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GREEN FINANCE FOR INCLUSIVE SUSTAINABLE GROWTH IN ETHIOPIA:

EXPLORING THE POTENTIAL OPPORTUNITIES AND CHALLENGES

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ACRONYMS

AGP – Agricultural Growth Program

CO2 – Carbon Dioxide

CRGE – Climate Resilient Green Economy

CSR – Corporate Social Responsibility

ESG – Environmental, Social, and Governance

FDI – Foreign Direct Investment

GDP – Gross Domestic Product

GHG – Greenhouse Gas

IMF – International Monetary Fund

MOE – Ministry of Environment

MOF – Ministry of Finance

NBE – National Bank of Ethiopia

OECD – Organization for Economic Co-operation and Development

PPP – Public-Private Partnership

RE – Renewable Energy

R&D – Research and Development

SDGs – Sustainable Development Goals

SLMP – Sustainable Land Management Program

UNEP – United Nations Environment Programme

WB – World Bank

DEDICATION

I dedicate this dissertation to the individuals and institutions whose unwavering support and guidance have been instrumental in my academic journey.

Above all else, I give all honor and praise to God for His unwavering support, guidance, and for continuously showing me the path in every step of my life. No matter how many words or languages exist in this world, none could ever truly express the depth of my love and gratitude toward Him. His presence and influence in my life are beyond what any words can convey, and I am forever thankful for His constant care and direction.

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1. INTRODUCTION

The global population has grown at the highest rate in recent decades, posing significant challenges in meeting the basic needs of an ever-growing population. This rapid population growth has placed enormous challenges on various sectors such as food, water, housing, and healthcare, raising concerns about sustainability and resource management (Bajracharya et al., 2019). The demand for products and services has also increased exponentially as a result of the rising population, creating high patterns of consumption that affect the planet's natural resources. Overexploitation of natural resources such as forests, freshwater, minerals, and fossil fuels has occurred as a result of this increased demand. Environmental deterioration, biodiversity loss, deforestation, pollution, and other types of ecosystem disruption have worsened the current environmental crisis (Peretto & Valente, 2015). The consequences of this unsustainable consumption and population growth are increasingly evident through climate change, habitat destruction, and other environmental challenges (Cosgrove & Loucks, 2015). In response to these challenges, the concept of sustainable growth has gained attention as a fundamental principle for addressing the environmental harm caused by population growth and consumption patterns (Bhattacharyay, 2021). This study used green finance, sustainable finance, and climate finance interchangeably to highlight the importance of these schemes of finance in supporting sustainable projects.

Green finance focuses on financing projects that have a positive environmental impact. Its primary aim is to support initiatives that contribute directly to environmental sustainability. The scope of green finance is primarily environmental, concentrating on projects like renewable energy generation, energy efficiency improvements, forest conservation and reforestation, and pollution control. Financial instruments commonly associated with green finance include green bonds, green loans, and green investment funds. These tools are specifically designed to fund environmentally beneficial activities. Green finance aligns with international standards such as the Green Bond Principles and the EU Green Taxonomy, which help define what qualifies as “green” in financial markets. Ultimately, the main goal of green finance is to promote and support environmental sustainability through targeted financial mechanisms.

Climate finance, in contrast, is specifically concerned with financing activities that mitigate or adapt to climate change. Its focus is narrower than green finance, targeting responses to climate-related challenges.

This includes funding for emission reduction projects, the development of climate-resilient infrastructure, and initiatives aimed at managing disaster risks associated with climate events. Instruments under climate finance include climate bonds, concessional loans designed to support climate adaptation in developing countries, and grants offered through international bodies. It is strongly linked to global agreements such as the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement, and institutions like the Green Climate Fund. The primary objective of climate finance is to address and reduce the adverse effects of climate change by providing the necessary financial support for adaptation and mitigation efforts.

Sustainable finance takes a broader approach, integrating environmental, social, and governance (ESG) considerations into financial decision-making. Its scope extends beyond the environment to include social issues and ethical governance. Sustainable finance supports a wide range of initiatives such as ESG-compliant investments, sustainability-linked loans, and corporate governance reforms that align with ethical and responsible business practices. Financial instruments used in sustainable finance include ESG funds, sustainability-linked bonds, and diverse responsible investment portfolios. This area of finance is guided by international frameworks like the UN Principles for Responsible Investment (PRI) and the EU Sustainable Finance Disclosure Regulation (SFDR), which aim to increase transparency and accountability in financial markets. The overarching goal of sustainable finance is to promote long-term economic growth that is not only profitable but also socially responsible and environmentally sustainable.

This chapter provides broad information on the research topic to enlighten readers about the study area. The background of the study is presented at the beginning of the chapter, followed by a statement of the problem, research questions, and general and specific study objectives. At the same time, the significance of the study will be discussed at the end of chapter one.

1.1.Background of the study

Sustainable growth refers to economic growth that is socially, economically, and environmentally sustainable (J. Sachs et al., 2019). Furthermore, it is described as fostering economic expansion and development while ensuring that natural resources continue to offer sustainable environmental benefits (Hornuf et al., 2021). The concept of sustainable growth has gained prominence in political discussions and economic decision-making frameworks, especially since most Group of Twenty (G20) countries have allocated a significant portion of their financial incentives to sustainable development activities (UNEP, 2021).

The idea is to achieve economic growth while also protecting and preserving natural resources and the environment. Others have viewed the action as changing economic governance to address resource scarcity in energy, transport, agriculture, water, and other resource demands of economic growth (OECD, 2021).

Sustainable growth is a primary strategy to save the ecosystem and accelerate the transition to inclusive growth (Bouma, 2015). The term inclusive growth refers to a form of growth that aims to reduce inequality, enhance political and economic participation, and ensure the equitable sharing of its benefits (UNEP, 2021). Moreover, sustainable growth offers numerous opportunities, particularly for underdeveloped and emerging economies (Fay, 2012). According to a study by Albagoury (2016), low-income countries (countries that have a relatively low gross national income (GNI) per capita ($1,135 or less) compared to other countries in the world) can achieve sustainable growth more quickly than middle- and high-income countries, since they have smaller ecological footprints. However, given their limited financial and capital resources, this change can be challenging (Indrawati, 2015). The transition to sustainable growth requires significant investments in infrastructure, technology, and human resources, which can exceed the financial capacity of developing and lower-income countries (J. D. Sachs et al., 2019). This limitation often leads to the exploitation of natural resources without considering sustainable growth (Dawood et al., 2019), resulting in unsustainable usage. Unsustainable usage has severe consequences for the environment and economy, as demonstrated by a recent analysis by the UNEP in 2021, which indicates that unsustainable usage leads to the degradation of 12 million hectares of land annually and two-thirds of the marine ecosystem across the globe (UNEP, 2021). To avoid being trapped in unsustainable paths and to achieve immediate local benefits, sustainable growth should prioritize

immediate actions (Sarma & Roy, 2015). Some countries, such as China, Brazil, and Morocco, have already taken steps toward action by implementing innovative development plans that focus on subsidies for research and development, industrial production of Photovoltaic panels and biofuels, and the creation of renewable energy sources (J. Sachs et al., 2019).

To support the transition to sustainable growth and overcome financial limitations, a financing scheme known as green finance has been introduced to promote green investments that contribute to inclusive, sustainable growth (J. D. Sachs et al., 2019). Some of these green financial methods are part of a state-subsidized program supported by monetary and fiscal policies.

Despite the green finance emergency as a tool for promoting sustainable growth, the global green finance gap remains huge (Fan et al., 2020). This gap still needs to be addressed to finance a net-zero climate, and efforts are ongoing to determine how to close this financing gap. Numerous studies (Quatrini, 2021; Long et al., 2022; Managi et al., 2022; Boix-Fayos & de Vente, 2023) have explored the challenges that impede the flow of financial resources to green investments. The key factors identified included the trade-off between risk and return on green investments (Azhgaliyeva & Liddle, 2020), political instability, information asymmetry in the market, internalizing environmental externalities, corruption, lack of institutional capabilities, and other micro and macroeconomic challenges (Iqbal et al., 2021). Despite the challenges, attempts are ongoing to fill the green investment gap through different financial incentives.

Ethiopia is among the countries that have prioritized sustainable growth as part of its efforts to end poverty and achieve sustainable development. The government has recognized the importance of promoting economic growth while minimizing environmental harm. In a bid to achieve these objectives, the Ethiopian government implemented the Climate Resilient Green Economy Strategy (CRGE) in 2010 (Bhopal et al., 2021). CRGE is used as an umbrella for all sustainable and climate change-related activities. The objective of this strategy was to promote sustainable growth, achieve social justice, and long-term sustainable development (Albagoury, 2016). Furthermore, through the CRGE strategy, the country aims to reach a middle-income country status by 2025. The cost of implementing the CRGE's objectives is estimated to be around $ 150 billion over the two decades, from 2010 to 2030, which requires $ 7.5 billion each year (MOFEC, 2018). However, this estimate does not provide a clear financing breakdown regarding the contributions of different stakeholders (i.e., government, communities, private sector, bilateral and multilateral development

partners, etc.), including the mode of contributions (i.e., grant, concessional loan, etc) (MOFEC, 2018). In addition, the availability of CRGE finance in Ethiopia is limited by fund availability, regulations, policies, awareness, and other constraints. Furthermore, the recent Ukraine-Russia war, the COVID-19 pandemic, and the civil war in the northern part of the country are creating substantial negative impacts on the CRGE objectives. Therefore, this study investigates the potential opportunities and challenges of adopting and enhancing green finance for inclusive sustainable growth, as evidenced by the low-income country, Ethiopia.

1.1.1. Current Status of Green Finance-Related Initiatives in Ethiopia.

The financial landscape of the CRGE reveals critical challenges. The estimated financial requirement to fully implement the strategy by 2030 is $150 billion, with only $82 billion mobilized between 2011 and 2024, leaving a significant funding gap of $68 billion. Most of the funding has come from domestic public resources and international aid, with minimal participation from the private sector. Though initially underemphasized in the CRGE, adaptation efforts have gained momentum through sectoral climate resilience strategies and programs like the Sustainable Land Management Program (SLMP), Agricultural Growth Program (AGP), and ONE-Wash initiative. These projects have improved food security, water access, and resilience against climate shocks, particularly in rural areas. Despite these achievements, significant gaps remain in pest control, drought resilience, and urban adaptation planning, underscoring the need for a more integrated approach to adaptation

Sectoral contributions reveal disparities in project distribution and investment levels. Agriculture and forestry received the highest number of projects due to their central role in emissions reduction and rural livelihoods, while transport projects attracted the largest investments, particularly for infrastructure projects like the Addis Ababa Light Rail Transit (LRT), and Ethiopia-Djibouti railway. These transport initiatives demonstrate significant potential for emissions reductions by shifting freight and passenger transport from road to rail. The energy sector has remained largely low-carbon due to Ethiopia's reliance on renewable energy sources such as hydropower, wind, and solar. Industrial emissions, particularly from cement manufacturing, account for 50% of industrial GHG emissions, with mitigation efforts focusing on energy efficiency and clinker substitution. However, financial and technical barriers have limited the widespread adoption of these measures

Policy and institutional challenges have also impeded CRGE implementation. Many sectoral policies lack alignment with CRGE objectives, reducing their effectiveness in supporting climate action. For example, traditional agricultural practices often conflict with green growth goals. Institutional fragmentation, particularly between the Ministry of Finance and the Environment, Forest, and Climate Change Commission (EFCCC), has further hindered the coordination and execution of climate initiatives. Strengthening institutional frameworks, enhancing technical capacity, and introducing centralized data systems are critical for overcoming these challenges

Data and measurement challenges remain a significant barrier to tracking progress. The absence of operationalized MRV systems prevents accurate monitoring of emissions reductions and the impact of climate finance. Baseline discrepancies and inconsistent methodologies for calculating emissions further complicate assessments of progress. Ethiopia must prioritize the development of robust MRV systems and ensure consistency in data collection and analysis to meet its reporting obligations under the Paris Agreement. Private sector involvement in CRGE implementation has been minimal despite its potential to provide both technical and financial support. The introduction of a private sector strategy in 2016 was a step in the right direction, but it lacked concrete guidelines and incentives for participation. Sectors like renewable energy, transport, and industry offer significant opportunities for private sector engagement, which could accelerate the transition to a green economy. Clearer policies, fiscal incentives, and enhanced collaboration with private entities are necessary to unlock this potential.

Financial management and knowledge gaps are further compounded by the absence of a centralized database for tracking climate finance and project outcomes. This lack of transparency impedes effective decision-making and undermines efforts to align resources with priority areas. Ethiopia needs a well-designed knowledge management system to consolidate data from public, donor, and private sources, enabling more informed and strategic climate action. In conclusion, Ethiopia’s CRGE strategy has laid a strong foundation for sustainable development and climate resilience. However, significant challenges in financing, policy coherence, institutional capacity, and data tracking remain. Addressing these gaps will require strengthened MRV frameworks, greater private sector engagement, innovative financing solutions, and enhanced policy integration across all sectors. By overcoming these barriers, Ethiopia can achieve its ambitious climate and development goals while serving as a model for other developing nations

1.2. Problem Statement

Green finance can play a critical role in promoting sustainable growth by providing the necessary financial support (Jin, 2018). However, recent empirical studies (Schwerhoff & Sy, 2017; Chang, Ji, & Zhang, 2021; Sunio et al., 2021; Bhutta et al., 2022; Managi et al., 2022; Wan et al., 2022; Zhao et al., 2022), show that there is a substantial green finance gap across the globe. As evidence, in 2017, global investment in renewable energy and energy efficiency declined by 3%, and there is a risk that it will slow further (Chander et al., 2019). Additionally, climate investment requires finance ranging from $ 1.6 to 3.8 trillion per year until 2050 (Attridge & Engen, 2015). At the same time, in developing countries alone, the funding gap for achieving sustainable development goals is estimated to be $ 2.5 trillion per year (Dunz et al., 2021). To address financing gaps in sustainable development and activities related to climate change, various financial instruments have been introduced, including green and climate bonds (Tolliver et al., 2020). However, there remains a significant financing gap on a global scale (Debrah et al., 2022).

It is crucial to close this financing gap to achieve sustainable development goals and mitigate the effects of climate change. To do so, looking for an alternative financing mechanism is very important, as domestic bank credit is often insufficient to meet the demand for green financing, highlighting the importance of mobilizing capital through different financing mechanisms (Taghizadeh-Hesary & Yoshino, 2019). According to a study conducted by Noh (2010), there are several reasons why green finance is becoming increasingly important. One reason is that many people are not aware of the effects of climate change and the depletion of natural resources, as well as the harm caused to the environment. Another reason is that there is uncertainty surrounding green investments, making it harder to attract funding. Additionally, renewable energy and sustainable infrastructure projects require large amounts of investment and financing, which contributes to the need for green financing (Noh, 2010).

