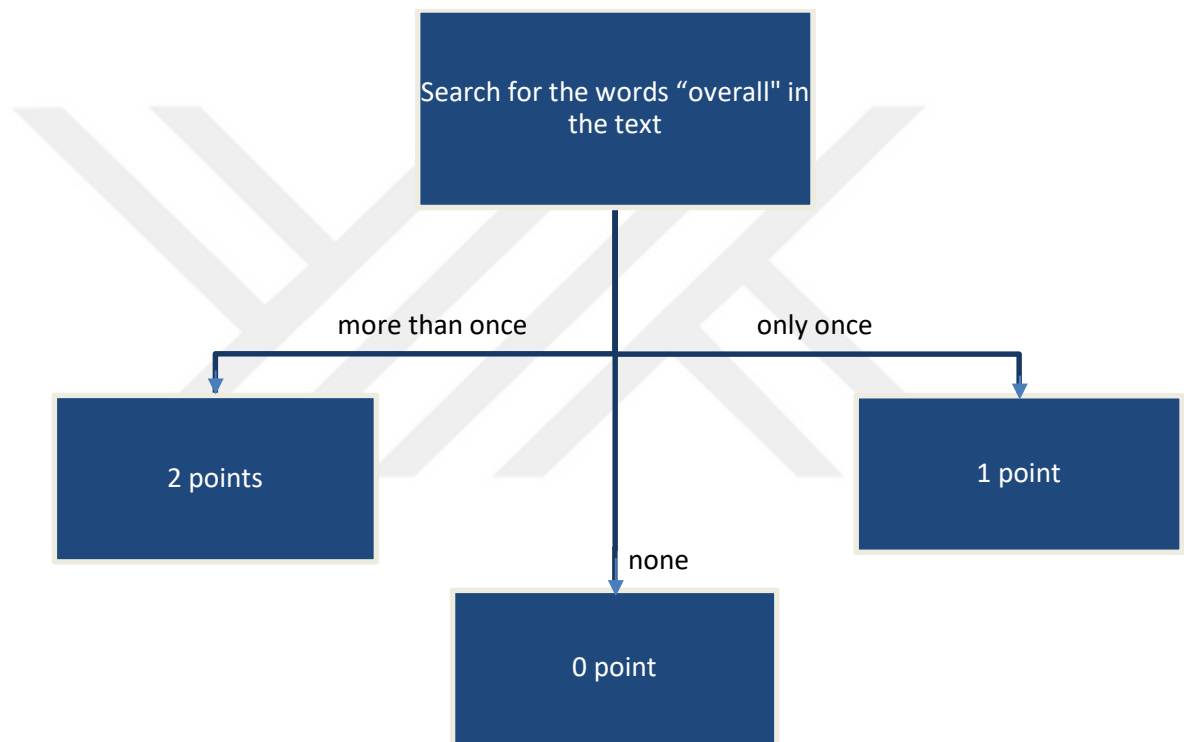
To score the criterion 3.3, I searched for the word “manag-.” If the bank did not mention how it would manage climate risks but only touched on climate risks in general, I gave 0 points. If it also mentioned how climate risks were managed in general but did not explain how specific climate risks would be managed separately, I gave 1 (half) point. If the bank mentioned climate risks and specifically explained specific climate risks, I gave 2 (full) points.

Table 4.13 Decision Tree Criteria 8



To score the criterion 3.4, the word of “overall” is searched. If it is not exist at all, I gave 0 point, and if it occurred once in the text, I gave 1 point. If it occurred more than once, I gave 2 points.

Table 4.14 Decision Tree Criteria 9



For the criterion 4.1, I first searched for the word “metric” in the text. Since there were reports about climate, I examined the words risk and opportunity where the word metric was mentioned. If it was not mentioned at all, I gave 0 points. If it was mentioned once, I gave 0.5 points. If it was mentioned more than once, I gave 1 point. I applied this separately for risk and opportunity.

Table 4.15 Decision Tree Criteria 10a

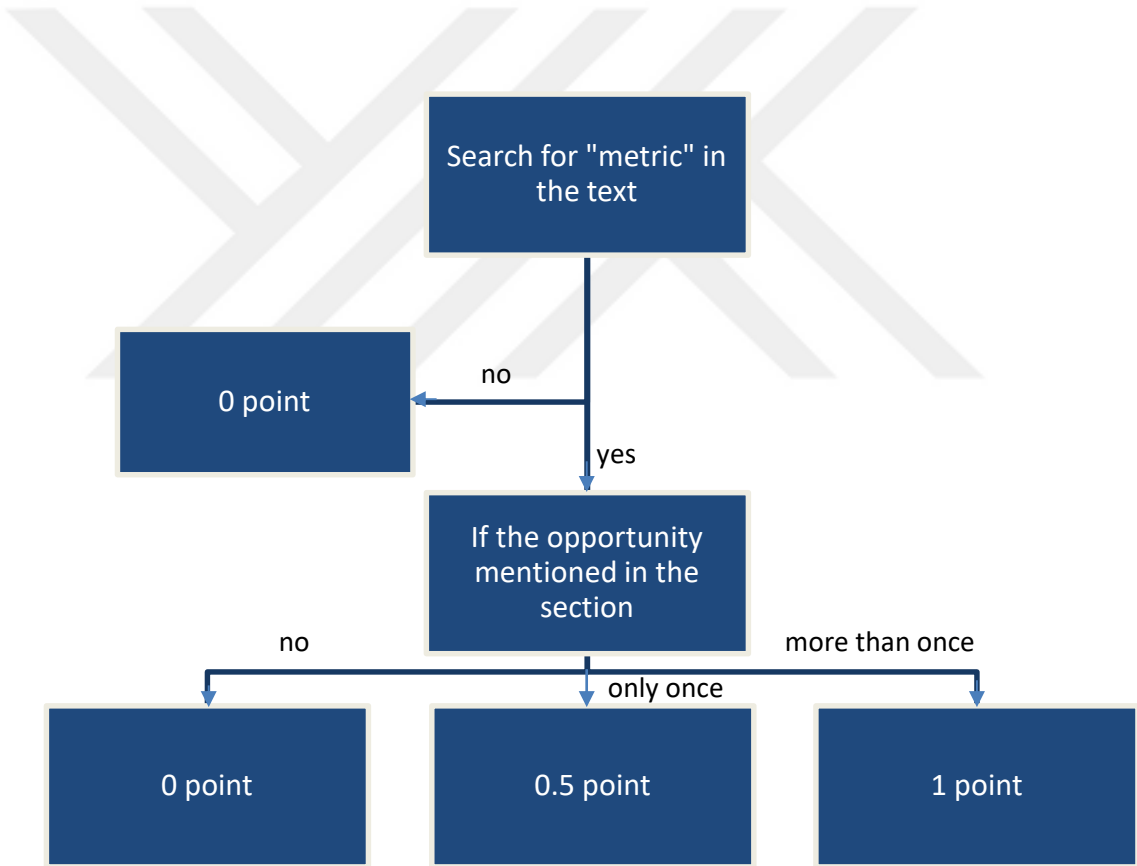
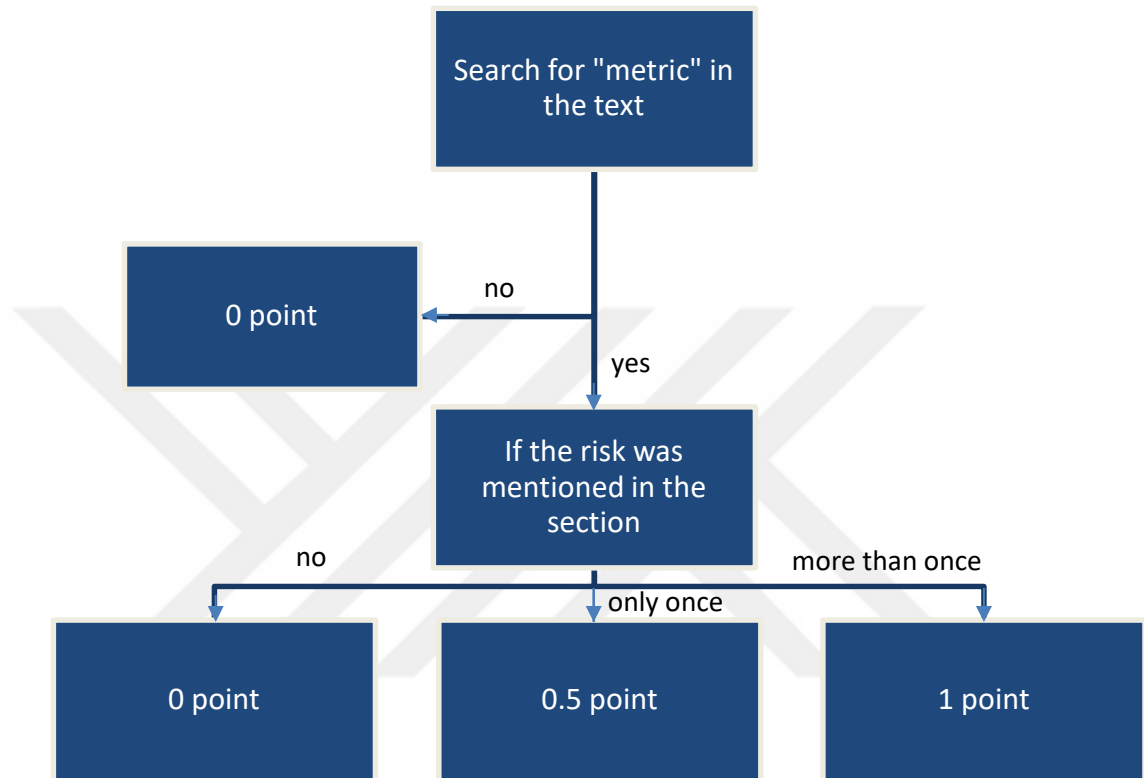
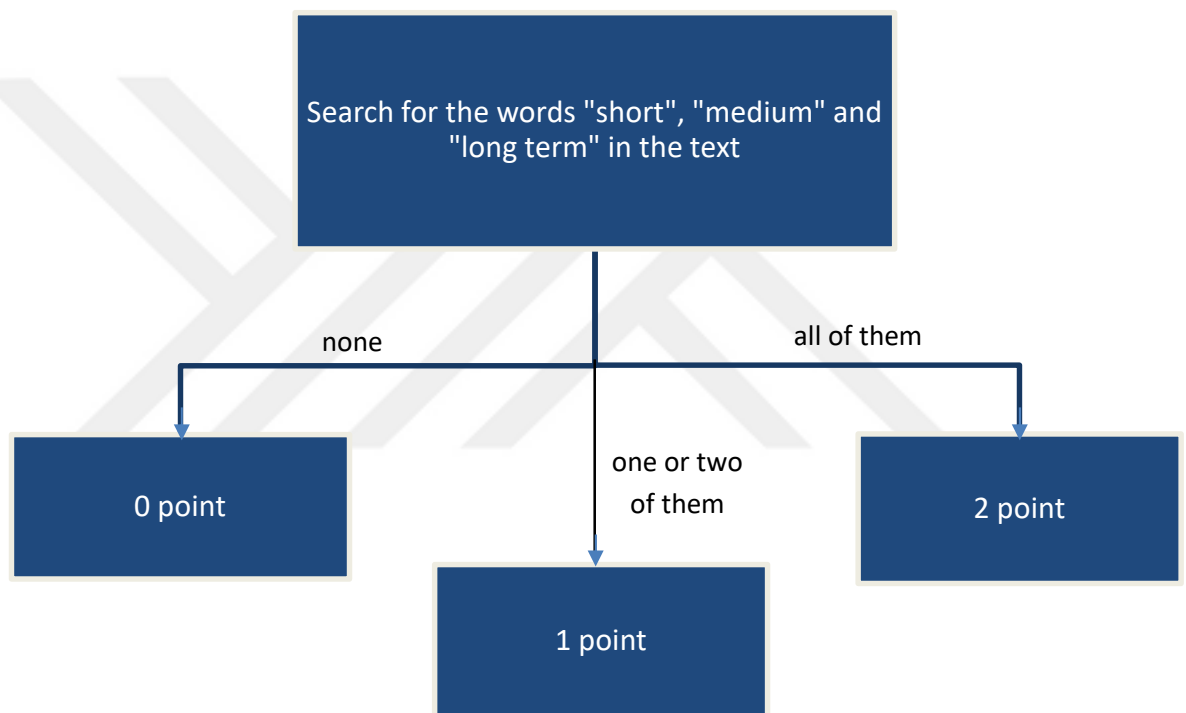


Table 4.16 Decision Tree Criteria 10b



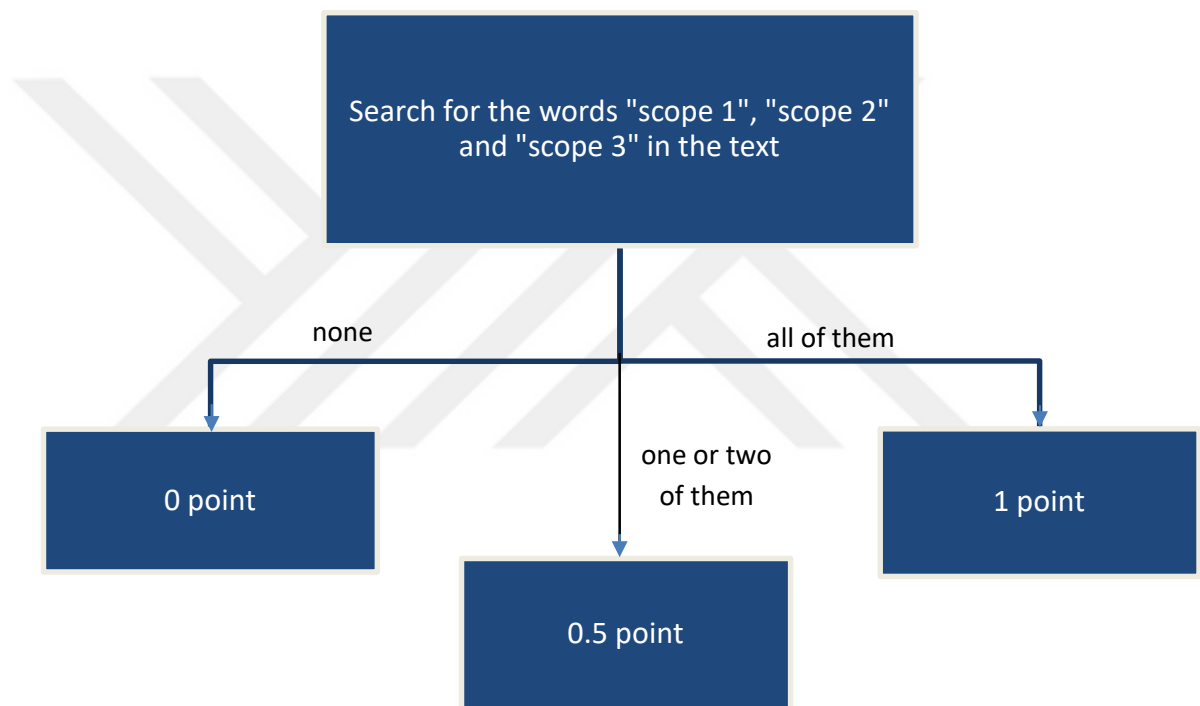
For the criterion 4.2, I searched for the words short, medium, and long term. I examined whether metrics were mentioned in these places. If it was mentioned in all of them, I gave 2 points. If it was mentioned in 1 or 2 of them, I gave 1 point. If none were mentioned, I gave 0 points.

Table 4.17 Decision Tree Criteria 11



In order to score the criterion 4.3, I searched for the words “scope 1”, “scope 2” and “scope 3” in banks’ climate change texts. If none were mentioned in the text, I gave 0 points. If one or two were mentioned, I gave 1 (half) point. If all three were mentioned, I gave 2 (full) points.

Table 4.18 Decision Tree Criteria 12



In order to score the criterion 4.4, I gave 1 (full) point if the scopes I searched for in the previous criterion were explained in terms of risk and opportunity. If one or two of the scopes were explained in this way, I gave 0.5 (half) points. If none of them were mentioned, I gave 0 points. I applied this separately for risk and opportunity.

Table 4.19 Decision Tree Criteria 13a

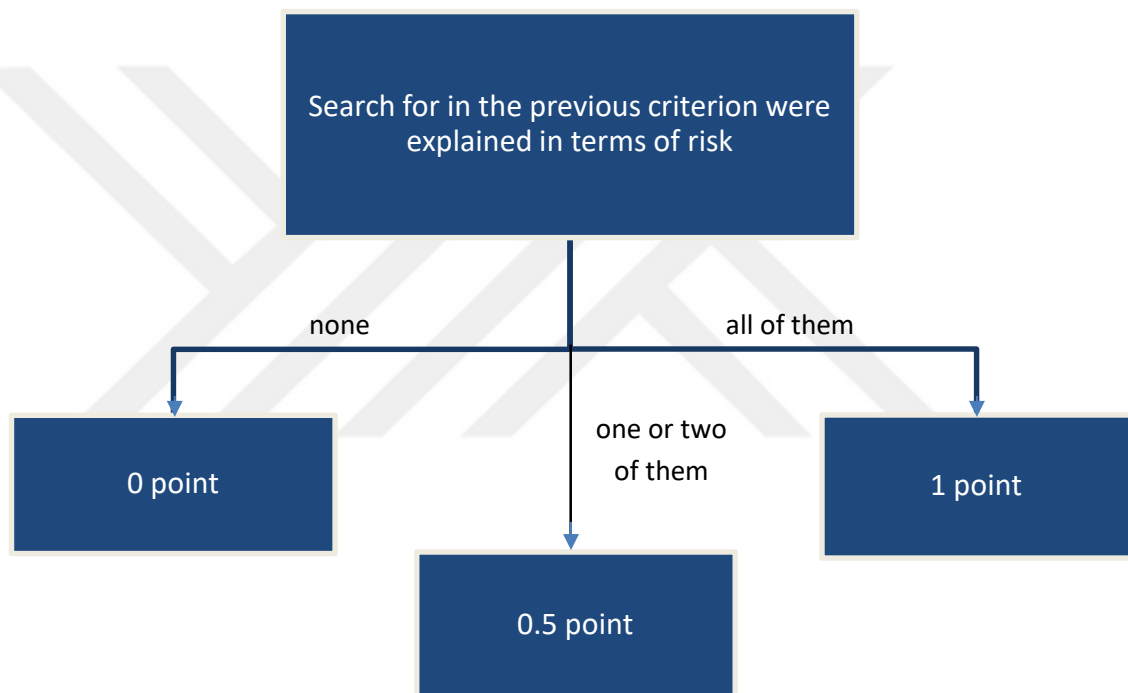
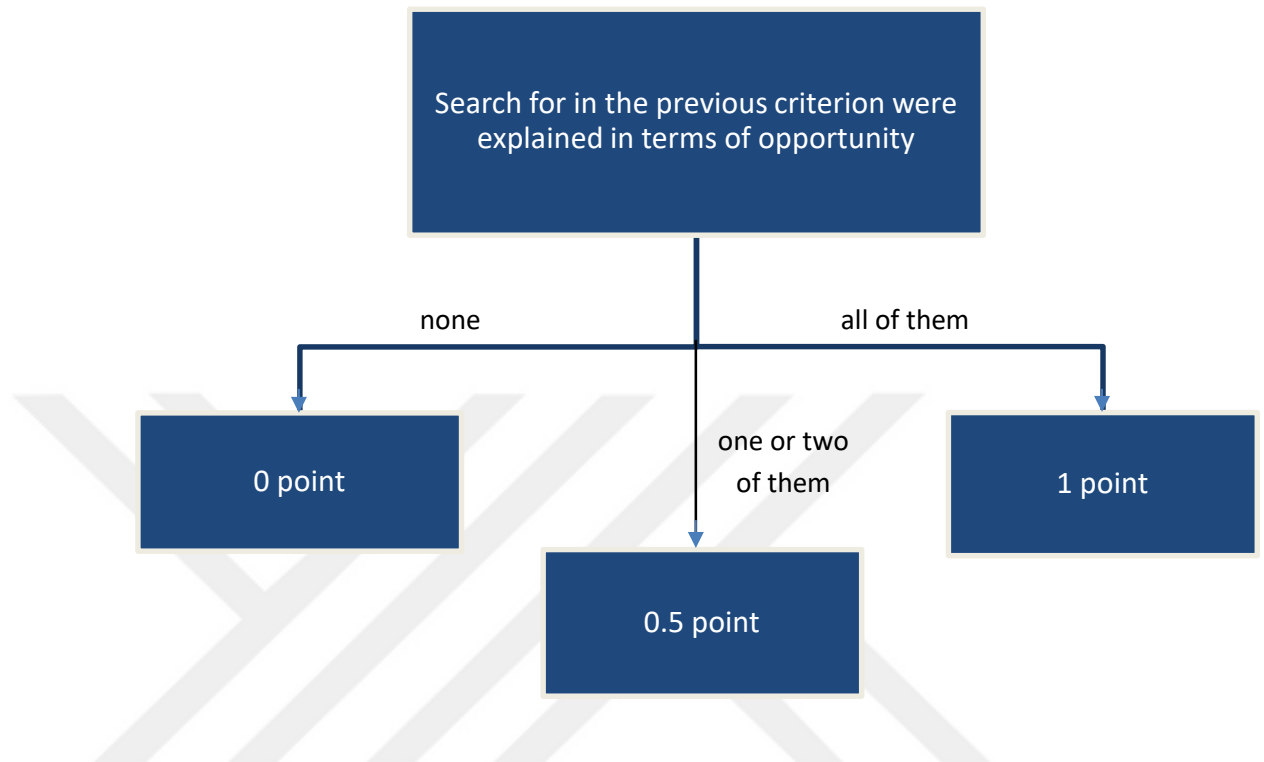