In addition, green finance is specifically related to the Sustainable Development Goals (SDGs) of the United Nations and can help to achieve several SDGs by funding projects and investments that are aligned with the goals, especially those related to environmental sustainability and climate action (Chander et al., 2019). The question now is how much it will cost to transition to a sustainable or green economy, given the enormous amount of cash needed to finance it. On the other hand, the opposite of the question is how much the global economy will suffer if business as

usual continues. These two ideas are the most important when discussing a sustainable or green economy. Some evidence suggests that if current business trends continue, the global economy could experience a 5 to 20% loss by 2100, while temperatures will increase dramatically, however, if reductions are implemented, it is possible to manage both the impacts of climate change and economic losses in the late twenty-first century (Jin, 2018). In Africa, the establishment of the Green Climate Fund (GCF) marked an important milestone in the pursuit of sustainable growth and climate change mitigation. However, it is noteworthy that even before the GCF came into existence, several other climate funds had already been introduced and were actively operating in the region (Fonta et al., 2018). However, the projects financed before the establishment of GCF are predominantly small-scale with high transaction costs, and more than 95% of those projects are funded by grants (Mohamed et al., 2014). It is argued that working with the GCF to diversify financial instruments away from grants and toward loans and private capital to support medium- and large-scale projects is crucial to improving the scalability of projects and the predictability of finances (Fonta et al., 2018). These processes have already begun in some African countries such as South Africa, Kenya, and Nigeria, which are taking the lead by establishing green climate funding organizations. The Fund was created to support the transition to a green economy and is responsible for providing catalytic funding for projects that can facilitate this transition, as well as for efforts to formulate policies, conduct research, and build capacity (Ngwenya & Simatele, 2020). Ethiopia is seeing a growing interest in lowering carbon emissions and advancing sustainable growth. As a result, the Climate Resilient Green Economy Strategy (CRGE) was implemented in 2010 (MOFEC, 2018). Although CRGE's objective is to expand climate finance and related sustainable development activities, the issue of clear definitions, scope, breakdown of financing, and institutional framework is found to be the main challenge of CRGE's strategy. Despite the limitations, the Ethiopian government has made efforts to promote sustainable growth by allocating a portion of the government budget to sustainable development initiatives (Zwedu, 2014; Alemu, 2016). These initiative funds gradually declined over time.

According to data from the Ministry of Finance and Economic Development, the Ethiopian government's support for the achievement of sustainable development goals began in 2011 with a $15 billion allocation. The allocation was increased to $ 20 billion in the following year, 2012. However, the allocation fell to $ 15 billion between 2013 and 2014. Subsequently, the allocation was reduced further to $ 6 billion from 2015 to 2022, with the most recent fund amounting to $ 6

billion in 2022 (MOFEC, 2022). The decline in funding for sustainable growth initiatives in Ethiopia is certainly concerning, as it can hinder progress toward achieving sustainable development goals. Furthermore, the study conducted by Padmanabhi & Meattle (2022) reveals that activities related to climate change received only 7% of Ethiopia's estimated climate finance needs in 2019/20. The study also highlights the country's reliance on grant and concessional financing for mitigation projects. To this end, the study highlights that the current climate finance landscape in Ethiopia is dominated by international public financiers (92 %), of which 70% are grants. While private financing from domestic and international investors' contributions is only 8% (Padmanabhi & Meattle, 2022)

To move away from grants and close the financial gap, introducing different financial strategies is found to be important. One of the strategies used by many countries is adopting and enhancing green finance (Wan et al., 2022; Zhao et al., 2022). However, Ethiopia is not as fast as other countries in adopting and implementing such investment and financial toolkits by providing a clear financing breakdown. The concept of green finance is still new and emerging, as the Climate Resilient Green Economy Strategy serves as an umbrella for all sustainable and climate-related activities, without providing a clear breakdown of funding contributions from different stakeholders and the mode of contributions. It is necessary to de-segregate and categorize these activities under different subunits to ensure that funds are allocated effectively and efficiently (Fonta et al., 2018). In doing so, local governments, financial institutions, and private investors are the most likely sources of funding (Chirambo, 2018).

The lack of scientific studies on the opportunities and challenges of green finance in promoting inclusive, sustainable growth in Ethiopia is a serious issue. Without a comprehensive understanding of the opportunities and challenges of green finance, it can be difficult for Ethiopia to achieve its goals of sustainable development. Therefore, the purpose of this study is to address this knowledge gap by conducting a comprehensive investigation of the opportunities and challenges of green finance in Ethiopia.

Furthermore, the lack of scientific studies in this area underscores the importance of researching the topic.

The opportunities and challenges of green finance in Ethiopia need to be identified and understood to create a roadmap to achieve inclusive, sustainable growth. Without this roadmap, it can be difficult to mobilize sufficient resources for green investment, create effective policies, and attract

private investors to support sustainable projects. Considering this, the study will identify the specific opportunities and challenges associated with green finance in Ethiopia. This includes examining existing policies and regulations related to green finance, the level of awareness among stakeholders, and the availability of financial resources. By identifying these factors, the study aims to provide actionable recommendations for policymakers, financial institutions, and investors to promote green finance and inclusive, sustainable growth in Ethiopia. Overall, this study provides a foundation for future research and action to promote inclusive, sustainable development in Ethiopia. Based on these arguments, this study answers the following research questions.

1.3.Research Questions

- What is the current state of Ethiopia's sustainable or green growth strategy?
- What are the potential opportunities for green finance in Ethiopia?
- What are the potential challenges of green finance in Ethiopia?
- How does the promotion of green finance contribute to inclusive, sustainable growth?

1.4.Objectives of the study

The study aims to explore the opportunities and challenges of green finance to promote inclusive, sustainable growth in Ethiopia. In line with this objective, the following specific objectives have been defined for the study.

- To assess the current state of green finance initiatives in Ethiopia and identify areas of opportunity for further development.
- To analyze the key challenges facing the implementation of green finance programs in Ethiopia and propose solutions to overcome these obstacles.
- To explore the potential impact of green finance on promoting inclusive, sustainable growth in Ethiopia
- To evaluate the effectiveness of existing green growth strategies in Ethiopia and provide recommendations for improving and expanding these efforts.

1.5. Significance of the study

The study findings can have far-reaching implications for various stakeholders and contribute to the achievement of sustainable development goals in Ethiopia. First, it helps the government build its policies and strategies. This study will provide insightful information about the opportunities and challenges of green finance in the country. Furthermore, the results of this study will assist financial institutions in understanding the opportunities and challenges facing the industry and will direct their risk management and investment choices. At the same time, the findings of this research can provide insights into the potential benefits of green finance for businesses, including increased access to financing, reduced costs, and improved reputation. Additionally, inclusive growth is critical for reducing poverty and improving the standard of living of communities in Ethiopia. The findings of this study can shed light on how green finance can promote inclusive growth and contribute to addressing environmental challenges. Additionally, scholars and researchers will find this study useful if they wish to use the findings as a basis for current and future research on the subject. Furthermore, academic researchers dedicated to studying green finance in the country will benefit from this empirical study focused on Green Finance for Inclusive Sustainable Growth in Ethiopia.

1.6. Structure of the Study

The research is structured across six chapters, each with its own distinct sections. Chapter one introduces the study, outlining the research problem, general and specific objectives, and the significance of the research. In chapter two, the literature review is presented, exploring the theoretical foundations of the study, empirical analyses of previous research, and the conceptual frameworks that offer a comprehensive view of the topic. Chapter three focuses on the research methodology, detailing the design and approach, target population, sampling methods, sample size calculations, and ethical considerations. Chapter four presents and analyzes the study's findings, supported by relevant evidence, while Chapter five discusses the conclusion, policy implications, and recommendations for stakeholders in the field. Chapter six highlights the study's novel scientific contributions and provides a summary of the research.

2. LITERATURE REVIEW

2.1. Conceptual Definition of Green Finance

Green finance is known for financing mechanisms involving various financial products used to fund public and private investments in sustainable projects (Lindenberg, 2014). This financing mechanism has gained significant popularity around the world since the ratification of the Paris Agreement(Muchiri et al., 2022). The definition of green finance can vary between organizations and scholars but is generally understood to encompass finance that is used to support environmentally friendly projects, mitigate the impacts of climate change, and promote sustainable development(Spinaci, 2021).

The United Nations Environment Program (UNEP, 2021) defines green finance as strategies for acquiring and allocating funds from all sources to bridge the huge green investment gap. Additionally, the OECD (2021) defines green finance as financing to achieve economic growth while lowering waste production, reducing greenhouse gas emissions, and increasing resource utilization efficiency. Furthermore, green finance aims to advance economic growth, environmental protection, and financial industry development at the same time (Mitić, 2012).

The concept of green finance is quite similar to other types of environmentally focused finance, such as carbon, climate, sustainable, and environmental finance. These concepts overlap and are often used interchangeably to describe financial activities that support sustainability and address environmental and social challenges (Banga, 2019). They share the common goal of promoting a more sustainable and environmentally friendly global economy and often involve similar financing projects, such as renewable energy and energy efficiency. However, there are understandable differences in their focus and scope, with green finance and carbon finance focusing more specifically on the environment and sustainable finance focusing on a more comprehensive range of environmental social governance (ESG) considerations (Spinaci, 2021). Green finance could improve overall environmental activities by encouraging green enterprises and developing green technology (Mitić, 2012). From an economic point of view, green finance is also helpful for the development of new technologies that deliberately stimulate growth (Noh, 2010). Generally, green finance can be summarized as financial practices and products that support environmentally sustainable and socially responsible projects, initiatives, and activities. It seeks to allocate capital

to ecologically beneficial projects and to reduce the negative impact of financial activities on the environment and society.

Increasing the level of green finance globally is viewed as one of the strategies used to decrease the effects of climate change and promote sustainable growth (Anderson et al., 2016). Different organizations and scholars have different ideas on the definition and measurement of sustainable growth. According to the OECD (2021)Sustainable growth is a term used to describe a path of economic growth that is economically, environmentally and socially sustainable. Furthermore, it is described as encouraging economic development and expansion while ensuring that natural resources provide environmental services sustainably. According to Fay (2012)Sustainable growth is a type of growth that takes into account ecological and other natural hazards in generating natural capital. Furthermore, the United Nations Environment Program (UNEP, 2021) defined sustainable growth as growth that considerably reduces environmental and ecological hazards while improving human well-being and social equality. As a result, sustainable growth has several dimensions, including "greening growth" and enhancing new growth opportunities based on environmental considerations. Therefore, capturing such a concept under a single indicator is difficult. Various organizations provide a baseline measurement for sustainable or green growth. As evidence, the OECD uses four interconnected groups of variables to quantify sustainable or green growth (Albagoury, 2016). The first indicator is the productivity of the environment and resources. This indicator shows the number of products produced for each unit of natural resource services. The second indicator is the base of natural assets served. This indicator is a key pillar of economic and human well-being because it provides the resources and ecosystem services necessary for human, social, and produced capital growth. The quality of life is measured in the third place, followed by economic opportunities and policy responses (fourth place). On the other hand, inclusive growth is also defined by different organizations and scholars in different ways. The general concept of inclusive growth is classified as absolute and relative pro-poor growth. Absolute pro-poor growth refers to a situation where the income or welfare of the poor increases in absolute terms. In other words, it focuses on lifting people out of poverty and improving their living standards. This can be achieved through policies and interventions that directly target poverty reduction, such as social safety nets, targeted employment programs, access to basic services, and infrastructure development in low-income areas.

Relative pro-poor growth, on the other hand, considers the distributional aspects of economic growth. It examines whether the incomes of the poor are growing at a faster rate than the incomes of the rest of the population. Relative pro-poor growth seeks to reduce income inequality and ensure that the poor are not left behind as the overall economy expands. It involves policies that address the root causes of inequality, such as improving access to education, healthcare, and economic opportunities, as well as promoting social mobility and fair labor practices. Both absolute and relative pro-poor growth are important dimensions of inclusive growth. While absolute pro-poor growth focuses on poverty reduction and improving the living standards of the poor, relative pro-poor growth emphasizes reducing income inequality and ensuring that the benefits of economic growth are shared more equitably. Combining these approaches can help create a more inclusive and sustainable development path.

The World Bank defines inclusive growth from the perspective of relative Pro-poor growth, which states that inclusive growth is characterized by equality of opportunity regarding access to the market, resources, and an impartial regulatory environment for enterprises and individuals (Scoones, et al., 2015). Although other literature takes a different view and defines inclusive growth in line with relative Pro-Poor growth as achieving growth that is accompanied by declining income inequality (Klasen, 2010). The African Development Bank defines inclusive growth as economic growth that results in greater access to sustainable socioeconomic possibilities for a greater number of individuals, regions, or countries (Triki & Faye, 2013). Furthermore, UNDP (2021) defines inclusive growth as growth with low and diminishing inequality, economic and political participation of the poor in the growth process, and the sharing of that process.

The goal of inclusive growth is to provide jobs that will increase the income of marginalized groups of people in the long run. As a result, inclusive growth is focused on the welfare of the current generation. Whereas sustainable or green growth is focused on the welfare of future generations (Bouma, 2015). Therefore, sustainable inclusive growth is produced by combining sustainable or green development with inclusive growth, which is advantageous for both present and future generations. Inclusive sustainable growth recognizes the importance of interaction between natural and social capital, both essential assets that must be managed and invested in green development. Furthermore, it promotes poverty alleviation through green job creation, low-carbon technologies, and the promotion of sustainable urban living and affordable energy for all (Scoones et al., 2015)

2.2. Theoretical review on Green Finance

A wide range of theories and concepts from numerous disciplines, such as environmental economics, ecological modernization, resource efficiency, and sustainable finance, are included in the topic of green finance. These theories offer a conceptual framework for understanding how the financial system can be used to advance sustainability and address environmental problems. The following section of the study discusses the details of theories related to green finance.

2.2.1. Sustainable finance theory

According to sustainable finance theory, environmental and social issues have a significant impact on the financial performance and economic stability of a firm. It gives great value to the importance of financial institutions incorporating environmental, social, and governance (ESG) factors into their investment and lending decisions(Dai et al., 2022).

Green finance is a practical application of sustainable finance theory that provides financial support for initiatives and activities that advance environmental sustainability (Dikau & Volz, 2021). This includes funding for sustainable agriculture and forestry initiatives, upgrades in energy efficiency, and renewable energy projects. Furthermore, sustainable finance theory promotes transparency and disclosure of ESG factors, which is an important component of green finance. One of the pioneer studies conducted to show the relationship between sustainable finance theory and green finance was written by Clark et al., (2015). According to the study, companies that prioritize sustainability and stakeholder value over short-term financial gains are more likely to succeed in the long run. This is consistent with the goals of green finance, which seeks to direct capital toward long-term financial returns while also having a positive environmental and social impact.