Table 4.20 Decision Tree Criteria 13b



Images are taken from QNB Finansbank's 2023 Climate Change report to illustrate the scoring. These quotes are taken in response to Criterion 3.4.

Criterion 3.4 (See Table 4.21): Finansbank received full points for this criterion because it sufficiently and clearly stated how it integrates climate-related risks into its overall risk management (See Table 4.22). Banks that do not include any responses to the criteria in their reports will not receive points for the relevant criterion.

Table 4.21 (QNB Finansbank, 2023)

Our Environmental and Social Risk Management (ESRM) tool enables the bank to proactively identify and manage exposure to E&S risks in our financing activities. Our ESRM clearly articulates exclusions, sectors deemed high risk, prohibited activities and risk categorization.

At all times, we strive to procure goods and services that have a reduced impact on the environment and our operations. We assess sustainability (environmental, social and human rights) risks in our supply chain as part of our third party risk management framework, and collaborate with our third parties to ensure compliance. Third parties are required to adhere to local laws and regulations as a minimum requirement.

Supply chain and/or value chain	Yes	We will assess sustainability risks in our supply chain as part of our third party risk management framework and collaborate with our third parties to ensure compliance. Third parties are required to adhere to relevant laws and regulations as a minimum requirement.
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(C2.2) Describe your process(es) for identifying, assessing and responding to climate-related risks and opportunities.

Value chain stage(s) covered

Direct operations
Upstream
Downstream

Risk management process

Integrated into multi-disciplinary company-wide risk management process

Frequency of assessment

Group to reduce reputational risks in its portfolio and maximise business opportunities emerging from the transition to a greener, more inclusive economy. Sustainability requirements and ESG due diligence are incorporated within our credit policy and existing credit risk management framework through the integration of our ESRM Framework. Our ESRM enables the bank to proactively identify and manage exposure to E&S risks in our financing activities. Our ESRM clearly articulates exclusions, sectors

In order to better explain the scoring, excerpts from the 2021 Climate Change Report of Halkbank of Türkiye, which received half a point, i.e. 1 point, from the same criterion, have been added. Although Halkbank mentioned in this report that it included climate change and sustainability in its overall risk management, it did not receive full points because it did not provide sufficient information on how it integrated it (See Table 4.22).

Table 4.22 (Türkiye Halk Bankası, 2021)

.2) Describe your process(es) for identifying, assessing and responding to climate-related risks and opportunities.

Value chain stage(s) covered

Direct operations
Upstream
Downstream

Risk management process

Integrated into multi-disciplinary company-wide risk management process

destruction in farmlands and hydropower plants, the possible financial and operational risks related to these sectors and regions are assessed by the sustainability committee and board of directors. The possible impact levels are decided by Risk Management Department in line with the sustainability committee. The end results are shared with other related business units and actions to be taken are discussed necessary control

in very soon future, this transition will hasten and sectors such as energy and manufacturing may face new regulations related to climate change. The opportunity and risk levels of this scenarios are evaluated in sustainability committee and the Board according to bank's risk management systems. The outcomes are shared with related business units and further actions are established.

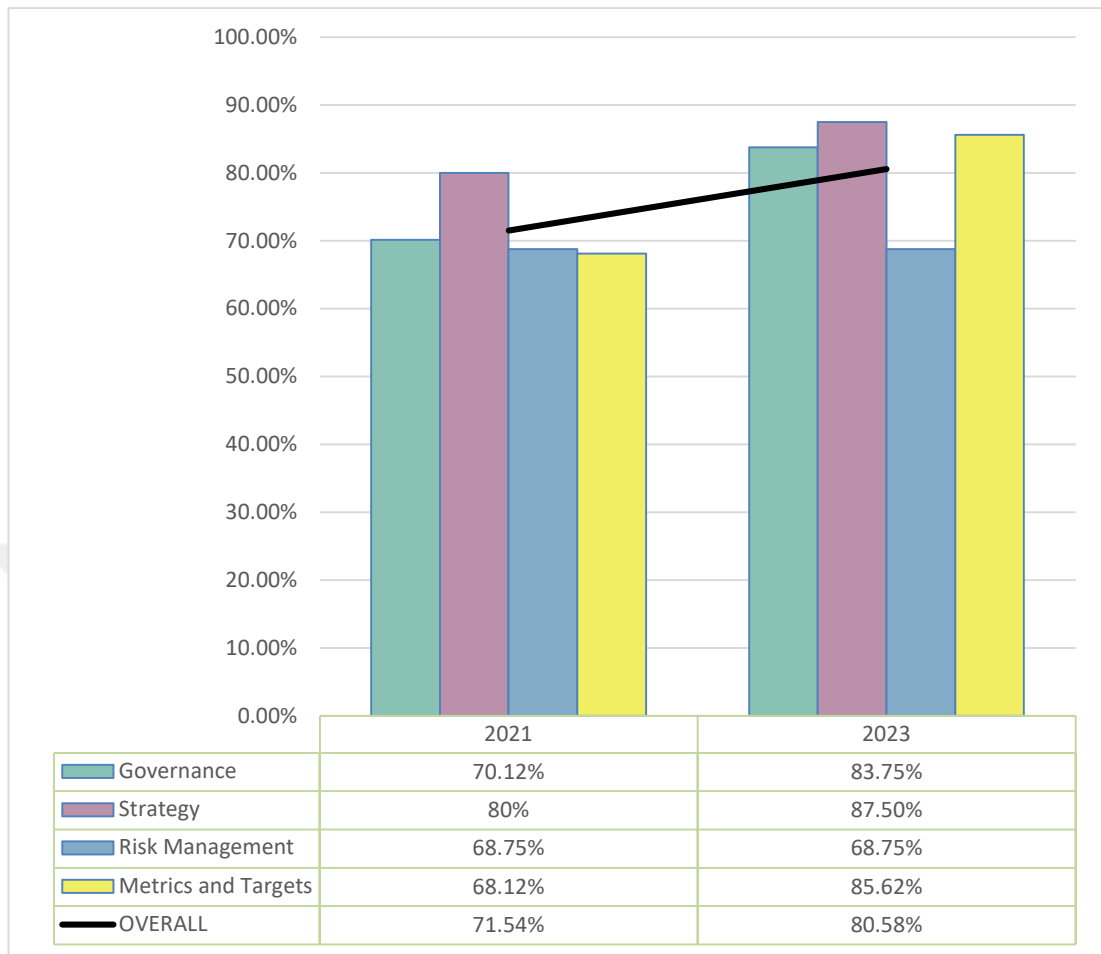


Figure 4.1 Average Reporting Quality of Each Section

As mentioned before, the 4 grouped criteria headings in the critical catalogue were examined separately (See Figure 4.1). The questions under these headings are considered as a whole. Figure 4.1 highlights that the quality of climate reporting increased by approximately 9 points from 2021 to 2023, as expected. In both years, the average score from the criteria titled "Strategy" is higher than the others. In addition, there are no change in the average score of the "Risk Management" criteria. There is an increase of approximately 13 points in the "Governance" category. On the other hand, the highest average increase is seen in the criteria in the "Metrics and Targets" category with approximately 17 points. This may be due to the recent increase in the use of metrics in this field in Türkiye, in other words, increased awareness.