The other study was conducted by Eccles & Serafeim (2013) to show how companies can achieve long-term success by integrating sustainability into core business strategies. The study goal aligns with the goals of green finance in that it advocates promoting sustainable innovation and incorporating sustainability into core business strategies to attract green finance investment and achieve both financial and environmental/social benefits. As a result, this concept of study is highly relevant to green finance because it emphasizes the importance of sustainability in achieving long-term financial performance and sustainable economics. Furthermore, Cojoianu et

al., (2021) highlight the role of financial institutions in promoting sustainability. According to the study findings, financial institutions can drive sustainable economic development by incorporating ESG factors into their lending and investing activities, as well as promoting sustainable products and services.

2.2.2. Environmental economics theory

Environmental economics is a branch of economics that studies the interactions between the economy and the environment (Gendron, 2014). It investigates the connection between the economy and the environment, as well as how economic actions and policies affect the environment. Environmental economics theory provides a framework for understanding the monetary causes and consequences of environmental issues such as climate change and biodiversity loss (Gendron, 2014). It emphasizes the need for market- and policy-based solutions that internalize the costs of environmental damage and encourage sustainable behavior.

Green finance is a practical application of environmental economics theory because it provides financial incentives for environmentally friendly actions and investments. Green finance solutions accelerate the transition to a low-carbon economy by concentrating investment in sustainable infrastructure, renewable energy, and energy efficiency. Environmental economics theory emphasizes the importance of pricing environmental externalities, such as greenhouse gas emissions, through mechanisms such as carbon pricing (Khurshid et al., 2022).

Falcone (2020) conducted a study that draws several concepts from the fields of environmental economics and finance, arguing that green finance can play a critical role in accelerating the transition to sustainability by mitigating environmental externalities. It implies that green investments can contribute to the creation of a level playing field between traditional and green economies, which will be required to achieve the goals of sustainable development. Furthermore, Pearce (2013) demonstrates how green finance and environmental economics theory recognize the importance of the natural environment for human well-being, as well as the need to account for the value of natural resources and ecosystem services in financial decision-making. According to the study's argument, both Environmental economic theory and green finance concepts are the blueprint for a green economy. Both studies emphasize the importance of a holistic approach to economic development that balances economic, social, and environmental factors. This is also a

key principle of green finance, which recognizes the importance of taking into account environmental and social impacts in addition to financial returns.

In addition, the study conducted by Tietenberg & Lewis (2018) provides detailed evidence of how green finance is related to environmental theories. The study's argument is based on the concept that justifies how natural resource economics seeks to promote long-term economic development by channeling capital toward environmentally and socially responsible investments. The study highlights the importance of market-based mechanisms in promoting environmental sustainability. Green finance also makes use of market-based mechanisms, such as green bonds and sustainability-linked loans, to encourage environmentally responsible investments and encourage businesses to improve their environmental performance.

2.2.3. Ecological modernization theory

Green finance and ecological modernization theory are related because both advocate using market-based tools and technology to promote economic growth while protecting the environment. According to this theory, companies can adopt more environmentally friendly practices, such as reducing emissions and increasing resource efficiency by incorporating environmental considerations into their business plans (Mol et al., 2013). The concept of this theory is related to the concept of green finance in that it plays a critical role in this process by providing financial incentives to companies that adopt more sustainable practices. Regarding this concept, the study conducted by Mol (2002) reveals that those companies' advances in technology from these companies shifts in cultural norms, can result in better environmental quality, more effective resource utilization, and a smaller negative impact on the environment. The study also emphasizes the importance of changing governance structures and policy frameworks to support ecological modernization.

York et al., (2003) conducted another study, arguing that modernization and economic growth are increasing environmental footprints as societies consume more resources and generate more waste. This study was relevant to green finance because it emphasizes the need to shift towards more sustainable patterns of economic development. Additionally, the study emphasizes the importance of societal values in influencing environmental impacts. According to the study, cultural beliefs about the value of economic growth and consumption contribute to environmental degradation.

At the same time, green finance aims to address these underlying values by promoting the idea that environmentally sustainable investments can generate economic returns while also helping to create a more sustainable future.

2.2.4. Resource efficiency theory

Resource efficiency theory and green finance are linked because waste reduction and better resource management are critical to achieving environmental sustainability. According to resource efficiency theory, the economy can grow while using fewer resources and having a smaller negative impact on the environment (Koh et al., 2016).

The theory argues that providing funding for programs and projects that increase resource efficiency, such as renewable energy projects, sustainable agricultural projects, and waste reduction projects, is a way to accelerate sustainable development. The concept of this theory is the same as the concept of green finance, which concentrates on promoting sustainable development (Delmas & Pekovic, 2015). In this regard, Van Ewijk (2018) discusses the significance of resource efficiency and the transition to a circular economy. According to the study, the traditional linear economy, in which resources are extracted, used, and then discarded, is no longer viable, and a circular economy, in which resources are continuously reused and recycled, is required for long-term ecological and economic sustainability. At the same time, the study emphasizes the importance of investing in long-term infrastructure and technologies that will aid in the transition to a circular economy.

In addition, the study emphasizes the importance of economic incentives and regulations that promote resource efficiency and a circular economy. In general, the study examines the opportunities and challenges associated with the transition to a circular economy in depth and concludes that the transition to sustainable development can be achieved through resource efficiency and promoting a circular economy. The argument of the study is similar to the concept of green finance in accelerating this transition by providing the financial resources and incentives needed to support resource-efficient and environmentally sustainable economic growth.

Additionally, Jackson (2016)conducted a study titled "Prosperity without Growth: Foundations for the Economy of Tomorrow, which presents a critique of the dominant economic paradigm that holds that economic growth is required for prosperity. This study is thought to be highly relevant

to green finance because it advocates a fundamental shift in economic thinking away from growth and toward sustainability. The main focus was on the need for a new economic model based on ecological sustainability and social justice principles.

2.3. Approaches to Green Finance

Green finance and green monetary policy have become increasingly important in global efforts to combat climate change and foster sustainable economic growth. These approaches are considered key tools for mitigating the negative effects of climate change and promoting long-term sustainable development. Various approaches have been proposed to achieve these goals, with neoliberalism being a prominent ideology. Neoliberalism is an economic philosophy that advocates the primacy of free market principles and limited government intervention in the economy (Hathaway, 2020). Neoliberalism suggests that market forces can drive the transition to a more sustainable economy in the context of green finance and green monetary policy. Essentially, neoliberalism promotes the idea that the private sector should be incentivized to invest in green technologies and products while reducing government regulations to stimulate innovation and competition (Dziwok & Jäger, 2021).

To promote green finance and green monetary policy, three distinct approaches are commonly used within the framework of neoliberalism: market-based neoliberal green finance, conventional neoliberal green finance, and laissez-faire neoliberal green finance. Each of these approaches includes distinct strategies and principles that shape how they are implemented. Market-based neoliberal green finance, for example, may include mechanisms such as carbon markets and green bonds, whereas conventional neoliberal green finance may focus on voluntary corporate sustainability initiatives. Laissez-faire, neoliberal green finance, on the other hand, may prioritize minimal government intervention and rely solely on market forces to drive the transition to a green economy. However, scholars and policymakers continue to debate the effectiveness and ethical implications of neoliberalism in the context of green finance and green monetary policy. Therefore, the following section of the study discusses the details of the approaches.

2.3.1. Neoliberalism approach on Green Finance

The first neoliberal approach is known as Laissez-faire neoliberal green finance. According to this approach, the role of financial investors is critical in finding solutions to environmental issues. Under this approach, green finance refers to an economic policy that emphasizes minimal government intervention and maximum market freedom (Lohmann, 2010). It is based on the principles of neoliberalism, which advocates for the deregulation of markets and the minimization of state intervention (Dziwok & Jäger, 2021). In addition, it highlights the importance of the private sector in addressing environmental problems and sees financial markets as the primary source of funding for green projects and programs. Encourage businesses and individuals to reduce their carbon footprints and invest in ecologically friendly activities often depends on market-based mechanisms such as carbon credits and green bonds. This approach is criticized because it does not address the underlying causes of environmental problems and could even affect existing economic and power disparities (Criscuolo & Menon, 2015).

The second neoliberal approach is standard neoliberal green finance**;** this approach is the indirect approach to subsidizing green investment. This strategy offers a practical policy alternative that is reflected in green finance. It argues that government subsidies in the form of guarantees, such as those used to reduce the risk of private-public partnerships (PPPs) or green credit guarantee programs, can foster the level of green investment (Criscuolo & Menon, 2015).

Standard neoliberal green finance typically prioritizes financial returns over environmental and social outcomes and often involves the creation of green financial instruments that are tradeable in financial markets. According to this strategy, the use of market-based processes rather than direct government interventions can help solve environmental issues. Standard neoliberal green finance can fund projects that benefit the environment, but it also has the potential to reinforce existing power structures and may not promote sustainable development. This strategy is founded on a less radical and more mainstream neoclassical theory, which contends that environmental issues result from externalities that can be socialized through taxes and subsidies (Liu & Lai, 2021) . This approach is criticized and often fails to address the root causes of environmental and social problems, and can lead to the greenwashing of unsustainable practices.

The third neoliberal approach is market-making neoliberal green finance; under this approach, green finance is a term used to describe a financial strategy that aims to expand the market for

green financial products and increase their accessibility to different investors (Bracking & Leffel, 2021). It is highly focused on developing financial products, such as green bonds, carbon credits, and sustainable investment funds, and making them available to a wider range of investors.

This approach aims to increase investment in environmentally sustainable projects and initiatives, thereby reducing greenhouse gas emissions and promoting sustainable development. Markets are likely to work more effectively towards environmental goals due to this approach (Bracking & Leffel, 2021). Market-making neoliberal green finance is criticized for not effectively addressing the underlying causes of environmental issues and for potentially sustaining existing power disparities and economic inequities. It is also criticized for relying entirely on market forces to change the effects of environmental problems.

2.3.2. Reformist Approach to Green Finance

Reformist types of green finance are financial strategies and methods intended to solve the shortcomings and constraints of standard neoliberal green finance (Gunningham, 2020). These strategies work within the confines of the current market-based financial system while attempting to make the financial system more socially and environmentally responsible. Reformist forms of green finance typically involve integrating environmental, social, and governance (ESG) considerations into financial decision making, developing new financial products that align with sustainability goals, and strengthening regulations and disclosure requirements to ensure that financial products are transparent and accountable (Jäger, 2022). This approach believes that the state should be more active in accomplishing environmental goals; however, it criticizes the market for environmental problems and opposes neoliberal green finance. The reformist neoliberal approach of green finance is classified as tax-based reformists and command-and-control policies. Tax-based reform advocates levying taxes on actions that affect the environment and using the revenues to support public environmental programs, such as the construction of green infrastructure (Bracking, 2015). On the other hand, the command policy reformist thinks that the laws governing actual economic activities, not the financial sector, are the most crucial in bringing about an environmentally friendly economic activity (Ekins, 2010).

The other branch of reformist neoliberalism is the progressive green finance approach. Those who advocate sustainable environmental practices are quite supportive of this strategy. This approach would also seek to address systemic challenges in the financial system that contribute to

unsustainable development, such as short-term thinking and lack of transparency (Castree, 2010). A progressive approach to green finance would focus on creating financial products and services that support the transition to a low-carbon economy, while also taking into account the needs and perspectives of marginalized communities and workers.

This would involve considering factors such as job creation, fair labor practices, and community involvement in decision-making processes. Furthermore, a progressive approach to green finance would aim to create a financial system that is more transparent, accountable, and inclusive, with a strong focus on ensuring that investments are made ethically and sustainably (Holt-Giménez & Altieri, 2013). This would involve measures such as greater disclosure of ESG risks and impacts, as well as greater engagement with stakeholders and efforts to build trust in the financial system (Gabor et al., 2019). In summary, both the neoliberal and reformist approaches to green finance represent different perspectives on the role of the financial system in promoting sustainable development. The neoliberal approach to green finance prioritizes market-based solutions and the use of financial instruments such as green bonds and carbon credits to support environmentally friendly projects. This approach views the financial system as a means to achieve environmental goals, but it may not take into account the broader social and environmental impacts of financial activities. On the other hand, the reformist approach to green finance seeks to fundamentally transform the financial system to align it with the goals of sustainable development.

This approach recognizes that the current financial system does not operate in an environmentally sustainable manner and that systemic changes are needed to ensure that financial activities promote a low-carbon and sustainable future. The reformist approach prioritizes the need for transparency, accountability, and stakeholder participation in the financial system and supports investment in renewable energy, energy efficiency, and sustainable agriculture. Both the neoliberal and reformist approaches to green finance aim to support environmentally sustainable development, but the reformist approach takes a more holistic and transformative approach, recognizing the need for systemic change in the financial system to achieve this goal.

2.4.Empirical review of the study

Due to climate change, demand for green finance is rising in all economic sectors. The necessity of refocusing financial resources on developing a sustainable economy is essential. According to Rydge et al., (2015), by 2030, the need for new infrastructure will cost $ 90 trillion.

As a result, more than the current flow of financial resources in the economy is needed to cover the required funds. However, previously conducted studies show that several reasons prohibit the flow of financial support to green investment (Heinkel et al., 2001; Dafermos et al., 2018; Jin, 2018). The following section of the study discusses the main opportunities and challenges of green financing from the global experience.

2.4.1. Challenges of green finance

Several studies have been conducted around the globe to investigate the driving challenges of green finance. One of the studies conducted by (Islam et al., 2014) identified several challenges that hinder the development of green finance. One of the challenges identified by the study was the present and projected competitiveness in the market. The study highlights those investments in green economies are less attractive than other investments due to risk and return trade-offs. As a result, private investors are mostly focused on traditional investments because of the financial returns. The study highly urges the government to pay more attention to disclosing crucial information, such as social benefits, the final use of funds raised, and the extent of the project's greening, in a bid to attract private investors. More specifically, barriers specific to certain activities, such as the regulatory framework, limit private investment in green growth. In response to its risk and return trade, it is recommended to make these investments more attractive compared to other options (Jin, 2018).

Another study conducted by Quatrini (2021), identified three major challenges, including credibility deficit, narrow focus, and time-horizon limitations. According to the study, the challenges mentioned hinder effective decision-making when it comes to investing in sustainable initiatives. The study also mentions that the COVID-19 crisis has made it even more challenging for the public and private sectors to make investment decisions that support global sustainable goals. Furthermore, the study conducted by Thomä & Chenet (2017) mentions that mispricing of risks is the main challenge for enhancing green finance. This study recalls the Paris Agreement, which formalizes investors' obligations to have a long-term perspective and to account for financial risks related to climate change beyond the usual corporate planning timeframes. The study asks policymakers and other regulatory bodies if they do not practice this agreement properly in a bid to clarify green investment-related risk and return trade.