CHAPTER 5

COMPARISON OF TCFD AND CDP SCORES

One of the important reasons why these 10 banks were selected in Türkiye is that they were scored by CDP. The relationship and correlation between CDP scores and their own TCFD scores were examined. CDP performed the scoring with letter grades. These letter grades were first converted to numerical values out of 4 in order to examine the correlation (See Table 5.1). As a result of the examination, a positive and strong correlation was determined between them. This may be an indication that the scoring is successful. Scatter graphs were created separately and together for both years (See Figure 5.1). The positive relationship is clearly seen in the graphs.

Table 5.1 CDP Letter Scores and Their Equivalents in the 4-point System

	2021			2023		
	TCFD disclosure scores	CDP num	CDP letter	TCFD disclosure scores	CDP num	CDP letter
QNB Finansbank	16.5	2	C	24	4	A
Halkbank	22	3	B	23	3.7	A-
Akbank	19.5	2.7	B-	20.5	3	B
Yapı Kredi	20.5	3	B	24	4	A
Albaraka	19	2.7	B-	19	2.7	B-
Türkiye İş Bankası	20	3	B	25	4	A
Türkiye Vakıflar Bankası	20.5	3	B	24	4	A
Garanti Bankası	20	3	B	20.5	3	B
Şekerbank	22	3	B	24	4	A
ICBC Turkey Bank	6	0.7	D-	5.5		

In this regression below (5.1), the value of 14.67 represents the t-statistic. This value tests the significance of the relationship between CDP and TCFD, and the larger the T-statistic, the more likely this relationship is to be significant. Here, a high t-value of 14.67 and the corresponding p-value (0.000) indicates that the relationship between CDP and TCFD is very strong and highly statistically significant.

$$TCFD = 5.36 + 4.92 \times CDP \quad (5.1)$$

(5.03) (14.67)

t-values are in parentheses

Figure 5.1 Scatter graphs of TCFD and CDP (2021)

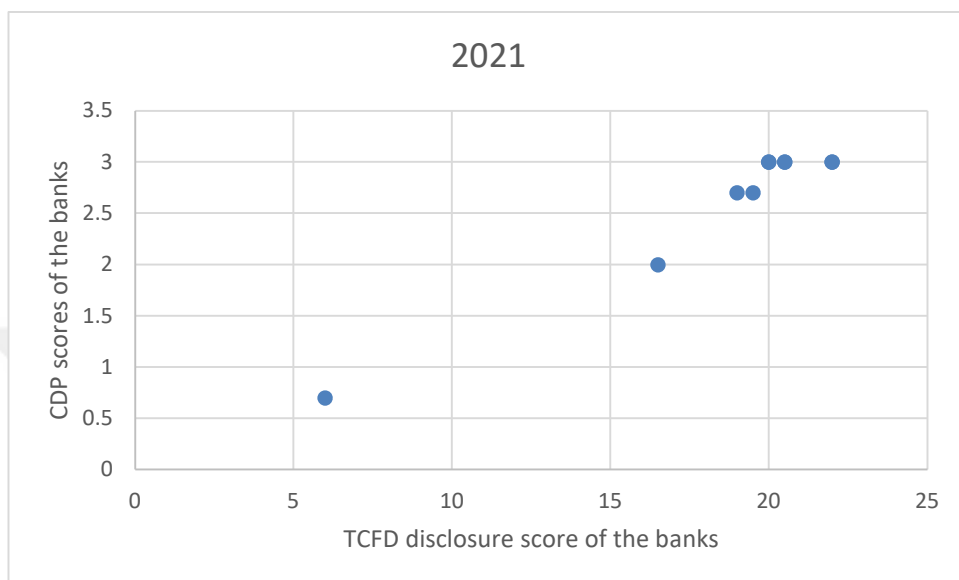


Figure 5.2 Scatter graphs of TCFD and CDP (2023)

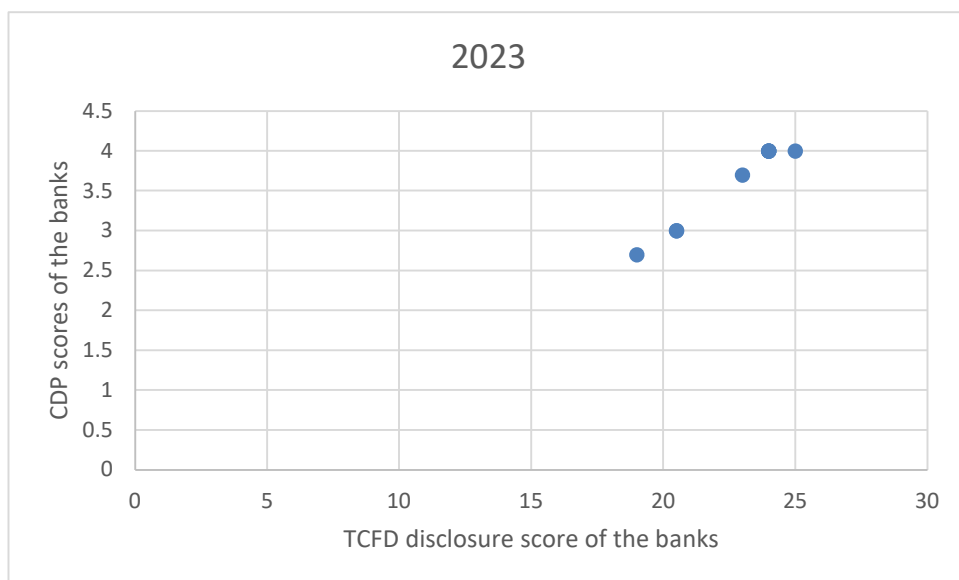
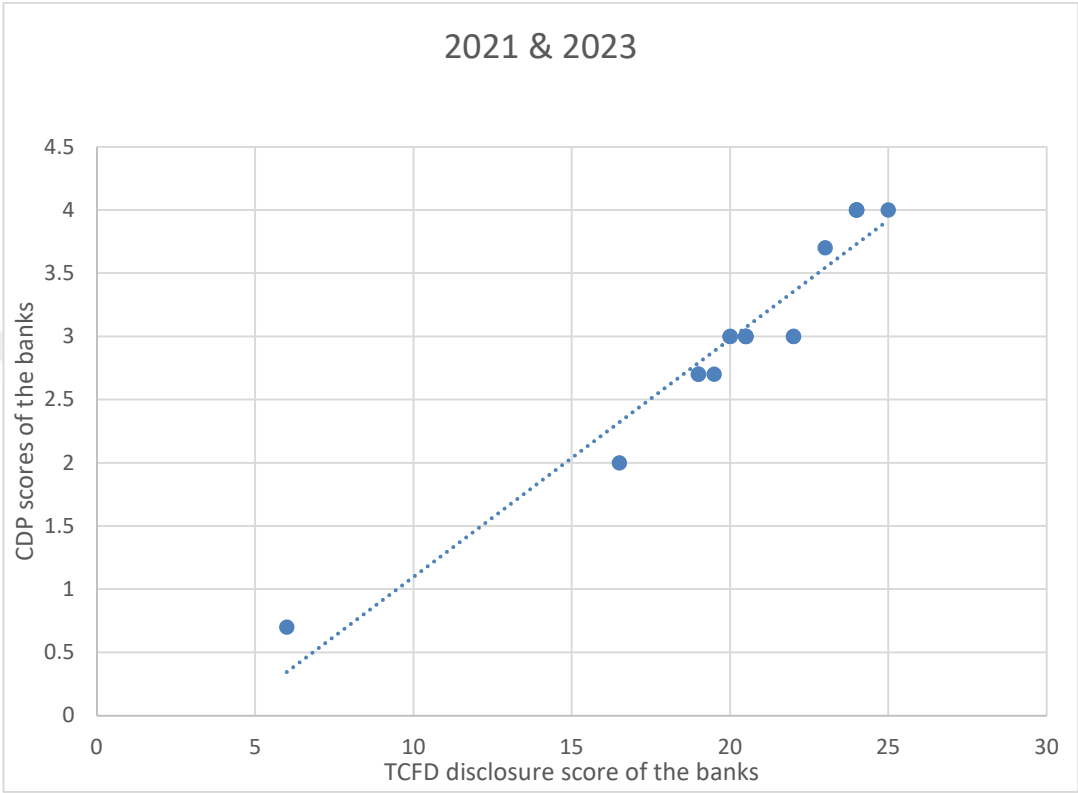


Figure 5.3 Scatter graphs of TCFD and CDP (pooled data)



CHAPTER 6

FINANCIAL PERFORMANCE INDICATORS AND TCFD

It was analyzed whether the sensitivity of banks to climate change affected the financial situation of the banks. The "return on equity" and "return on assets" of the banks in 2021 and 2023 were used for the analysis (See Table 6.1).