At the same time, the study blames the structure of capital markets in some countries for not properly assessing risks related to green projects. It also mentions that the overall investment and environmental policy of different countries is another challenge to enhancing green finance, which deliberately reduces green investment across the globe.

The other challenge is market distortions and shortcomings (Prasad et al., 2022). Market distortions, such as the limited variety and availability of green financing instruments, as well as the specific marketplaces in which they can be traded, pose significant challenges to the growth of green finance. The lack of diverse financing options for sustainable projects and technologies limits the potential for innovation and growth in the green finance sector. These distortions disrupt the true value of renewable energy sources, creating an uneven playing field for green investments. Another study conducted by Guerci & Carollo (2016) highlights the presence of conflicting goals as a challenge to green finance. According to the study, balancing environmental sustainability and financial profitability can result in competing priorities, making it difficult for investors and stakeholders to align their objectives. These can occur when, on the one hand, public green finance providers seek to achieve the greatest potential environmental improvement and, on the other hand, private investors seek to maximize risk-adjusted returns on their investments.

The study conducted by Azad et al., (2022) reveals that the limited time horizon of company strategy is considered another significant barrier to green finance. Government regulatory gaps are also another barrier to the expansion of green finance (Yousuf et al., 2014). Furthermore, an imbalance in incentive and control systems for investment and financing firms in green projects is also considered a challenge to green financing (Lv et al., 2022).

More specifically, several microeconomic challenges hinder the growth of green finance. One of the factors, among others, is the internalization of environmental externalities, which refers to the incorporation of the true costs of environmental impacts into the pricing and valuation of financial instruments (Berensmann et al., 2017). Environmental costs, such as pollution or carbon emissions, are currently not fully accounted for in investment pricing, resulting in misaligned incentives and distorted market signals. Another microeconomic challenge is the information asymmetry between investors and beneficiaries (Desalegn & Tangl, 2022). Green finance involves complex financial products and projects that require specialized knowledge and information to assess their environmental performance and financial risks. However, there is information asymmetry, where

investors do not have access to complete and reliable information on the environmental impact and financial viability of green investments, leading to misinformed investment decisions. Bridging this information gap through improved reporting standards, transparency, and disclosure mechanisms is crucial to enable informed decision making in green finance (Clark et al., 2018).

The lack of widely accepted green finance terminology is another microeconomic challenge in green finance (Falcone, 2020). There is currently no globally standardized definition of what constitutes green finance, leading to inconsistencies and discrepancies in the market. This lack of clear and consistent terminology can create confusion among investors, issuers, and regulators, making it difficult to accurately identify and assess green investment opportunities. Furthermore, maturity mismatches of green investments, which refer to the mismatch between the maturity of assets and liabilities in green finance, are also a concern (Cao et al., 2021). Many green projects, such as renewable energy infrastructure, have long-term investment horizons, while some green financial products, such as green bonds, may have shorter tenures. This maturity mismatch can create challenges in managing risks and aligning the timing of cash flows, which may affect the attractiveness and feasibility of green investments.

According to the study conducted by Dowson et al., (2012), the analytical incapacity of issuers and investors in assessing the environmental and financial risks of green investments is the challenge of green finance. Evaluating the risks and returns of green projects requires specialized expertise and tools, including environmental impact assessments, life cycle assessments, and financial modelling. However, not all issuers and investors may possess the analytical capabilities to accurately assess the risks and returns of green investments. Green investment is often considered riskier than traditional investment in the current market due to lower investment returns. This perception is highly influenced by the market demand for green products. Despite increasing awareness and demand for environmentally friendly products, many private investors remain uncertain about investing in green projects.

One of the primary reasons for this reluctance is a lack of the necessary experience and analytical capacity to properly assess the market performance of green products.

Stricter lending policies also make it harder for green projects to get financing. To ensure that money is allocated to sustainable and environmentally friendly projects, it is crucial to have strict

lending policies in place. However, if these policies are too strict, even profitable green projects may find it challenging to obtain the funding they require (Taghizadeh et al., 2020).

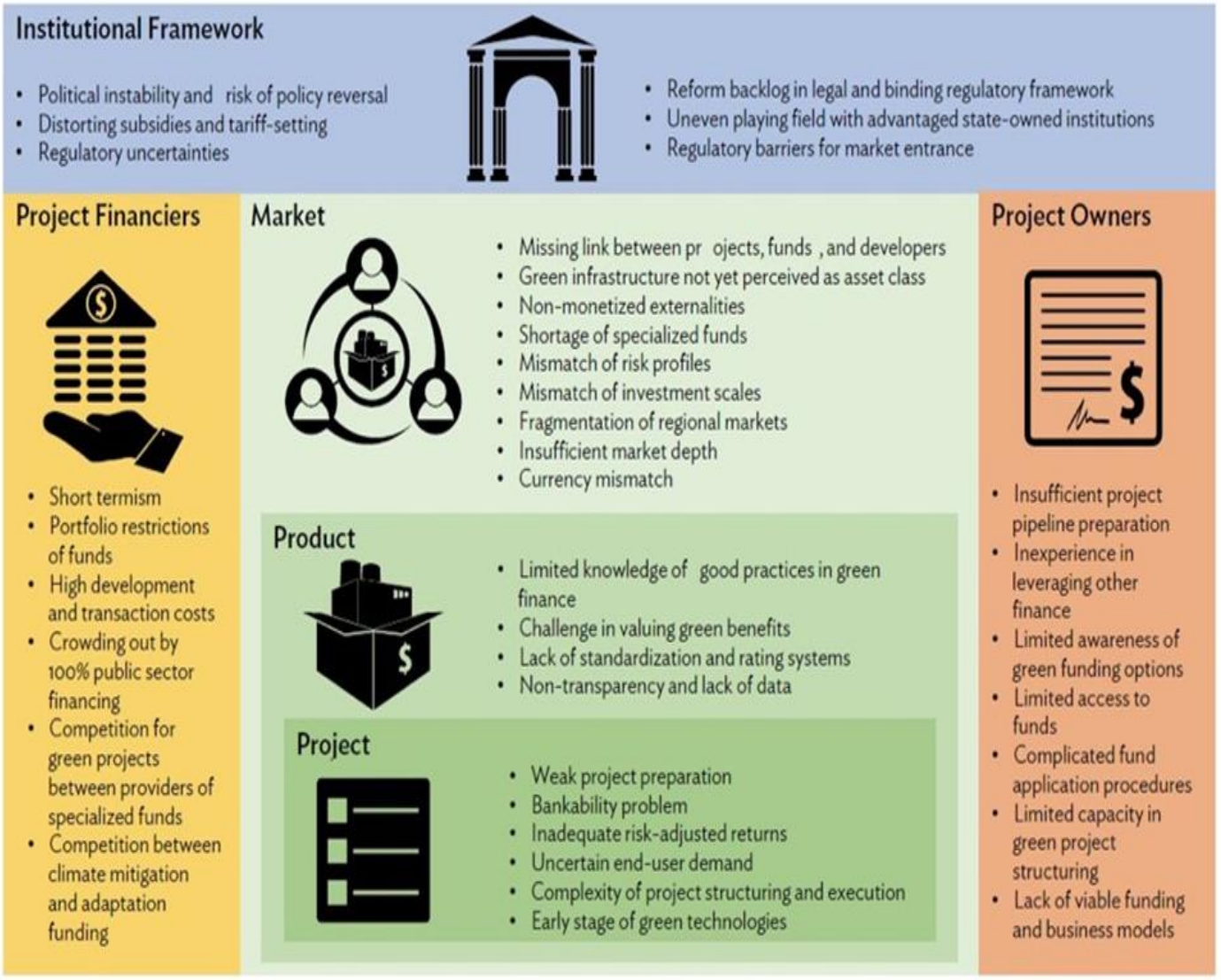
Furthermore, stricter lending regulations may raise the cost of borrowing for green projects, reducing their economic viability. Small and medium-sized enterprises (SMEs), which may have less access to financing and may be more sensitive to changes in borrowing costs, may find this to be particularly difficult. In addition to stricter lending policies for green projects, the lack of producing cash flow and returns in short time horizons, uncertainty about government policies, unsuitability of financial institutions, lack of intra-sectoral networks, lack of demonstration sites, excessive bureaucratization, low market demand, the limited sectoral experience of potential investors, lack of technical expertise, limited entrepreneurship, insufficient guarantees, low level of highly skilled professionals, scarce research and development, and low financial knowledge are considered collective challenges of green financing (Yu et al., 2021).

The other main challenge is global disparities in access to finance (Schwerhoff & Sy, 2017). It is well known in the academic literature that low-income countries face significant obstacles when trying to access financing for sustainable development. The significant differences between high-income and low-income countries' access to financing for sustainable development are highlighted in a World Bank report from 2021 (Blicharska et al., 2021). The study points out that while sustainable finance is rapidly expanding in high-income nations, low-income nations have had difficulty attracting investment due to a lack of suitable projects, a lack of ability to structure financing agreements, and the high perceived risk of doing business. In addition, the COVID-19 pandemic has made the financial problems even worse.

According to the study conducted by Arora & Sarker (2023), low-income nations have been greatly affected by the pandemic and, as a result, are experiencing a significant financing gap. Many low-income nations are at risk of falling further behind in the global race toward sustainable development because they have little fiscal room to address the crisis (Arora & Sarker, 2023). Most (97%) of recently launched sustainable investment funds are collected from high-income countries (Xu et al., 2019). However, only 0.3% of all green bonds by value and 1.5 percent by number are issued in sub-Saharan Africa (Tyson, 2021). Thus, disparities in financial access are highly witnessed in low-income countries as they strive to finance their sustainable recovery. Another issue is that low-income countries cannot fully benefit from the push for sustainability

due to enduring investment hurdles and capability limitations(Collier et al., 2010). These include the shallowness of the financial markets and the difficulty of providing evidence of compliance with sustainability criteria (e.g., lack of data or reporting mechanisms). However, the good news is that by increasing the use of sustainable finance innovations, such as sustainability bonds and debt swaps, certain lower-income countries can become more attractive to investors and access financing commitments. Developed countries have been leaders in promoting green finance, both in terms of policy and investment (Rasoulinezhad et al., 2022). For example, the European Union's Green Deal initiative aims to mobilize at least €1 trillion of sustainable investment over the next decade (Sikora, 2021). Similarly, the United States has recently committed to re-joining the Paris Agreement and has proposed a $ 2 trillion plan to invest in clean energy and infrastructure (Arifiandi, 2022). The following Figure 1 of the study summarizes the challenges of green finance in different economies from the perspectives of the institutional framework, project financiers, market demand and supply, project owners, type of products, and projects.

Figure 1: Challenges of Green Finance



Source: Adopted from wang (2020)

2.4.2. Opportunities for green finance

The global agreement on decarbonization and climate change presents opportunities and challenges, particularly for the financial sector and the economy in general. Green finance has many opportunities for both developing and developed economies of the world. These opportunities are different from one economy to another based on their economic size. Generally,

adopting and enhancing green finance will create opportunities for renewable energies, food, agriculture, energy efficiency, and infrastructure (Azad et al., 2022).

Among the many opportunities readily available for implementing and improving green finance, the use of renewable energy is essential. The growing demand and interest of numerous investors around the world in investment in renewable energy can be viewed as one of the sources of funding to close the gap in green finance (Wüstenhagen et al., 2007).

Renewable energy sources have lower production costs than fossil fuels, making them a more cost-effective option in the long run, despite the possibly substantial initial investment required for the infrastructure (Kberger, 2018). Due to the lower production costs, this cost-effectiveness will aid in lowering consumers' energy costs, likely making renewable energy a more accessible choice for those residing in low-income areas.

Secondly, investment in renewable energy will create many job opportunities, especially in the fields of research, design, manufacture, infrastructure, installation, and maintenance (Wei et al., 2010). These jobs can be expanded frequently in regional areas, bringing economic opportunity to places that the fossil fuel sector may have left behind. The fact that renewable energy infrastructure is a long-term investment with predictable returns makes it a desirable choice for institutional investors such as pension funds and insurance companies (Kaminker & Stewart, 2012). These investors can diversify their portfolios and work toward a more sustainable future by investing in the infrastructure supporting renewable energy sources. As a result, green finance has many opportunities to support inclusive, sustainable growth utilizing renewable energy. Renewable energy is probably going to become an ever-larger part of the international economy as we move toward a more sustainable future.

The other opportunity related to implementing and improving green finance is the use of sustainable agriculture. As the world faces growing challenges in food security, climate change, and natural resource depletion, sustainable agriculture is likely to become an increasingly important part of the global economy (Horrigan, Lawrence & Walker, 2002). Through investment in sustainable agriculture, it is possible to mitigate the consequences of climate change. Sustainable agriculture can help reduce the carbon footprint of the agricultural industry by employing farming methods that rely less on fossil fuels and sequester carbon in the soil (Pretty et al., 2002). As a result, sustainable agriculture can provide investment opportunities for institutional investors such

as pension funds and insurance companies, which can deliberately increase the funds allocated to green finance.

Sustainable transportation also presents another opportunity to improve green financing. Currently, it is possible to observe that there is growing interest from customers and investors in sustainable transportation options, such as electric vehicles, bikes, and public transit (Negrutiu et al., 2020). Such demand and interest will present an opportunity for green financing to invest in the development and deployment of these technologies and infrastructure. In addition to increased demand among users, this type of transport option can have lower operating costs over the lifetime of the vehicle or infrastructure. For example, electric vehicles can have lower fuel and maintenance costs than traditional gasoline vehicles (Romm, 2006). This can make them an attractive investment for fleet managers and individual consumers. As a result, most countries around the world are increasingly supporting sustainable transportation through regulations and incentives, such as tax credits and subsidies (Solangi et al., 2011). This can make sustainable transportation an attractive investment for public sector entities, such as municipal governments and public utilities. Sustainable transportation options can have a positive impact on the environment by reducing greenhouse gas emissions and air pollution. This can make them an attractive investment for investors who are interested in promoting environmental sustainability.

Furthermore, the current status of green buildings can be the greatest advantage in adopting and enhancing green finance. Green buildings are designed to be energy efficient, which can result in lower operating costs over the lifetime of the building (Darko et al., 2017). This can make them an attractive investment for building owners and developers, who can benefit from reduced energy bills and increased profitability. Green buildings often have higher asset values than traditional buildings due to their energy efficiency, sustainability features, and lower operating costs (Kats, 2003). This can make them an attractive investment for real estate investors who can benefit from increased property values and rental income. To this end, governments around the world are increasingly supporting green buildings through regulations and incentives, such as tax credits and subsidies (Circo, 2007). This can make green buildings an attractive investment for public sector entities, such as municipal governments and public utilities. At the same time, there is a growing market demand for green buildings as consumers become more aware of the environmental and

social impacts of their purchasing decisions. This can make green buildings an attractive investment for private sector entities, such as banks and investment firms.

Green infrastructure also presents another significant opportunity to improve green financing. Green infrastructure can help to reduce expenses related to managing traditional infrastructure, decrease the effects of urban heat islands, and mitigate the effects of climate change (Sturiale & Scuderi, 2019). Enhancing green infrastructure can increase the overall value of green properties. Due to this fact, investors and developers in real estate may find it to be a desirable investment. For public sector organizations such as local governments and public utilities, this might make it an attractive investment (Block, Livesley & Williams, 2012). As a result, governments around the world are increasingly supporting the use of green infrastructure through regulations and incentives, such as tax credits and subsidies. This can make green infrastructure an attractive investment for public sector entities, such as municipal governments and public utilities, which deliberately enhance green finance.

In addition, one of the most promising options for advancing green finance is the use of innovative funding methods. These programs aim to support the shift to a low-carbon, more sustainable economy by leveraging private sector investment through different mechanisms such as green bonds, green loans, climate funds, and Pay-for-Performance Mechanisms, which are some of the cutting-edge financing methods that are now being employed to improve green finance (Owen, Brennan & Lyon, 2018). Another key opportunity to improve green finance is the development of supportive policy frameworks that can create the necessary incentives for private investment in sustainable projects(Fu & Ng, 2021). One such framework is the Paris Agreement, which aims to limit global warming to well below 2 °C (Gao, Gao & Zhang, 2017).

The Paris Agreement has catalyzed a wave of climate-related policy initiatives, including carbon pricing, renewable energy mandates, and energy efficiency standards, that have created a more supportive environment for green finance.

In addition to national policy frameworks, international initiatives such as the Sustainable Development Goals and the Principles of Responsible Investment (PRI) provide guidance and best practices for investors and financial institutions looking to integrate environmental, social, and governance considerations (ESG) into their decision-making. Furthermore, technological

advances are creating new opportunities to improve green finance by reducing the cost and risk of sustainable investments (Ng et al., 2021). One such advance is the development of renewable energy technologies, such as solar and wind power, which have become increasingly cost-competitive with traditional fossil fuel sources. Other advances include using blockchain technology to increase transparency and reduce transaction costs in green finance and developing climate risk assessment tools that can help investors better understand the physical and transition risks associated with climate change (Fahim & Mahadi, 2022).

In addition, there are also many prospects that green finance can bring to the economy. According to the study conducted by Moxey et al., (2021), green finance offers opportunities to improve overall spending on addressing climate change and biodiversity loss. It can offer a mechanism to combine public and private finance to achieve environmental goals in a way that is economically and socially advantageous. Enhancing green finance will create a comparative advantage in response to the mounting constraints of climate change and other environmental and economic challenges(Chiou et al., 2011). At the same time, it will add value to the portfolios of companies, organizations, and corporations by improving and publicizing their participation in green finance (Azad *et al.,* 2022). With the help of green finance, developing countries can avoid the development model of grow first, clean up later. Because a significant part of green investment flows into infrastructure (Soundarrajan & Vivek, 2016). This situation provides the opportunity for a country to leap ahead to eco-efficient infrastructure. The responsibility then falls on governments to develop infrastructure that will result in the better long-term management of resources, which will increase a country's competitiveness and channel private sector capital into domestic green markets (Iqbal et al., 2021).

According to the study conducted by Yousuf et al., (2014), One of the opportunities for green finance is improving online financing/banking. Banks and other financial institutions can help customers have easier access to green financial products and services by utilizing the power of online platforms. Furthermore, the study highlights that improving green finance will help in creating a separate unit for green financing/banking. In this case, financial institutions can show their commitment to sustainability by creating a specific team or department within their organization that focuses solely on offering environmentally friendly financial solutions. These

teams can also help find new green investment opportunities and create ground-breaking goods and services that support the institution's overall environmental objectives.

The enhancement of green finance will create a good economy (Ranasinghe, 2010). This can be done by creating and encouraging domestic markets for alternative resources and technology; Governments that support the enhancement of green finance are indirectly creating opportunities, such as promoting rural development (Chirambo, 2017). In rural areas, various green projects can provide income for locals, such as farmers and landowners. For example, financial support for sustainable agriculture can help small-scale farmers in making the switch to greener farming methods. The ability of green finance to promote the creation of green jobs is another opportunity (Chirambo, 2017). Green projects need a trained workforce to plan, implement, and maintain them, which can lead to job possibilities in the engineering, building and renewable energy industries. Jobs in the green sector are frequently well paid and can offer sectors that have been severely impacted by economic downturns secure employment. Furthermore, by supporting initiatives that reduce greenhouse gas emissions, safeguard biodiversity, and preserve natural resources, green financing can help guarantee environmental protection. This may benefit local ecosystems and fauna while also reducing the negative effects of climate change (He et al., 2022).

To that end, by encouraging access to sustainable technology and practices for low-income communities and marginalized groups, green finance can also improve social inclusion(Akomea-Frimpong et al., 2022). This can involve providing low-income households with investments in energy efficiency and renewable energy sources, as well as assistance with sustainable agricultural and forest techniques for indigenous populations.

Additionally, in the long-term process, green finance can educate and help small and medium businesses about the possibilities of green investments. This can help these businesses in gaining access to funding for environmentally friendly initiatives and make the switch to more environmentally friendly business practices.

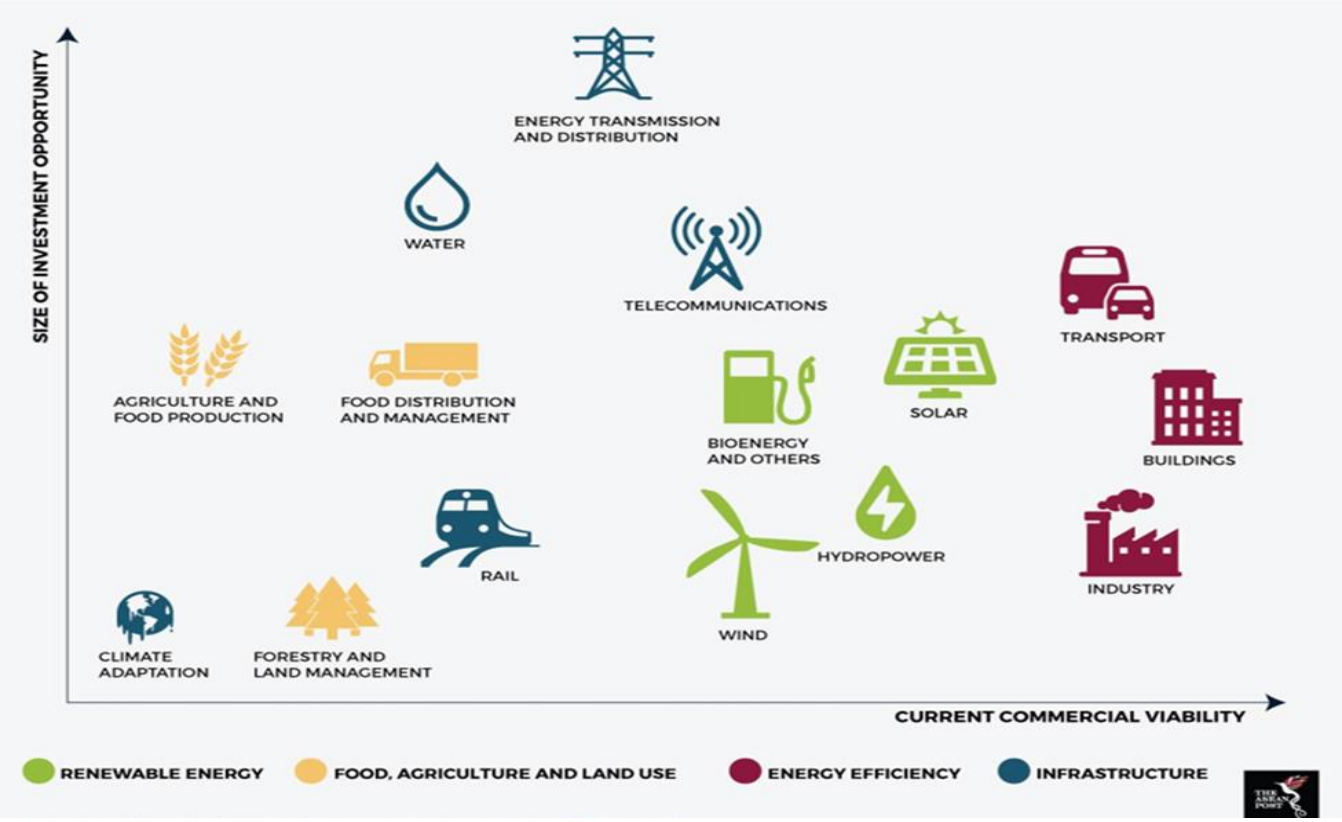
It also noted that enhancing green finance will increase public awareness and comprehension of environmental issues by promoting sustainability programs, events, and other environmental awareness-related activities (Mejia-Escobar et al., 2020). This can motivate people and businesses to take action to reduce their environmental effects while also helping to develop support for laws and activities that support sustainability. At the same time, by making investments in green

technology and practices like renewable energy and energy efficiency, green finance can help in the transition to a low-carbon economy(Richardson, 2009). This can provide economic opportunities, encourage sustainable development, and help minimize greenhouse gas emissions and the effects of climate change. In general, government policies and regulations that support the enhancement of green finance are indirectly driving green jobs, ensuring environmental protection, supporting social inclusion, providing knowledge for small and medium companies about the potential of green investments, supporting long-term value generation, increasing environmental awareness, sustainability initiatives and events, transitioning to a low carbon economy, high unemployment rate, innovative value chains, etc (Falcone & Sica, 2019).

It also contributes to improving online banking and financing. This is crucial for banks to support their green banking and financing strategy. Online statements and bill payments reduce paper waste, gas use, and carbon emissions while saving money on printing and delivery.

Figure 2 of the study shows the overall opportunities for green finance.

Figure 2: Opportunities of Green Finance



Source: Adopted from (Gnanasagaran A, 2018)

The other opportunity to improve green finance will support the LEAN principles (M et al., 2022). The development of LEAN ideas, which are connected to the production costs, is the other option for green finance. The LEAN idea motivates companies to reduce greenhouse gas emissions by implementing some lean concepts, such as removing waste, cutting waste, and streamlining operations. Non-manufacturing businesses could benefit from applying lean principles such as reducing paper use, decreasing travel, and buying locally produced goods. Once again, these straightforward measures will enhance profitability while reducing the company's carbon impact (Thomä & Chenet, 2017). Furthermore, green finance can attract green customers(Raluca, 2019). Without a doubt, most customers continue to prioritize price, quality, and service when making purchasing decisions, but when all other factors are equal, environmental factors can influence the consumer's purchase decision. Therefore, the improvement of green finance has the opportunity to promote green products that are deliberately used to attract green customers.

Adopting and improving green finance will promote the green business and innovation model that deals with climate change, as it involves value chains, organizational structures, operations management, incentive agreements, marketing, and R&D that are focused on products and services (Kohtamäki & Rajala, 2016). As a result, green innovation fosters economic success and competitive advantage at the enterprise (micro) level, while advancing the economy and society at the national (macro) level. Another opportunity is related to the creation of green entrepreneurs. The term "green entrepreneurship" refers to the fusion of the critical elements of entrepreneurship: creativity, risk taking, a fresh idea for a firm, and an individual's devotion to the environment and society (Kirkwood &Walton, 2010). In addition, enhancing green finance has a crucial role to play in promoting social responsibility and sustainable business growth. This is especially important in light of the negative impacts of economic expansion and climate pollution, which have resulted in a decline in natural capital and social well-being across the globe (Rahdari et al., 2016).

Enhancing green financing is crucial for promoting a green economy and motivating stakeholders to participate in the new economic transition toward green growth. Governments can play a key role in this by creating regulations that encourage the sale of green goods, revising laws, implementing new incentives, bolstering the market's infrastructure and economic mechanisms, rerouting financial resources, and greening government procurement. By increasing finance and investment levels in response to changes in policy and price signals, the private sector may be better able to understand and assess the likelihood of a successful transition to a green economy. In conclusion, the literature on the opportunities and challenges of green finance for sustainable, inclusive growth highlights the urgent need to shift toward a more sustainable and inclusive financial system. The main identified challenges include the lack of adequate regulatory frameworks, the limited availability of green finance instruments, and the lack of information and awareness about green finance among market participants. Despite these challenges, there are several opportunities to improve green finance for sustainable, inclusive growth. These include the potential for green finance to drive innovation and investment in clean energy and sustainable infrastructure, to promote social and environmental responsibility among market actors, and to enable more equitable and inclusive access to finance for marginalized communities. However, to fully realize these opportunities, governments, regulators, financial institutions, and civil society organizations must work together to create an enabling environment for green finance.

This will require the development of robust regulatory frameworks that encourage green investments, the expansion of green finance instruments and markets, and the provision of targeted education and technical assistance to help build capacity and awareness among market participants. Overall, the literature suggests that improving green finance is a crucial step toward achieving sustainable and inclusive economic growth. Addressing the challenges and capitalizing on the opportunities presented by green finance, policymakers, market actors can help build a more resilient, equitable, and sustainable financial system that benefits all members of society.

2.5. Publication Trends

Previously published literature was reviewed for this study to review the trends analysis of publications related to green finance topics and encompasses a timeline extending from 1997 to 2022. An analysis of the temporal distribution of publications within this period highlights an uneven pattern of scholarly engagement with the topic. During the initial phase, particularly between 1997 and 2010, the number of publications related to the study area remained notably low, with only three relevant documents identified. This limited scholarly attention during the early years may be attributed to several interrelated factors. Most prominently, this period was marked by significant global financial instability, including the 1997 Asian financial crisis, the early 2000s dot-com bubble, and the global financial crisis of 2007–2008. These economic disruptions likely redirected the focus of researchers and policymakers alike toward urgent financial and macroeconomic issues, thereby reducing academic emphasis on topics that did not align directly with immediate economic recovery strategies.