Return on assets shows how much of each money invested in the business will be returned as profit, for example, the cash provided to the business is compared to the profit made in that year when the facilities, equipment, etc. were purchased. In other words, it is an indicator of how effectively the company uses its assets to generate profit (Blanding, 2016).

$$\frac{\text{net profit}}{\text{total assets}} = \text{return on assets}$$

Return on equity is a similar concept. It shows how much profit each money invested in the company provides to the equity (Blanding, 2016).

$$\frac{\text{net profit}}{\text{shareholder's equity}} = \text{return on equity}$$

Table 6.1 Return on Equity and Return on Assets of the Banks (Türkiye Bankalar Birliği, 2021), (Türkiye Bankalar Birliği, 2023) (Halk Yatırım Menkul Kıymetler A.Ş., 2021)

	2021		2023	
	Return on Equity	Return on Assets	Return on Equity	Return on Assets
QNB Finansbank	18.7	1.4	52.7	4.1
Halkbank	3.6	0.2	8.3	0.5
Akbank	17.5	2.2	36.7	4.4
Yapı Kredi	18.9	1.8	44.5	4.7
Albaraka	4.19	0.2	33.4	1.9
Türkiye İş Bankası	18	1.8	32.3	3.6
TÜRKİYE VAKIFLAR BANKASI T.A.O	8.5	0.5	16.6	1.1
T.GARANTİ BANKASI A.Ş.	18.6	2.2	42.6	5.3
ŞEKERBANK T.A.Ş.	9.3	0.6	38.5	3.4
ICBC TURKEY BANK A.Ş.	8	0.4	30.9	1.5

In the regression model below (6.1), the value of 0.902 represents the t-statistic of TCFD. However, since the t-statistic of 0.902 is below the significance limit, it is concluded that this coefficient is not statistically significant. The t-statistic of 0.902 and the corresponding p-value of 0.379 indicate that the coefficients are not statistically significant. TCFD has no effect on the return on equity of banks.

$$ROE = 11.571 + 0.582 \times TCFD \quad (6.1)$$

(0.877) (0.902)

t-values are in parentheses

Figure 6.1 Scatter Diagrams of Return on Equity and TCFD Disclosure Scores (2021)

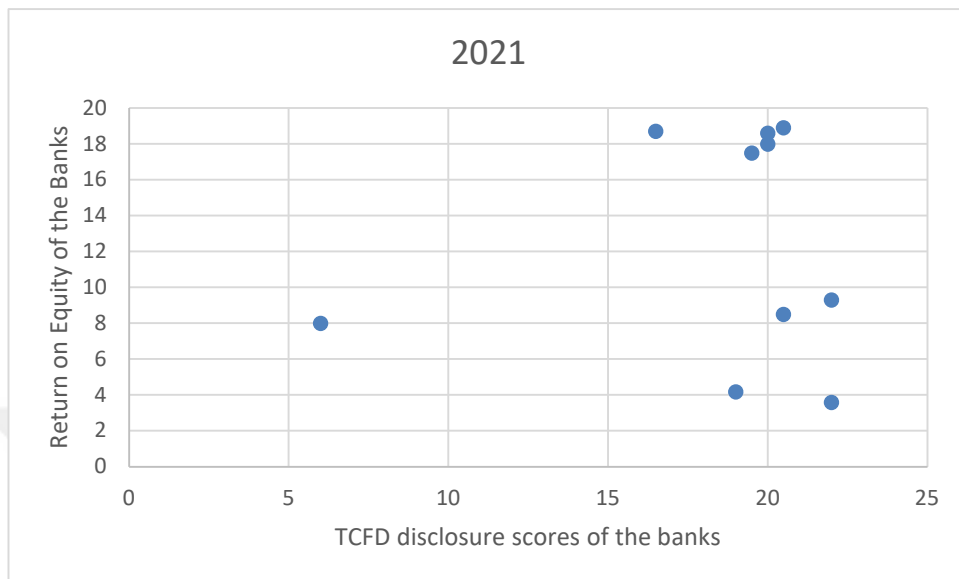
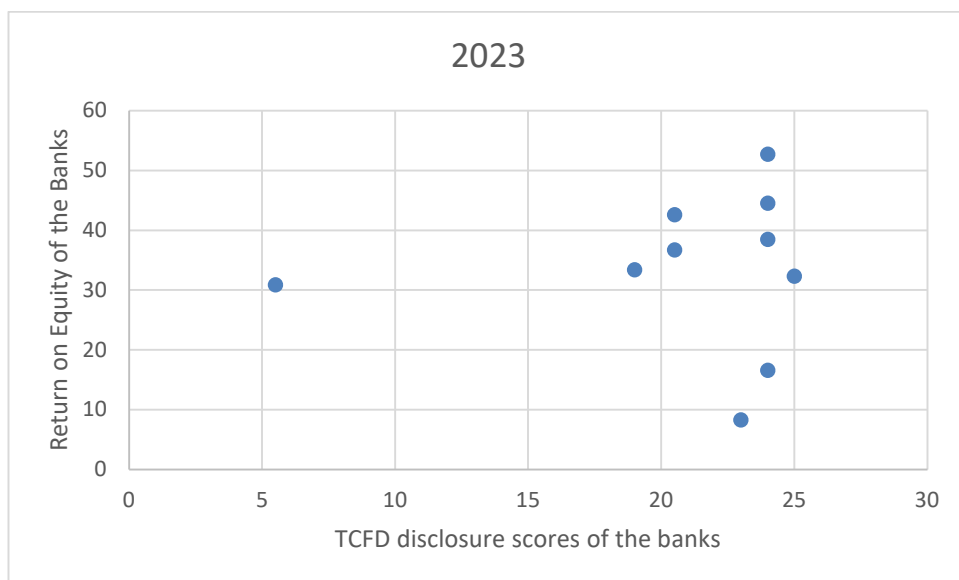


Figure 6.2 Scatter Diagrams of Return on Equity and TCFD Disclosure Scores (2023)



In the regression analysis below (6.2), the coefficient of TCFD on ROA is 0.103, but this result is not statistically significant enough. According to the results, although TCFD has a positive effect on ROA, this effect may have occurred by chance. In other words, other variables may have also been effective. 1.51 is the t-statistic of the coefficient showing the effect of the TCFD variable on return on assets. Since the P value is 0.149, TCFD does not have a significant effect on ROA.

$$ROA = 0.0531 + 0.103 \times TCFD \quad (6.2)$$

(0.038) (1.508)

t-values are in parentheses

Figure 6.3 Scatter Diagrams of Return on Assets and TCFD Disclosure Scores (2021)

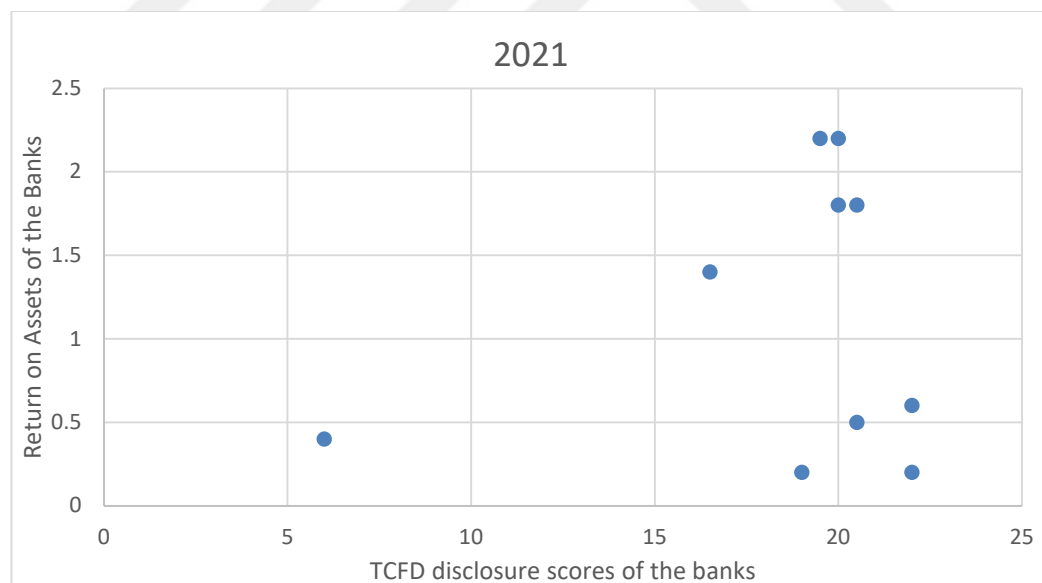


Figure 6.4 Scatter Diagrams of Return on Assets and TCFD Disclosure Scores (2023)

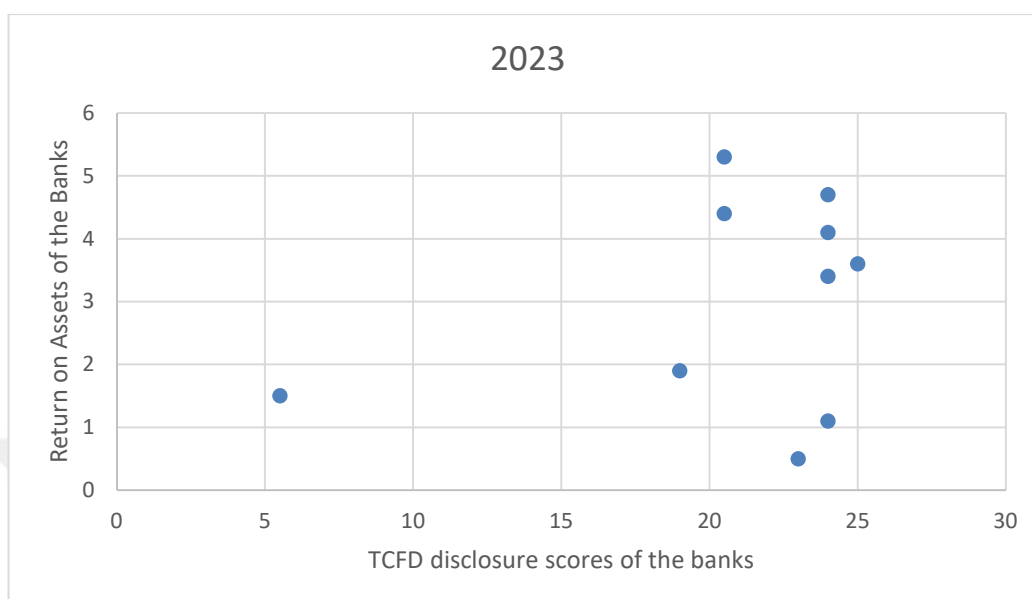


Figure 6.5 Scatter Diagrams of Return on Assets and TCFD Disclosure Scores (pooled data)