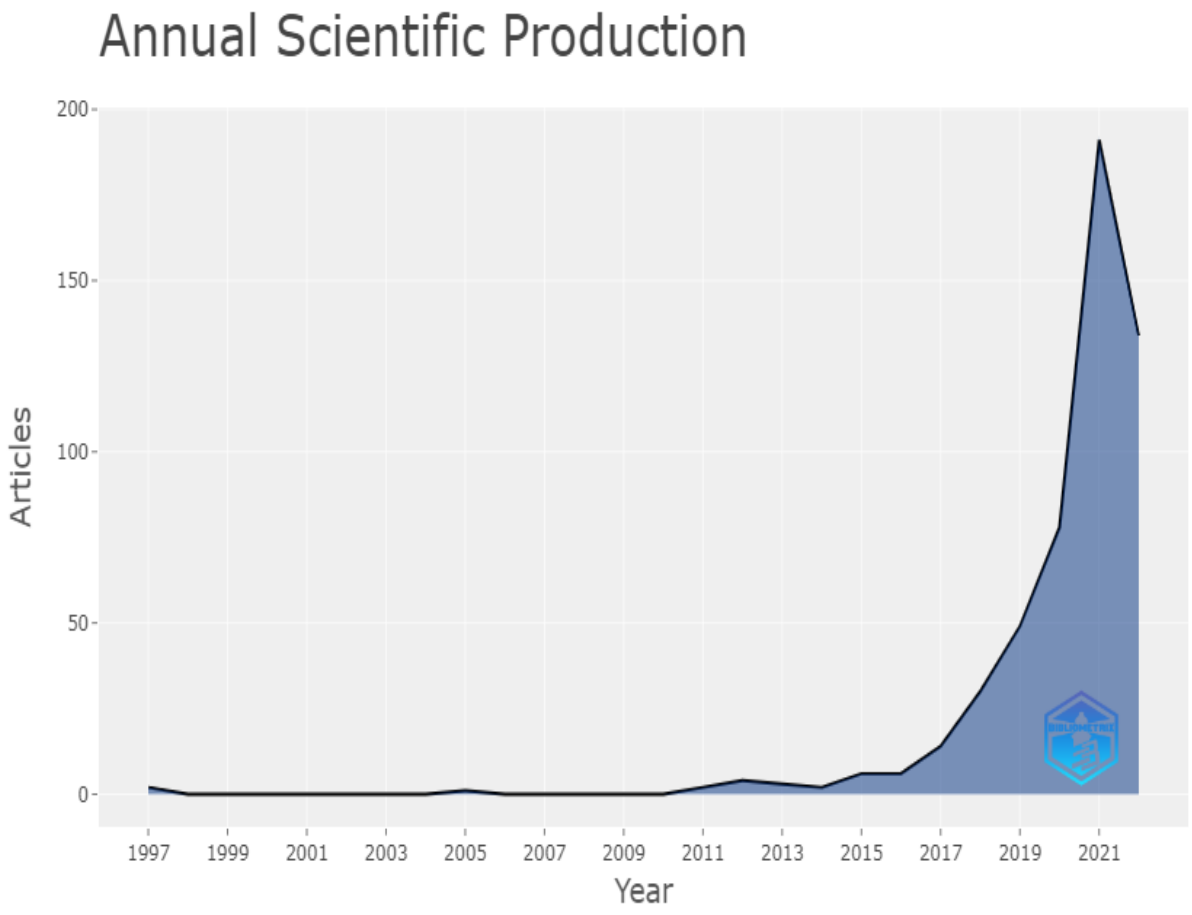
It was not until after 2015 that a discernible shift occurred in the volume and frequency of publications addressing the subject matter. From that year onward, the number of studies increased substantially, reflecting a growing academic interest in the field. This growth appears to have been catalyzed by major international policy developments most notably, the adoption of the Paris Agreement in December 2015. The Agreement signaled a renewed global commitment to combating climate change and advancing sustainability, thereby inspiring a surge in related research, including within the focus area of this review.

The years following 2015 saw a sharp rise in publication activity, culminating in 2021, which recorded the highest number of publications within the entire study period 164 documents in total. This sharp increase indicates not only an expansion in scholarly engagement but also a broadening

recognition of the study area's relevance to global sustainability and environmental policy agendas.

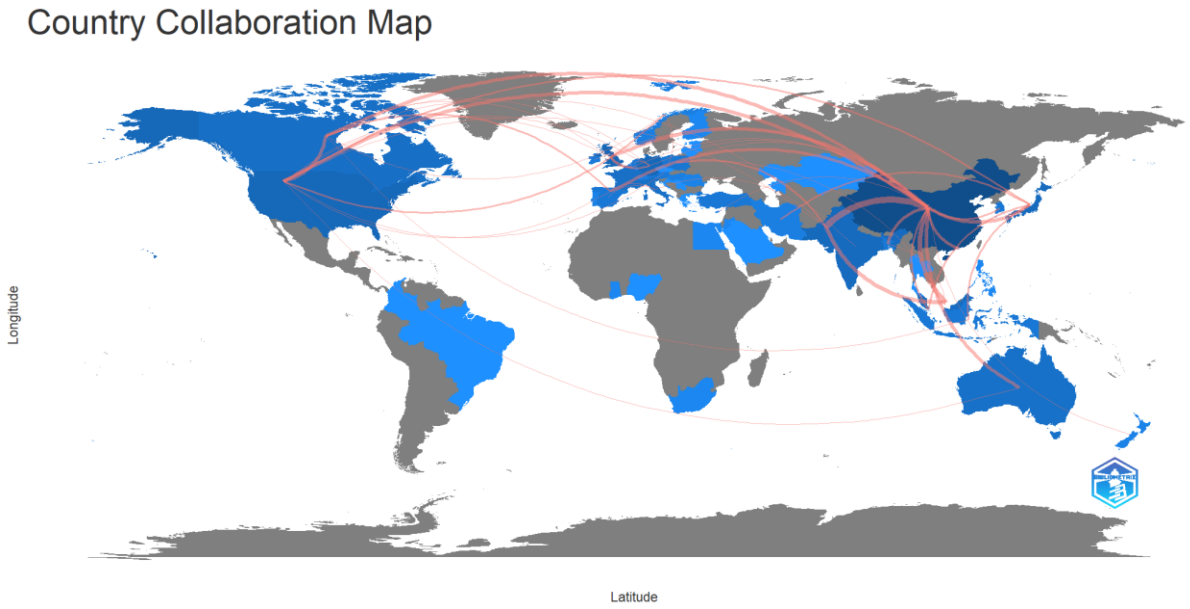
Figure 3 in this study provides a visual depiction of these evolving publication trends. It clearly illustrates the contrast between the sparse scholarly output of the earlier years and the dramatic surge in publications observed after 2015. This trajectory suggests a growing prioritization of the topic within the academic community, driven by external socio-political and environmental developments that have elevated the significance of the study area in both theoretical and applied research contexts.

Figure 3: Trends in Annual Publication Overtime for Green Finance



Source: Web of Science Data Base (Compiled by the author using R programming)

Figure 4:Country's collaboration network for Green Finance



Source: Web of Science Data Base (Compiled by the author using R programming)

Figure 4 of the reviewed literature illustrates the global collaboration network among countries engaged in green finance research, encompassing nations from both the Global North and Global South. The visualization employs color-coded markers to distinguish between types of contributions: countries shaded in blue are those that have actively contributed to the global body of scientific literature on green finance, while the red-colored connections indicate instances of cross-national collaboration in research activities.

A closer examination of this map reveals notable disparities in collaborative engagement between regions. Countries in Africa, South America, and parts of Asia appear to be significantly underrepresented in the global green finance research network, particularly in terms of establishing international collaborative ties. This suggests a persistent gap in cross-border research cooperation, which may be attributed to structural barriers such as limited research infrastructure, funding constraints, or lower prioritization of green finance within national policy agendas in these regions.

In contrast, countries from Europe, North America, selected parts of Asia, and Australia demonstrate a higher degree of interconnectedness and collaboration. These regions have formed extensive research partnerships, indicating a more active and integrated role in advancing the discourse on green finance.

The analysis further highlights that China plays a central role in facilitating global collaboration. Notably, China has established research ties with countries from both the Global North and Global South, thereby acting as a key node in the international green finance research ecosystem. Alongside China, nations such as Japan, the United States, and the United Kingdom also emerged as pivotal actors within the global collaboration network. Their centrality suggests that much of the knowledge diffusion and academic networking in the field of green finance is concentrated around these countries, which serve as major contributors and connectors in the international research landscape.

2.6. Knowledge gap

Despite growing interest in green finance and its potential to address environmental challenges, there is a notable gap in the literature on the opportunities and challenges of green finance in Ethiopia. While many studies have been conducted around the globe to investigate these issues, there is a lack of research on this topic in Ethiopia, a country with unique economic and environmental circumstances. The Ethiopian economy is highly dependent on agriculture, which is highly vulnerable to climate change and environmental degradation. The country is also experiencing rapid urbanization, which puts pressure on its natural resources and contributes to environmental challenges such as air pollution and waste management. At the same time, there are opportunities for green finance in Ethiopia, such as the country's significant potential for renewable energy, including hydropower, wind, and solar. Additionally, the government has committed to promoting sustainable development through various policies and initiatives, including the Green Economy Strategy and the Climate Resilient Green Economy Strategy. However, significant challenges must be addressed to unlock the full potential of green finance in Ethiopia. These include a lack of awareness and understanding of green finance among stakeholders, Access to Finance, and a weak regulatory framework for environmental and social issues. In general, the lack of research on the opportunities and challenges of green finance in Ethiopia presents a significant knowledge gap that needs to be addressed. By conducting a comprehensive study on this topic, policymakers, financial institutions, and other stakeholders can better understand the potential of green finance to drive sustainable development in Ethiopia and address environmental challenges.

2.7.Hypotheses of the Study

Drawing from the reviewed literature, this study explores the role of green finance in Ethiopia by formulating key hypotheses that address its challenges and opportunities. Green finance has emerged as a critical tool for promoting sustainable economic development, yet its implementation in Ethiopia faces several constraints. Existing green growth strategies may have limitations in effectiveness, requiring targeted improvements to enhance their impact and scalability (H1). Additionally, Ethiopia's green finance initiatives reveal significant gaps, highlighting the need for further development (H2). Various obstacles, including regulatory barriers, limited financial resources, and low awareness, pose substantial challenges to the successful implementation of green finance programs (H3). Despite these challenges, green finance remains a vital mechanism for fostering inclusive and sustainable economic growth in the country (H4). By testing these hypotheses, this study aims to provide valuable insights into strengthening Ethiopia's green finance framework and advancing its sustainability agenda. The following hypotheses were developed for the study.

H1: Existing green growth strategies in Ethiopia face limitations in effectiveness, and targeted enhancements can improve their impact and scalability.

H2: Ethiopia's green finance initiatives exhibit significant gaps, creating opportunities for further development.

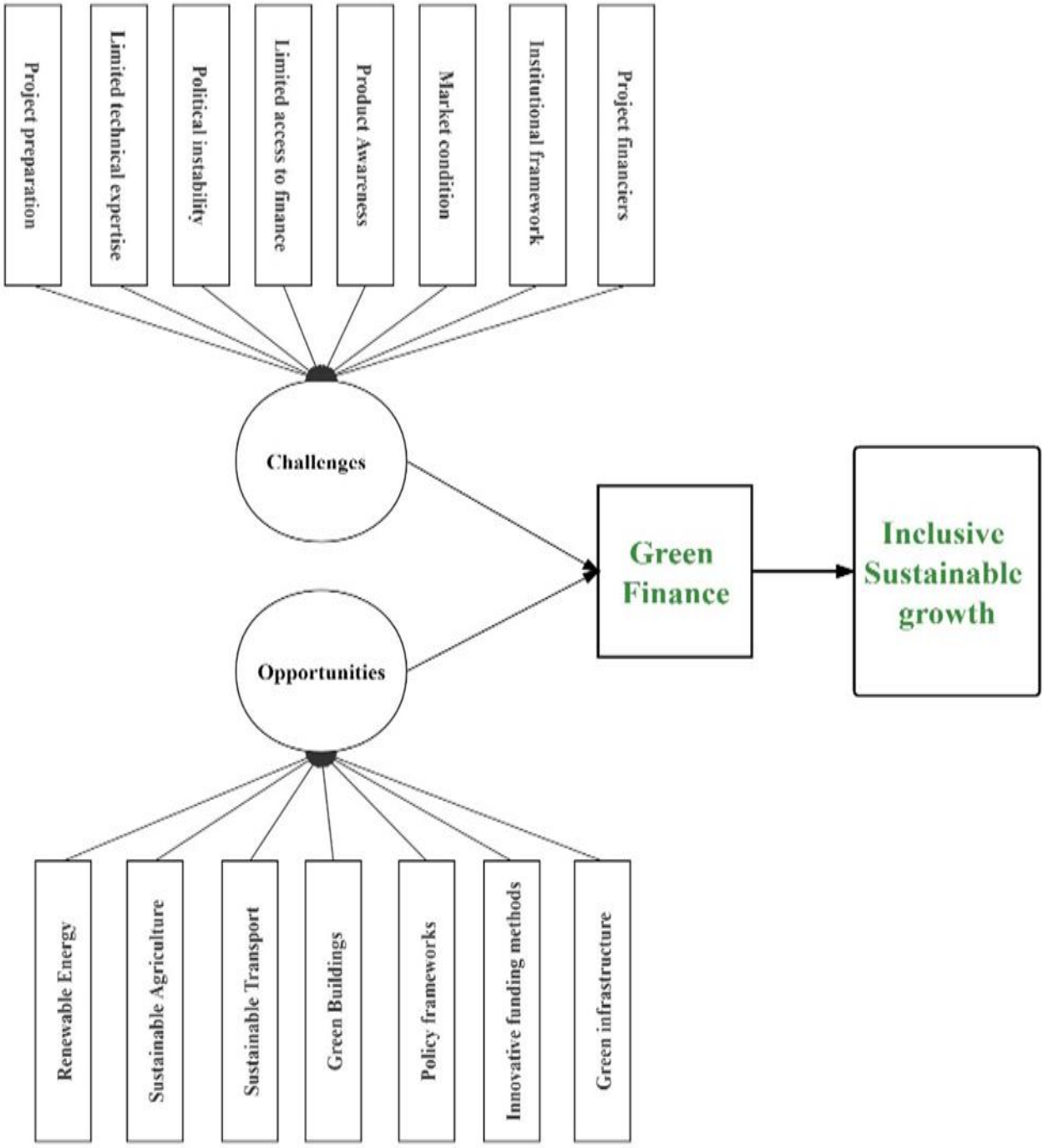
H3: Key challenges, such as regulatory barriers, limited financial resources, and low awareness, substantially hinder the effective implementation of green finance programs in Ethiopia.

H4: Green finance plays a crucial role in fostering inclusive and sustainable economic growth in Ethiopia.

2.8. Conceptual Framework

Figure 5 illustrates the proposed conceptual framework, structured in alignment with these hypotheses. Based on the empirical review and theoretical presumptions, the study created the following graphic representation of the conceptual framework.

Figure 5:Conceptual Framework



Source: Compiled by Author

3. RESEARCH METHODOLOGY

The theoretical and empirical foundations of green finance in the global market were examined in earlier sections of the study, particularly in section two. As a result, this section provides details on the study area, the research approach and design employed, describes the target population, outlines the sampling technique and determination of sample size, explains the type and source of data, provides specifics on the data collection method and instruments used, clarifies the strategies employed for data analysis, and thoroughly addresses issues of validity and reliability.

3.1. Research Design

The research design is the framework or blueprint that a researcher uses to carry out a study (Abutabenjeh & Jaradat, 2018). It describes the processes used to achieve the study objectives, including the data to be collected. There are many types of research designs, however, the choice of research design is based on the behavior of the study under investigation. Based on the behavior of the study under investigation, this study will use a triangulation research design to investigate the potential opportunities and challenges of green finance in Ethiopia. The triangulation design is a research approach that involves the simultaneous or sequential collection and analysis of multiple types of data to gain a comprehensive understanding of a research problem (Creswell, 2012). It combines quantitative and qualitative methods to provide a more robust and holistic perspective on the phenomenon under investigation. More specifically, the study will use a concurrent triangulation design that will be used in the simultaneous collection and analysis of quantitative and qualitative data (Siedlecki, 2020). This approach allows the researcher to understand the research problem. There are four variants of the triangulation design: the convergence model, the data transformation model, the quantitative data model, and the multilevel model.

The convergence model is the traditional approach in mixed-method triangulation design. In this model, the researcher collects and analyzes quantitative and qualitative data separately on the same phenomenon. The results are then compared and contrasted during the interpretation phase.

This model is used when researchers want to compare or validate quantitative results with qualitative findings, to draw valid and well-supported conclusions about a single phenomenon (Creswell, 2012).

The data transformation model is another option that researchers may choose to use (Creswell et al., 2004). This model also involves collecting and analyzing quantitative and qualitative data sets separately. However, after the initial analysis, the researcher employs procedures to transform one type of data into the other. This can be achieved by quantifying qualitative findings or by qualifying quantitative results. It becomes possible to integrate and compare the two data sets during the analysis stage by transforming the data.

The validated quantitative data model is used when researchers want to validate and enhance the findings obtained from a quantitative survey by incorporating a few open-ended qualitative questions (Creswell et al., 2004). In this model, both types of data are collected within a single survey instrument. Since qualitative items are an addition to a primarily quantitative survey, they generally do not result in a rigorous qualitative data set. However, they provide the researcher with interesting quotes that can be used to validate and enrich the findings of the quantitative survey. The fourth variant of the triangulation design, referred to as multilevel research, involves using different methods (quantitative and qualitative) to address various levels within a system. The findings obtained from each level are then integrated into a single overall interpretation (Creswell et al., 2004). As a result, this study uses a multilevel triangulation design to investigate the potential opportunities and challenges of green finance in Ethiopia.

3.2. Research Approach

A research approach is a way for a researcher to investigate a phenomenon and respond to a specific research question. There are many different research approaches, such as qualitative, quantitative, and mixed methods. The selection of the research approach is all down to the type of research question, data selection, and the study's objectives (Creswell, 2012).

The qualitative research approach is used when the researcher is interested in investigating people's experiences, views, and beliefs through techniques including in-depth interviews, observation, and focus groups. This approach aims to produce a deep understanding of the phenomenon under investigation and to shed light on the social and cultural setting in which it occurs (Creswell, 2012). It is further understood that qualitative research would be appropriate to investigate a particular phenomenon, the need for a complex and thorough understanding of a phenomenon, and the need to allow people to share their stories freely. Unlike the qualitative approach, adopting a quantitative approach can help scholars learn cause-and-effect reasoning, how to narrow down hypotheses and

questions to a few key variables, how to use measurement and observation to test theories, and how to use employee-driven inquiry methods such as surveys and experiments (Creswell, 2012).

The quantitative approach aims to generalize the findings of a sample to the entire population. It employs cross-sectional, longitudinal, and self-administered questionnaires. An advantage of a well-designed and conducted quantitative research technique is that the results of the sample can be generalized to a larger population.

The mixed research approach incorporates qualitative and quantitative research into a single study. This methodology is applied when a researcher wishes to compile both numerical data and a thorough understanding of a phenomenon. The use of mixed methods enables researchers to enhance their conclusions, triangulate data, and answer topics that are not open to a single approach. In a mixed research approach, qualitative and quantitative components can be integrated in different ways, such as collecting qualitative data before or after the quantitative data or simultaneously collecting qualitative and quantitative data. The combination allows researchers to explore and understand complex phenomena more comprehensively and overcome the limitations of each method. Due to the nature of the topic being investigated, which requires both qualitative and quantitative research approaches, the mixed research approach is employed to carry out the study at hand.

3.3. Data Type and Data Source

The study utilized both primary and secondary data sources to collect relevant information. Primary data was obtained through the use of questionnaires and in-depth interviews. The questionnaires were designed to contain closed-ended questions that are relevant to the study's topic and easy for the respondents to answer. The purpose of the questionnaires was to gather quantitative data that was used in the analysis of the study (Carolyn Boyce, 2006). The questionnaires were prepared with a Likert scale ranging from 1-5 (strongly agree to strongly disagree). Furthermore, in-depth interviews with key informants from selected organizations were conducted using unstructured questions.

The unstructured questions allowed for flexibility in the interview process, allowing for additional questions to be answered within the framework of the study's objectives (Qu & Dumay, 2011). In-depth interviews are helpful when the researcher wants to go deeper into a new topic or wants to

learn more about a person's ideas and actions. It frequently serves as a context for other data, giving a more thorough understanding of what transpired in the program. In-depth interviews have the main advantage of producing much more precise data than other data collection methods, such as surveys. Furthermore, they could provide a more relaxed environment for data collection; people might feel more comfortable speaking with the researcher directly about their program than completing a survey (Siedlecki, 2020). The main objective of the in-depth interviews was to assess the processes and practical challenges associated with the adoption of green finance in Ethiopia.

The secondary source of information was collected from different published and unpublished documents. Document reviews were used in the study to obtain important data. In document reviews, proclamations, regulations, and strategic plans for the Climate-Resilient Green Economy Strategy (CRGE), annual financial reports of financial institutions, including national banks, and other documents relevant to the study area were reviewed.

3.4. **Population, Sample Size, and Sampling Techniques**

The group of individuals or entities about which a researcher aims to investigate or draw conclusions is referred to as the target population. When designing a study, it is essential to consider the target population to ensure that the sample is appropriate. The sample is a subset of the target population that is selected for the study, and the sample needs to be representative of the target population so that the results can be applied to a larger group (Althubaiti, 2016). Inaccurately defining the target population can result in a biased sample, which can lead to incorrect conclusions. Therefore, it is crucial to identify and define the target population before selecting the sample.

The target population of the study at hand includes respondents from different organizations, including financial institutions (commercial banks), national banks, academicians, the Ministry of Economic and Finance, the Ministry of Planning and Development, and the Environment Commission. Hence, knowing the exact number of the target population is difficult. As a result, the study targets respondents from each organization. The selection process was based on the criteria set by the study which includes relevant positions (individuals who are in positions related to green finance in the organization such as Chief Financial Officers (CFO), Financial Managers, or Sustainability Managers), experience (those who have experience and knowledge of green finance, sustainability, environmental management, or related fields).

3.4.1. Sample Size

For this study, the authors used Corbetta's (2003) guidelines to calculate the sample size. They applied a 95% confidence level and a 5% margin of error to ensure the sample size was sufficient to produce reliable and meaningful results. The calculation was based on the Topman formula:

$$n = Z^2pq/e^2$$

n = required sample size

z = degree of confidence (i.e., 1.96)

p = probability of positive response (0.5)

q = probability of negative response (0.5)

e = tolerable error (0.05)

[n = (1.96) ^2 * 0.5 * 0.5 / (0.05) ^2] = 384

Based on the prescribed formula, this study includes a sample size of 384 respondents drawn from various sectors. Regarding sampling methods, the purposive and convenient sampling method was utilized. Purposive sampling is a non-probability approach where the researcher deliberately selects participants according to specific criteria (Etikan, 2016). This method aims to identify individuals who are most likely to possess the relevant information or characteristics required for the study, ensuring they can provide valuable insights to address the research questions effectively (Etikan, 2016). Out of the distributed questionnaires, 340 were returned, but 20 were incomplete. As a result, only 320 valid responses were analyzed.

3.5. Method of data analysis

This study used descriptive and inferential statistics to summarize and describe the main features of the dataset, such as central tendency and standard deviation, and to make inferences about a larger population based on a sample of data (Maguire and Delahunt, 2017). The data collected through the questionnaire were edited, coded, and analyzed using Microsoft Excel and SMART PLS software. The coding of the questionnaire responses was conducted on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). Various methods, including descriptive statistics and frequency distribution, were employed to evaluate and interpret the data collected from the respondents.

Additionally, the study utilized a measurement model to assess how effectively the questions represented opportunities and challenges as accurate reflections.

3.6. Reliability and Validity

To see the consistency or stability of a measurement or research tool, the reliability test is the most important (Fshani, 2003). A reliable measurement yields consistent results over time and in many contexts. This implies that the results should be consistent if the same measure is used repeatedly to gauge the same phenomenon. On the other hand, validity refers to the extent to which a measure or research instrument measures what it is intended to measure (Fshani, 2003). In other words, a valid measure accurately captures the phenomenon being studied. The study used composite reliability and Cronbach's alpha to carry out the reliability analysis, which is supposed to be the initial part of the measurement model. The cutoff threshold for Cronbach's alpha and composite reliability is expected to be higher than 0.70, following the benchmark set by (Sarstedt et al., 2020).

The second criterion of the measurement model is related to convergent validity; convergent validity helps determine the validity of data with an average variance extracted value (AVE). According to average variance criteria, each latent variable should score greater than 0.50 AVE to satisfy convergent validity (Sarstedt et al., 2020). Based on this fact, the study performs both reliability and validity tests to ensure the stability and accuracy of the measurements.

3.7. Ethical Considerations

Research ethics involves adhering to moral principles and professional codes of conduct during the collection, reporting, and publication of information about research subjects. This encompasses a sincere commitment to respecting subjects' rights to privacy, confidentiality, and informed consent. In this study, ethical standards were upheld by assuring participants that their authentic responses would be utilized solely for productive research outcomes and would be treated confidentially without revealing their identities. To achieve this, the data collected from participants underwent thorough screening, sorting, coding, categorization, and editing, aiming to eliminate any potential bias during the stages of discussion, analysis, and report writing.

4. DATA ANALYSIS AND PRESENTATION

In the preceding chapters, important literature that gives an understanding of the topic was reviewed and used to identify the knowledge gap in the study area. In line with the reviewed literature, the research problem, objectives, questions, and research design used for this study were also discussed. This chapter deals with the descriptive statistics of the data collected and the measurement model of the study to see if the model is viable.

4.1. Presentation of Results

The study distributed 384 questionnaires, primarily using Google Forms via email to various organizations' employees, including financial institutions, the Ministry of Economic and Finance, the Ministry of Planning and Development, the Ethiopian Environmental Protection Authority, the National Bank of Ethiopia, and the Climate and Resilient Green Economy Initiative office. Out of the total distributed questionnaires, 340 were returned. However, 20 of them were not properly filled out with some important questions, as a result, the study only considered 320 responses for analysis. These responses were collected from key personnel directly targeted for the study. The analysis was conducted using SPSS version 29 and R programming version 4.2.2. In this chapter, the researcher delves into the data collected from the target population, employing various tools for comprehensive analysis.

Table 1:Commutation of Respondents' Response Rate

Response from Respondents			
Distributed		Collected	
In No	In Per	In No	In Per
384	100%	320	83.3%

Source: Survey data, 2025.

4.2. Reliability Analysis

Reliability measures the internal consistency of the constructs/items used in the questionnaire. A construct/items of the research tools/in this case the questionnaire, is reliable if the Cronbach's alpha value of the scores of responses is greater than 0.7 (HAIR et al., 2013).

The study used data from all respondents to calculate Cronbach's alpha, a measure of the internal consistency of the questionnaire items, to assess the consistency of the scores obtained. As mentioned in the introduction section, this study was conducted to investigate the potential opportunities and challenges of green finance in promoting inclusive, sustainable growth in Ethiopia. In doing so, the study identified three main targets to explore the situation (opportunities, challenges, and the current status of green finance in Ethiopia). Based on these facts, the questionnaires were prepared for each proxy variable through different measurements. Accordingly, Cronbach's alpha results confirmed that the data collected in the study were found reliable, with each item in the questionnaire having an alpha value of greater than 0.70. Similarly, the overall result of Cronbach's alpha value is 0.74, which discloses all items' reliability. A summary of the reliability results is presented in Table 2 below.

Reliability analysis
Call: alpha (x = Green Finance)

Table 2:The Result of Reliability Analysis

raw_alpha	std.alpha	G6(smc)	average_r	S/N	ase	mean	sd	median_r
0.74	0.74	0.76	0.11	2.90	0.021	3.7	0.32	0.11
95% confidence boundaries: lower (0.7), alpha (0.74), upper (0.78).								

Source: R programming Software version 4.2.2 output

The reliability analysis conducted on the data collected affirms the internal consistency of the sur vey items. The Cronbach's alpha coefficient, a measure of how reliably the questions in the questi onnaire capture the underlying construct, was found to be 0.74. This indicates a high level of relia bility, as it surpasses the recommended threshold of 0.70. The standardized alpha, Guttman's Lam bda 6, and other indicators further support the robustness and consistency of the survey items.

The average inter-item correlation was 0.11, signifying a moderate degree of association between individual items. The signal-to-noise ratio, at 2.9, reinforces the strength of the signal relative to t he random noise in the data. The mean score of 3.7 suggests a generally positive response tenden cy among the participants. Additionally, the median inter-item correlation of 0.11 aligns with the average correlation, indicating a balanced distribution of item relationships. The 95% confidence intervals for reliability estimates fall between 0.7 and 0.78, providing a range within which the tr ue reliability of the questionnaire is likely to lie. These findings underscore the reliability and inte rnal consistency of the proxy questions prepared to measure the opportunities, challenges, and cu rrent status of Green Finance in Ethiopia, affirming its suitability for capturing meaningful insigh ts into the opportunities and challenges associated with green finance.