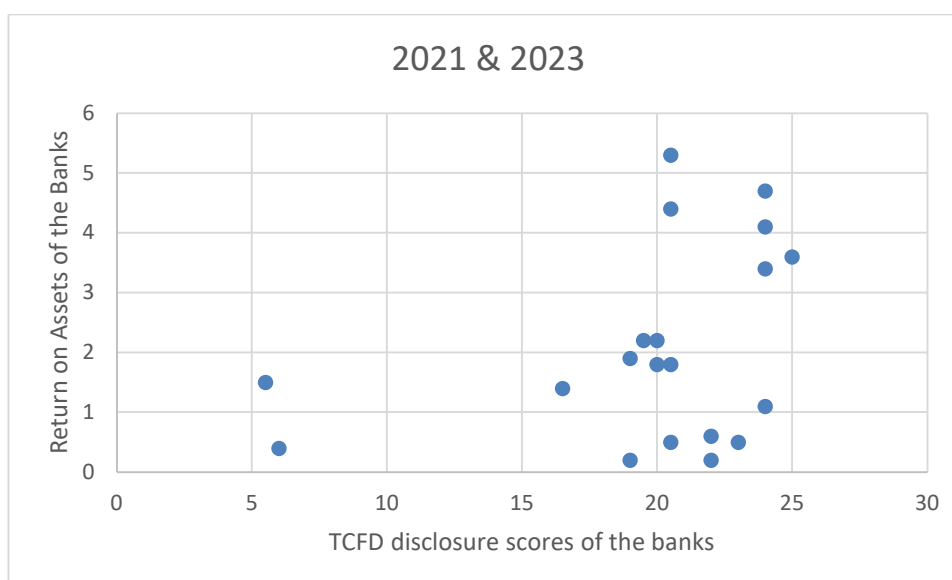
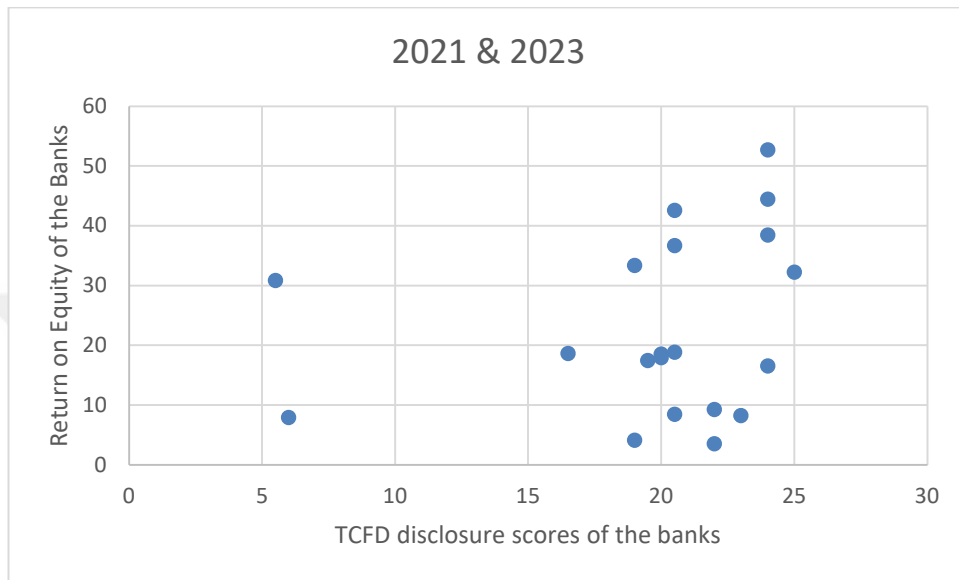


Figure 6.6 Scatter Diagrams of Return on Equity and TCFD Disclosure Scores (pooled data)



Although there is a positive relationship between the mentioned financial indicators and TCFD Disclosure Score, it is not significant enough. In other words, it can be concluded that there is no direct relationship between this scoring and financial indicators.

In order to make a comparison, regression analysis was conducted with 10 banks that report CDP and 22 banks that do not report CDP.

$$ROA = 4.116 - 2.026 \times CDP_Reporting \quad (6.3)$$

(8.241) (-2.286)

$$ROE = 21.82 + 1.27 \times CDP_Reporting \quad (6.4)$$

(9.695) (0.318)

t-values are in parentheses

The p-value of the CDP_Reporting variable (0.0258) is significant at the 5% level of significance. This indicates that CDP reporting has a statistically significant negative effect on return on assets (ROA). It can be said that the ROA values of banks that report CDP are lower on average than those that do not. The p-value of the constant term is close to zero and significant.

The p-value (0.7519) of the CDP_Reporting variable is not statistically significant at 5% significance level, indicating that CDP reporting has no significant impact on return on equity (ROE).

These results show that CDP reporting has a negative and significant effect on ROA, but not on ROE. This can be concluded that CDP reporting by banks may reduce asset returns, but does not affect equity returns.

$$ROE_{2021} = 13.959 - 1.43 \times CDP_Reporting \quad (6.5)$$

(8.85) (-0.507)

$$ROE_{2023} = 30.057 + 3.59 \times CDP_Reporting \quad (6.6)$$

(9.109) (0.618)

$$ROA_{2021} = 3.05 - 1.92 \times CDP_Reporting \quad (6.7)$$

(4.926) (-1.733)

$$ROA_{2023} = 5.233 - 2.183 \times CDP_Reporting \quad (6.8)$$

(7.091) (-1.68)

t-values are in parentheses

The coefficient of the CDP_Reporting variable is negative (-1.43) and the t-statistic is -0.507. This t-statistic indicates that CDP reporting does not have a statistically significant effect on ROE (2021). In addition, CDP reporting does not appear to have a significant decreasing effect on the ROE in 2021.

The coefficient of the CDP_Reporting variable for 2023 ROE is positive (3.59) but the t-statistic is 0.618. This low t-statistic again indicates that CDP reporting does not have a statistically significant effect on the ROE in 2023.

In other words, although CDP reporting has a negative effect on ROE in the short term, it has a positive effect over a longer period of time, although it is not significant.

The coefficient of the CDP_Reporting variable for the ROA 2021 regression is -1.92 and negative. This coefficient means that the average return on assets (ROA) of banks reporting CDP in 2021 is lower than those not reporting. However, the t-statistic is at the limit of significance with -1.733 and is not significant enough. Although CDP reporting seems to have a negative effect on ROA, it can be concluded that this effect does not provide a statistically definite result.

In the other regression, the coefficient of the CDP_Reporting variable is -2.183 and is a negative value. This indicates that the average return on assets (ROA) of banks reporting CDP in 2023 is lower than those not reporting. However, the t-statistic is -1.68, which is again not considered significant at the 5% level of significance. It can be concluded that CDP reporting does not have a statistically significant effect on ROA.

CHAPTER 7

CONCLUDING REMARKS

In this study, firstly, information about the historical progress, current state and the importance of sustainability reporting standards is presented. Although these reports are being published by large companies in developed countries, sustainability reporting on climate change is rather new in the banking sector. Thanks to the scoring of these reports by independent experts, banks are encouraged to publish high quality sustainability reports systematically and investors can make more informed decisions. Realizing this importance, we conducted the first study that score banks in Türkiye according to TCFD criteria. The TCFD disclosure scoring criteria is used in Friedrich et al. (2022).

In this thesis, the 2021 and 2023 Climate Change reports published by 10 banks on their websites are evaluated according to the TCFD criteria. Our TCFD scores are then compared with the scores previously given by CDP for the same banks, for the same years. We find a high correlation between our TCFD scores and the CDP scores. As a result of this comparison, we conclude that CDP scores are calculated with a similar approach to TCFD.

The relationship between the obtained data and the banks' financial indicators "return on equity", and "return on asset" data is also examined in the thesis. Although there is a positive correlation between the financial performance indicators and the calculated TCFD scores, they are not statistically significant. Therefore, it can be concluded that the sustainability scores of banks in Türkiye regarding climate change do not yet have a pronounced effect on their financial performance according to the recent data. This conclusion may have been reached due to the low number of data points available for Turkish banks. Banks in Türkiye have been systematically reporting and publishing climate change for a short time. Although some banks have started publishing these reports rather recently, most of them are sufficiently aware of the importance of these reports. If more banks report on their sustainability performance over time, future studies on this subject may provide stronger evidence.

Our study is a starting point for scoring the sustainability awareness of banks in Türkiye regarding climate change according to the TCFD criteria. We believe that sustainability reporting for the banking sector will become an essential part of climate action both in Türkiye and globally in the coming years.



REFERENCES

- Allen, M. R., Friedlingstein, P., Girardin, C. A. J., Jenkins, S., Malhi, Y., Mitchell-Larson, E., Peters, G. P., & Rajamani, L. (2022). *Net zero: Science, origins, and implications*. *Annual Review of Environment and Resources*, 47(1), 849–887. <https://doi.org/10.1146/annurev-environ-112320-105050>
- Andrew, J., & Cortese, C. L. (2011). *Carbon disclosures: Comparability, the carbon disclosure project and the greenhouse gas protocol*. *Australasian Accounting, Business and Finance Journal*, 5(4), 5–18.
- Apergis, N., Poufinas, T., and Antonopoulos, A. (2022). *ESG Scores and Cost of Debt*. *Energy Economics*, 112, 106186.
- Armstrong McKay, D. I., Staal, A., Abrams, J. F., ..., and Lenton, T. M. (2022). *Exceeding 1.5°C Global Warming Could Trigger Multiple Climate Tipping Points*. *Science*, 377(6611), eabn7950, 11 pages.
- Avramov, D., Cheng, S., Lioui, A., and Tarelli, A. (2022). *Sustainable Investing with ESG Rating Uncertainty*. *Journal of Financial Economics*, 145(2), pp. 642-664.
- Bansal, P., & Roth, K. (2000). Why companies go green: A model of ecological responsiveness. *Academy of Management Journal*, 43(4), 717–736. <https://doi.org/10.5465/1556363>
- Becker, M. G., Martin, F., and Walter, A. (2022). *The Power of ESG Transparency: The Effect of the New SFDR Sustainability Labels on Mutual Funds and Individual Investors*. *Finance Research Letters*, 47 (Part B), 102708.
- Bellora, C., & Fontagné, L. (2023). *EU in search of a carbon border adjustment mechanism*. *Energy Economics*, 123, 106673. <https://doi.org/10.1016/j.eneco.2023.106673>
- Ben Slimane, M., Brard, E., Le Guenedal, T., Roncalli, T., and Sekine, T. (2019). *ESG Investing in Fixed Income: It's Time to Cross the Rubicon*. SSRN, 3683477.
- Ben Slimane, M., Da Fonseca, D., and Mahtani, V. (2020). *Facts and Fantasies about the Green Bond Premium*. ResearchGate, 348650560.

- Ben Slimane, M., Lucius, D., Roncalli, T., and Xu, J. (2023). *Net Zero Investment Portfolios— Part 2. The Core-Satellite Approach*. SSRN, 4611418.
- Berg, F., Kölbel, J. F., and Rigobon, R. (2022). *Aggregate Confusion: The Divergence of ESG Ratings*. *Review of Finance*, 26(6), pp. 1315-1344.
- Billio, M., Costola, M., Hristova, I., Latino, C., and Pelizzon, L. (2021). *Inside the ESG Ratings: (Dis)agreement and Performance*. *Corporate Social Responsibility and Environmental Management*, 28(5), pp. 1426-1445.
- Blanding, M. (2016, April 4). *A refresher on return on assets and return on equity*. *Harvard Business Review*. Retrieved August 23, 2024, from <https://hbr.org/2016/04/a-refresher-on-return-on-assets-and-return-on-equity>
- Boffo, R., and Patalano, R. (2020). *ESG Investing: Practices, Progress and Challenges*. Report, OECD Paris.
- Bölgesel Çevre Merkezi REC Türkiye. (2015). *COP21 Paris Güncesi: Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi 21. Taraflar Konferansı*, 30 Kasım 2015 – 11 Aralık 2015, Paris, Fransa.
- Calice, P., Diaz Kalan, F., Dunz, N., & Miguel, F. (2023). *Biodiversity and finance: A preliminary assessment of physical risks for the banking sector in emerging markets* (Policy Research Working Paper No. 10432). World Bank. <https://doi.org/10.1596/1813-9450-10432>
- Callendar, G. S. (1938). *The Artificial Production of Carbon Dioxide and its Influence on Temperature*. *Quarterly Journal of the Royal Meteorological Society*, 64(275), pp. 223-240.
- Casadiago, R. P. (2022). *Observing the absorption of ultraviolet radiation from the sun by oxygen from the atmosphere as the cause of global warming*. *Technology Audit and Production Reserves*, 5(3(67)), 29–33. <https://doi.org/10.15587/2706-5448.2022.266490>
- CDP (2024). About us. Carbon Disclosure Project. Retrieved August 14, 2024, from <https://www.cdp.net/en/info/about-us>
- Charney, J. G., Arakawa, A., Baker, D. J., Bolin, B., Dickinson, R. E., Goody, R. M., Leith, C. E., Stommel, H. M., and Wunsch, C. I. (1979). *Carbon Dioxide and Climate: A Scientific Assessment*. US National Academy of Sciences, 22 pages.

- Chiu, I. H.-Y. (2022). *The EU Sustainable Finance Agenda: Developing governance for double materiality in Sustainability Metrics*. European Business Organization Law Review, 23(1), 87–123. <https://doi.org/10.1007/s40804-021-00229-9>
- Cointe, B., and Guillemot, H. (2023). *A History of the 1:5_C Target*. WIREs Climate Change, 14(3), e824, 11 pages.
- Corporate Sustainability Due Diligence Directive. (2024). *Corporate Sustainability Due Diligence Directive (CSDDD)*. Retrieved August 14, 2024, from <https://www.corporate-sustainability-due-diligence-directive.com/#:~:text=The%20CSDDD%20introduces%20the%20obligation,in%20companies%20chains%20of%20activities.>
- Council of the European Union. (2024). *Fit for 55: Delivering the EU's 2030 climate target on the way to climate neutrality*. Retrieved August 14, 2024, from <https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55/>
- del Mar Alonso-Almeida, M., Llach, J., & Marimon, F. (2013). *A closer look at the 'Global Reporting Initiative' Sustainability Reporting as a tool to implement environmental and Social Policies: A worldwide sector analysis*. Corporate Social Responsibility and Environmental Management, 21(6), 318–335. <https://doi.org/10.1002/csr.1318>
- de Souza Barbosa, A., da Silva, M. C., da Silva, L. B., Morioka, S. N., & de Souza, V. F. (2023a). *Integration of environmental, social, and governance (ESG) criteria: Their impacts on corporate sustainability performance*. Humanities and Social Sciences Communications, 10(1). <https://doi.org/10.1057/s41599-023-01919-0>
- European Commission (2017). *European Semester: Thematic factsheet on resource efficiency*. Retrieved August 23, 2024, from https://commission.europa.eu/document/download/708b320b-5494-4b1d-85cf-ed2013e6dfce_en?filename=european-semester_thematic-factsheet_resource-efficiency_en.pdf
- Eccles, R. G., Lee, L. E., and Strohle, J. C. (2020). *The Social Origins of ESG: An Analysis of Innovest and KLD*. Organization & Environment, 33(4), pp. 575–596.

- European Commission (2022). Corporate sustainability reporting. Retrieved August 14, 2024, from https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en
- European Commission (2023). Questions and answers: Corporate Sustainability Reporting Directive (CSRD). Retrieved August 14, 2024, from https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_4043
- European Commission (2024). The European Green Deal. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/story-von-der-leyen-commission/european-green-deal_en
- European Parliament (2023). Circular economy: Definition, importance, and benefits. Retrieved August 23, 2024, from <https://www.europarl.europa.eu/topics/en/article/20151201STO05603/circular-economy-definition-importance-and-benefits>
- European Commission (2024). *What is the EU ETS?* Retrieved August 14, 2024, from https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/what-eu-ets_en
- Fetting, C. (2020). “*The European Green Deal*”, ESDN Report, December 2020, ESDN Office, Vienna.
- Friede, G., Busch, T., and Bassen, A. (2015). *ESG and Financial Performance: Aggregated Evidence from more than 2000 Empirical Studies*. Journal of Sustainable Finance & Investment, 5(4), pp. 210-233.
- Friedrich, T. J., Velte, P., & Wulf, I. (2022). *Corporate climate reporting of European banks: Are these institutions compliant with climate issues?* Business Strategy and the Environment, 32(6), 2817–2834. <https://doi.org/10.1002/bse.3272>
- Gerard, B. (2019). *ESG and Socially Responsible Investment: A Critical Review*. Beta, 33(1), pp. 61-83.
- Ghil, M., & Lucarini, V. (2020). *The physics of Climate variability and climate change*. Reviews of Modern Physics, 92(3). <https://doi.org/10.1103/revmodphys.92.035002>
- Global Reporting Initiative (GRI) (2024a). About GRI. Retrieved August 14, 2024, from <https://www.globalreporting.org/about-gri/>

- Global Reporting Initiative (GRI). (2024b). Mission and history. Retrieved August 14, 2024, from <https://www.globalreporting.org/about-gri/mission-history/>
- Greenhouse Gas Protocol. (2024). Calculation tools and guidance. Retrieved August 14, 2024, from <https://ghgprotocol.org/calculation-tools-and-guidance>
- Halkos, G., & Nomikos, S. (2021). *Corporate Social Responsibility: Trends in global reporting initiative standards*. *Economic Analysis and Policy*, 69, 106–117. <https://doi.org/10.1016/j.eap.2020.11.008>
- Halk Yatırım Menkul Kıymetler A.Ş. (2021). *Albaraka Türk Katılım Bankası A.Ş. 2021 yıllık raporu*. Retrieved from https://www.halkyatirim.com.tr/pdf/SirketRaporlari/248671_ALBRK_07122_021_sirketrapor.pdf
- HÅijbel, B. (2022). *Do Markets Value ESG Risks in Sovereign Credit Curves?*. *Quarterly Review of Economics and Finance*, 85, pp. 134-148
- Intergovernmental Panel on Climate Change (2021). *Climate change 2021: The physical science basis. Summary for policymakers* (Sixth Assessment Report, Working Group I). Retrieved from https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SP_M.pdf
- International Financial Reporting Standards (IFRS) Foundation. (2022). International <IR> framework. Retrieved from https://integratedreporting.ifrs.org/wp-content/uploads/2022/08/IntegratedReportingFramework_081922.pdf
- International Financial Reporting Standards (IFRS) Foundation (2024). About SASB standards. Retrieved August 14, 2024, from <https://sasb.ifrs.org/about/>
- Joppa, L., Luers, A., Willmott, E., Friedmann, S. J., Hamburg, S. P., and Broze, R. (2021). *Microsoft's Million-Tonne CO2-Removal Purchase — Lessons for Net Zero*. *Nature*, 597(7878), pp. 629-632.
- Kamu Gözetimi, Muhasebe ve Denetim Standartları Kurumu (2023a). Türkiye sürdürülebilirlik raporlama standardı 1: Genel esaslar. Retrieved from <https://www.kgk.gov.tr/Portalv2Uploads/files/Duyurular/v2/Surdurulebilirlik/RaporlamaStandarti/TSRS%201.pdf>
- Kamu Gözetimi, Muhasebe ve Denetim Standartları Kurumu (2023b). Türkiye sürdürülebilirlik raporlama standardı 2: Genel bilgi açıklamaları. Retrieved

from

<https://www.kgk.gov.tr/Portalv2Uploads/files/Duyurular/v2/Surdurulebilirlik/RaporlamaStandarti/TSRS%202.pdf>

Krueger, P., Sautner, Z., and Starks, L. T. (2020). *The Importance of Climate Risks for Institutional Investors*. Review of Financial Studies, 33(3), pp. 1067-1111.

Martellini, L., and Vallée, L. S. (2021). *Measuring and Managing ESG Risks in Sovereign Bond Portfolios and Implications for Sovereign Debt Investing*. Journal of Portfolio Management, 47(9), pp. 198-223.

Matos, P. (2020). *ESG and Responsible Institutional Investing around the World: A Critical Review*. CFA Institute Research Foundation.

Meinshausen, M., Lewis, J., McGlade, C., ..., Hackmann, B. (2022). *Realization of Paris Agreement Pledges may limit Warming just below 2°C*. Nature, 604(7905), pp. 304-309.

Morseletto, P. (2020). Targets for a circular economy. *Resources, Conservation and Recycling*, 153, 104553. <https://doi.org/10.1016/j.resconrec.2019.104553>

Ramchandani, S., & Singh, A. K. (2022). *"pathway to corporate sustainability: drivers & dimensions – a review study "*. Delhi Business Review, 23(1), 33–42. <https://doi.org/10.51768/dbr.v23i1.231202204>

Rodrigues, M., & Franco, M. (2019). *The corporate sustainability strategy in organisations: A systematic review and Future Directions*. Sustainability, 11(22), 6214. <https://doi.org/10.3390/su11226214>

Sabuncu, T. B. (2015). *COP 21 ve Paris Anlaşması'nın Sonuçları (TS/SSB/2016-004)*. Sanayide Dönüşüm, Sektörel Politikalar Bölümü.

Sermaye Piyasası Kurulu (2022). Sürdürülebilirlik ilkeleri uyum çerçevesi. Retrieved from

<https://cmb.gov.tr/data/62816f571b41c617eced1005/c1fad28f78a657e385ba3d2d94b2eee6.pdf>

Securities and Exchange Commission (2024). The enhancement and standardization of climate-related disclosures for investors (Release No. 33-11275). <https://www.sec.gov/files/rules/final/2024/33-11275.pdf>

Stahel, W. R. (2016). *The circular economy*. Nature, 531(7595), 435–438. <https://doi.org/10.1038/531435a>

- SustainCase (2020). The time has come: KPMG survey of sustainability reporting 2020. Retrieved August 14, 2024, from <https://sustaincase.com/the-time-has-come-kpmg-survey-of-sustainability-reporting-2020/>
- Sætra, H. S. (2021). *A Framework for Evaluating and Disclosing the ESG Related Impacts of AI with the SDGs*. Sustainability, 13(15), 8503.
- Task Force on Climate-related Financial Disclosures (TCFD) (2024). About the TCFD. Retrieved August 14, 2024, from <https://www.fsb-tcfd.org/about/>
- Tensie Whelan, T., & Fink, C. (2016). *The Comprehensive Business Case for Sustainability*. New York University Stern Center for Sustainable Business. Retrieved from https://www.stern.nyu.edu/sites/default/files/assets/documents/NYUSternCSBSustainabilityMateriality_2019_0.pdf
- T.C. Çevre ve Şehircilik Bakanlığı. (2019). *Türkiye Çevre Etiketli Sistemine İlişkin Taslak*. Retrieved from https://webdosya.csb.gov.tr/db/destek/icerikler/full_taslak-20191127113907.pdf
- T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı (2022). *Türkiye Yeşil Mutabakat Eylem Planı*. Retrieved from <https://webdosya.csb.gov.tr/db/dongusel/icerikler/turk-ye-yes-l-mutabakat-eylem-plan--20220615123955.pdf>
- Türkiye Bankalar Birliği (2021). *Bankalarımız 2021*. Retrieved from https://www.tbb.org.tr/Content/Upload/Dokuman/8850/Bankalarimiz_2021.pdf
- Türkiye Bankalar Birliği (2023). *Bankalarımız 2023*. Retrieved from https://www.tbb.org.tr/Content/Upload/Dokuman/9034/Bankalarimiz_2023.pdf
- Türkiye Halk Bankası A.Ş. (2021). *CDP climate change questionnaire 2021*.
- United Nations Environment Programme (2024). *Global resource outlook 2024*. Retrieved August 23, 2024, from <https://www.unep.org/resources/Global-Resource-Outlook-2024>

- United Nations. (2024a). *Progress towards the Sustainable Development Goals: Report of the Secretary-General*. United Nations General Assembly, Economic and Social Council.
- United Nations. (2024b). *The sustainable development goals report 2024: Advanced unedited version*. Retrieved from <https://unstats.un.org/sdgs/files/report/2024/SG-SDG-Progress-Report-2024-advanced-unedited-version.pdf>
- United Nations (2024c). *Sustainable consumption and production*. Retrieved August 24, 2024, from <https://www.un.org/sustainabledevelopment/sustainable-consumption-production/>
- United Nations (2024d). *THE 17 GOALS: Sustainable Development*. <https://sdgs.un.org/goals#history>
- U.S. Environmental Protection Agency (2022). *Overview of greenhouse gases*. Retrieved August 14, 2024, from <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>
- World Bank (2014). *Background note: Carbon tax*. Retrieved from https://www.worldbank.org/content/dam/Worldbank/document/Climate/background-note_carbon-tax.pdf
- World Bank (2017). *Carbon tax guide: A handbook for policy makers*. Retrieved from <https://documents1.worldbank.org/curated/en/728421535605566659/pdf/129668-V1-WP-PUBLIC-Carbon-Tax-Guide-Main-Report.pdf>
- World Bank (2021). *Carbon pricing for climate action*. Retrieved from <https://documents1.worldbank.org/curated/en/725801627450789550/pdf/Carbon-Pricing-for-Climate-Action.pdf>
- World Wildlife Fund (2024). *What is biodiversity?* Retrieved August 23, 2024, from <https://www.worldwildlife.org/pages/what-is-biodiversity>
- QNB Finansbank A.Ş. (2023). CDP climate change questionnaire 2023.

APPENDICES

2021

	QNB Finansbank	Halkbank	Akbank	Yapı Kredi	Albaraka	Türkiye İş Bankası	Şekerbank	Türkiye Vakıflar Bankası	Garanti Bankası	ICBC Bank
risks	0.5	1	1	1	0.5	1	1	1	0.5	0.5
1.1 opportunities	0.5	0.5	1	1	0.5	0	1	1	0.5	0
risks	1	0.5	1	0.5	1	1	1	0.5	1	0.5
1.2 opportunities	1	0.5	0.5	0.5	0.5	1	1	0.5	1	0
risks	0.5	1	1	1	1	1	0.5	1	1	0.5
2.1 opportunities	0.5	1	0.5	1	1	0.5	1	1	1	0.5
2.2	2	2	1	2	1	2	2	2	2	0
risks	1	1	0.5	1	1	1	1	1	1	0.5
2.3 opportunities	0.5	1	0.5	1	1	1	1	0.5	1	0
3.1	2	2	2	2	2	2	2	2	2	0
3.2	1	2	0	1	1	1	2	1	1	1
3.3	1	1	2	1	2	1	2	1	1	1
3.4	0	1	2	2	2	1	2	2	0	1
risks	0	1	0.5	0.5	0.5	0.5	0	0.5	1	0
4.1 opportunities	0	0.5	1	0.5	0	0	0	0.5	0.5	0
4.2	1	2	1	1	2	2	2	2	2	0
4.3	2	2	2	2	2	2	2	2	2	0
risks	1	1	1	1	0.5	0.5	1	0.5	1	0
4.4 opportunities	1	1	1	1	0	0.5	0.5	0.5	0.5	0.5
TOTAL	16.5	22	19.5	20.5	19	20	22	20.5	20	6

2023

	QNB Finansbank	Halkbank	Akbank	Yapı Kredi	Albaraka	Türkiye İş Bankası	Şekerbank	Türkiye Vakıflar Bankası	Garanti Bankası	ICBC Bank
risks	1	1	1	1	1	0.5	1	1	1	0.5
1.1 opportunities	1	1	1	1	1	0	1	1	1	0.5
risks	1	1	1	1	1	0.5	1	1	1	0
1.2 opportunities	1	1	1	1	1	0.5	1	1	1	0
risks	1	1	1	1	1	1	1	1	1	0
2.1 opportunities	1	1	0.5	0.5	1	1	1	1	1	0
2.2	2	2	2	2	2	2	2	2	2	0
risks	1	1	0.5	1	1	1	1	1	1	0.5
2.3 opportunities	1	1	1	1	1	1	1	1	1	0.5
3.2	2	2	2	2	2	2	2	2	2	0
3.3	1	2	0	2	2	2	2	2	2	1
3.4	2	0	1	1	2	2	1	1	1	0
risks	1	1	0.5	1	1	0.5	1	1	1	0
4.1 opportunities	1	0.5	1	1	1	0	1	1	1	0
4.2	2	2	2	2	2	2	2	2	2	0
4.3	2	2	2	2	2	2	2	2	2	1
risks	1	1	1	1	1	1	1	1	1	0
4.4 opportunities	1	0.5	1	0.5	1	1	1	1	1	0.5
TOTAL	24	23	20.5	24	24	19	25	24	24	5.5