Table 3:The Result of Reliability Analysis for each Variable

Reliability if an item is dropped	raw_alpha	std.alpha	G6(smc)
Opportunities for Green Finance			
Renewable Energy (OP1)	0.73	0.73	0.75
Sustainable Agriculture (OP2)	0.73	0.73	0.75
Sustainable Transport (OP3)	0.73	0.74	0.75
Green Buildings (OP4)	0.72	0.73	0.75
Policy Frameworks (OP5)	0.73	0.74	0.75
Innovative Funding Methods (OP6)	0.74	0.74	0.75
Green Infrastructure (OP7)	0.72	0.73	0.75
Challenges of Green Finance			
Institutional Framework (C1)	0.73	0.74	0.75
Project Financiers (C2)	0.73	0.73	0.75
Market Conditions (C3)	0.73	0.73	0.75
Product Awareness (C4)	0.73	0.74	0.75
Access to Finance (C5)	0.73	0.74	0.75
Political Instability (C6)	0.73	0.73	0.75
Limited Technical Expertise (C7)	0.73	0.73	0.75
Project preparation (C8)	0.73	0.73	0.75
Current Status of Green Finance			
Concept of GF (CS1)	0.73	0.73	0.75
Green Finance Initiatives (CS2)	0.73	0.73	0.75
Green Finance Options (CS3)	0.73	0.74	0.75
Green Finance Supportive (CS4)	0.73	0.73	0.73
Green Finance Extent (CS5)	0.73	0.73	0.73
Availability of Green Finance (CS6)	0.73	0.73	0.73
Green Finance Awareness (CS7)	0.73	0.73	0.73
Green Finance Importance (CS8)	0.73	0.73	0.73

Source: R programming Software version 4.2.2 output

The reliability analysis was extended to assess the impact of dropping each item from the proxy questions prepared. These findings suggest that removing any single item from the questionnaire does not significantly impact the overall reliability, as reflected in the consistently high Raw Alpha, Standardized Alpha, and G6 values across all items. This indicates that each item contributes consistently to the internal consistency of the questionnaire, reinforcing the robustness of the Green Finance instrument in capturing reliable data related to opportunities and challenges of green finance in Ethiopia.

4.3. Demographic Characteristics of Respondents

This section provides an overview of the demographic information of the study participants, totaling 320 individuals. Factors such as age, gender, educational background, and professional experience were considered general characteristics of the respondents in this study. The subsequent paragraphs will delve into a detailed examination of the demographic data for each participant.

Table 4:Respondents' Gender Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	121	37.8	37.8	37.8
	Male	199	62.2	62.2	100.0
	Total	320	100.0	100.0	

Source: SPSS Version 29

A comprehensive analysis of the gender distribution table depicted in Table 4 above elucidates a notable trend in participant demographics, revealing a clear preponderance of male respondents in the study. This noticeable pattern is substantiated by the corresponding respondent response rate, providing additional evidence that the study predominantly attracted individuals identifying as male. The cumulative data further underscores this observation, indicating that a substantial majority, specifically 62.2%, of the respondents identified as male. In contrast, the female respondents accounted for 37.8% of the total participants. Consequently, the study concluded that the study's participant pool was characterized by a significant overrepresentation of the male gender. This conclusion is underscored by the fact that the majority of individuals who actively engaged in the study were male respondents.

Table 5:Respondents Age Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	39	12.2	12.2	12.2
	26-35	141	44.1	44.1	56.3
	36-45	110	34.4	34.4	90.6
	Above 46	30	9.4	9.4	100.0
	Total	320	100.0	100.0	

Source: SPSS Version 29

The age distribution table provided in Table 5 above explains the demographic composition of respondents concerning their age, shedding light on patterns within the study cohort. A noteworthy observation emerges, revealing that the majority of participants actively engaged in the study are within the age bracket of 26-35 years. This age group is the most predominant among the study respondents, suggesting a significant representation of individuals in their prime working years. The second-largest segment of respondents falls within the 36-45 age range, indicative of diverse perspectives and experiences within this cohort. The third-largest group encompasses individuals aged between 18 and 25, reflecting the inclusion of younger participants who bring a dynamic and fresh perspective to the study. Surprisingly, the respondents aged above 46 constitute the smallest group, suggesting a lesser degree of participation from individuals in the older age brackets.

Considering the productivity aspect, the study infers potential implications based on the age distribution. The concentration of respondents in the 26-35 age range, often considered the peak of professional productivity and career development, may indicate a cohort with substantial work experience and expertise. This age group may bring a wealth of knowledge and skill to the study, contributing valuable insights and perspectives. The 36-45 age bracket, while slightly older, likely comprises individuals within their careers, combining experience with a continued capacity for innovation and productivity. The inclusion of participants between 18 and 25 introduces a dynamic element, suggesting a blend of emerging talent and the infusion of youthful energy into the study. In conclusion, the age distribution of study respondents not only paints a portrait of the demographic composition but also offers valuable insights into the potential productivity and contributions of participants based on their respective age brackets. This nuanced understanding

of the respondent demographics enriches the study's context and informs future analyses and interpretations.

Table 6:Respondents' Educational Background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	1	.3	.3	.3
	BA Degree	30	9.4	9.4	9.7
	Msc Degree	216	67.5	67.5	77.2
	PhD and above	73	22.8	22.8	100.0
	Total	320	100.0	100.0	

Source: SPSS Version 29

Regarding the educational qualification of the respondents, the data presented in Table 6 above provides valuable insights into the educational landscape of the study participants. Notably, a substantial majority of respondents, constituting 67.5% of the total, indicated that they hold a master's degree (MSc). This dominant representation of individuals with advanced academic credentials suggests a cohort with a high level of specialized knowledge and expertise, potentially enriching the depth and quality of responses.

The second-largest group of participants comprises those with Doctoral degrees (PhD), accounting for 22.8% of the respondents. This signals a significant presence of individuals with the highest level of academic achievement, likely contributing nuanced perspectives and a profound understanding of the subject matter. The third-largest group in the study consists of respondents holding bachelor’s degrees (BA), representing 9.4% of the total participants. While this group is comparatively smaller, it introduces diversity in educational backgrounds, potentially offering a broader range of perspectives. The researcher draws a noteworthy conclusion from these findings, asserting that the majority of respondents possess educational qualifications surpassing a Master's degree. This observation leads to the inference that the study benefits from a high degree of reliability, given the correlation between educational level and the capacity to comprehend and respond thoughtfully to the study's inquiries. The prevalence of advanced degrees among the participants enhances the credibility of the study, suggesting a cohort with a heightened ability to engage critically with the subject matter.

Table 7:Respondents' Level of Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 years	5	1.6	1.6	1.6
	Between 6-10 years	45	14.1	14.1	15.6
	Between 11-15 years	151	47.2	47.2	62.8
	Above 16 years	119	37.2	37.2	100.0
	Total	320	100.0	100.0	

Source: SPSS Version 29

The data provided in Table 7 outlines the distribution of respondents based on their professional experience, revealing interesting patterns within the participant cohort. The frequency and percentage breakdowns offer a comprehensive understanding of the diversity in experience levels among those engaged in the study. An initial observation is that a small but notable segment of respondents, constituting 1.6%, possess less than 5 years of professional experience. This subgroup may represent individuals in the early stages of their careers, offering unique perspectives shaped by their relatively recent entry into the workforce. A more substantial proportion, comprising 14.1% of the total respondents, falls within the experience range of 6-10 years. This category likely encompasses professionals who have gained a moderate level of experience, contributing a blend of foundational insights and mid-level expertise to the study.

The most predominant group among the respondents is those with 11-15 years of experience, constituting a significant 47.2%. This suggests a substantial representation of experienced professionals who bring a wealth of knowledge and a mature understanding of their respective fields to the study. Their contributions may carry the weight of extensive practical insights and industry wisdom. A noteworthy 37.2% of respondents boast experience levels above 16 years. This category encompasses individuals with a wealth of practical knowledge, potentially serving as pillars of expertise within their domains. Their contributions may significantly impact the depth and richness of the study findings. In conclusion, the distribution of respondents based on their professional experience reveals a diverse cross-section of participants at different stages of their careers. This diversity is poised to enrich the study with a multifaceted perspective, incorporating insights from both early-career professionals and seasoned experts.

The cumulative effect of this varied experience spectrum contributes to the robustness and applicability of the study findings across a broad range of professional contexts.

4.4. Descriptive statistics of the study

The study employs descriptive statistics to explain the distribution of the dataset concerning the variables under consideration, namely the challenges, opportunities, and current status of green finance in Ethiopia. This comprehensive summary of descriptive statistics aims to unveil key parameters such as the minimum, maximum, mean, and standard deviation for each variable of the study. In the preceding section of the study, the opportunities within the realm of green finance in Ethiopia are operationalized through seven different measurements, namely Renewable Energy (OP1), Sustainable Agriculture (OP2), Sustainable Transport (OP3), Green Buildings (OP4), Policy Frameworks (OP5), Innovative Funding Methods (OP6), and Green Infrastructure (OP7). Correspondingly, the challenges inherent in green finance in Ethiopia are assessed by eight proxy questions, including Institutional Framework (C1), Project Financiers (C2), Market Conditions (C3), Product Awareness (C4), Access to Finance (C5), Political Instability (C6), Limited Technical Expertise (C7), and Project preparation (C8). Each of these proxy questions encompasses three specific questions, with the aggregate response of participants utilized in subsequent data analysis.

It is imperative to note that each proxy question originated from three distinct sub-specific questions. Moreover, to assess the present status of green finance in Ethiopia, a series of questions denoted as CS1 to CS8 were formulated. These questions summarize various dimensions pertinent to the current state of green finance. The following table summarizes the descriptive statistics derived from 320 observations. The particular deployment of descriptive statistics not only provides a comprehensive overview of the dataset but also facilitates a nuanced understanding of the challenges, opportunities, and current dynamics within the domain of green finance in Ethiopia. This analytical approach ensures a robust foundation for subsequent analyses and interpretations, enriching the overall quality and reliability of the study's findings.

Table 8:Descriptive Statistics of the Study

	N	Minimum	Maximum	Mean	Std. Deviation
OP1	320	1	5	3.81	.859
OP2	320	2	5	4.14	.708
OP3	320	1	5	3.76	.772
OP4	320	1	5	3.66	.895
OP5	320	1	5	3.48	.889
OP6	320	1	5	3.57	.872
OP7	320	1	5	3.68	.869
C1	320	1	5	3.67	.872
C2	320	1	5	3.22	.939
C3	320	1	5	3.62	.822
C4	320	1	5	3.70	.811
C5	320	1	5	3.45	.939
C6	320	1	5	3.73	.762
C7	320	1	5	3.87	.801
C8	320	1	5	3.91	.739
CS1	320	1	5	3.65	.798
CS2	320	1	5	4.03	.705
CS3	320	1	5	3.34	1.007
CS4	320	1	5	3.94	.773
CS5	320	1	5	3.62	.738
CS6	320	1	5	3.50	.892
CS7	320	1	5	3.83	.790
CS8	320	1	5	4.01	.738
Valid N (listwise)	320				

Source: SPSS 29 output.

Note: OP1-OP7 represent observed variables on opportunity, C1-C8 represent observed variables on challenges of green finance, and CS1-CS8 represent observed items on the current status of green finance in Ethiopia. The decision rules employed in the analysis, as outlined by Best and

Khan (1995), stipulate that an average mean less than 3 is considered low, an average mean equal to 3 is categorized as medium, and an average mean greater than 3 is deemed high. In the subsequent section, a comprehensive exploration of all variables will be undertaken, providing a detailed examination and discussion of their specific attributes and characteristics. The mean distribution of the latent variable "opportunity" exhibits a consistent trend, with all observed questions, namely Renewable Energy (OP1), Sustainable Agriculture (OP2), Sustainable Transport (OP3), Green Buildings (OP4), Policy Frameworks (OP5), Innovative Funding Methods (OP6), and Green Infrastructure (OP7), having mean values greater than 3.

According to the criteria established by Best and Khan (1995), this indicates that the opportunities within the realm of green finance in Ethiopia achieve a mean value categorized as high (all are greater than 3 mean score values). This observation suggests a favorable and robust assessment of the opportunities associated with Renewable Energy, Sustainable Agriculture, Sustainable Transport, Green Buildings, Policy Frameworks, Innovative Funding Methods, and Green Infrastructure within the context of green finance in Ethiopia. Even though all the observed variables scored more than 3 mean values, sustainable agriculture was the highest observed variable, scoring a 4.14 mean value. Next to sustainable agriculture, renewable energy was the second highest observed variable that has a great opportunity in Ethiopia for enhancing green finance. However, the variable innovative funding methods and policy framework received less scoring value compared to others. This result implies that Ethiopia's policies and frameworks need to be improved to enhance green finance. At the same time, innovative funding methods need to be improved. Based on the above descriptive statistics, working towards sustainable agriculture and renewable energy in Ethiopia can be considered a priority sector for enhancing green finance in Ethiopia.

In assessing the challenges of green finance in Ethiopia, various proxy questions were employed, including Institutional Framework (C1), Project Financiers (C2), Market Conditions (C3), Product Awareness (C4), Access to Finance (C5), Political Instability (C6), Limited Technical Expertise (C7), and Project Preparation (C8). The descriptive analysis's outcomes revealed that all observed variables exhibit mean values surpassing 3, emphasizing the highest mean scores associated with Project Preparation and Limited Technical Expertise.

The finding underscores a critical aspect of the challenges faced by green finance projects in Ethiopia, highlighting a significant impact arising from insufficient project preparation and a scarcity of technical expertise in this domain. Proper project preparation is vital for the successful implementation of green finance projects, ensuring that initiatives are well-structured, planned, and executed to achieve their intended environmental and financial goals.

Moreover, the identified lack of technical expertise highlights a crucial problem, as the success of green finance projects relies heavily on specialized knowledge and skills. The consistent correlation between limited technical expertise and the inadequacy of project preparation further underscores the need for targeted interventions to address this challenge comprehensively.

The implications of these findings suggest that strategic measures and investments are imperative to enhance project preparation processes and bolster technical expertise in the green finance domain in Ethiopia. Addressing these challenges head-on not only ensures the viability of individual projects but also contributes to the overall resilience and sustainability of the green finance sector in the country. As Ethiopia navigates the complex landscape of green finance, a concerted effort towards building capacity, improving technical proficiency, and refining project preparation methodologies emerges as a crucial step towards overcoming these challenges and fostering a more robust and successful green finance ecosystem.

Finally, descriptive statistics were conducted to provide holistic insights into the current green finance status in Ethiopia. Among the areas used to measure the status of green finance in Ethiopia, Green Finance Initiatives, which is operationalized as the second question related to the current status of green finance (CS2), has the highest average score of 4.03, showing that people feel positive about the efforts to promote green finance. On the other hand, Green Finance Options (CS3) has the lowest average score of 3.34, with the highest variation among responses, meaning people have mixed opinions or experiences about the variety of green finance choices. Green Finance Importance (CS8) also scores high (4.01), showing that people believe green finance is very important. From these results, a few key points stand out. First, while initiatives to promote green finance are well-regarded, there seem to be gaps in the availability of options (CS3) and resources (CS6). This could make it harder for people to fully benefit from green finance.

Second, the high score for awareness (CS7) shows that people are familiar with green finance, which is a positive sign for future progress. Lastly, the strong scores for support (CS4) and importance (CS8) suggest that people value green finance and believe it plays a significant role.

4.5. Measurement Model of the study

The study further employed a measurement model to examine the relationship between the latent variable and its respective outer loadings, as depicted in the following table. This analysis was conducted using the lavaan package within the R programming language, which facilitated structural equation modeling (SEM) to explore the underlying associations comprehensively. The subsequent section of the study presents a detailed analysis of the results for each variable, providing insights into their contributions and overall impact within the study's framework.

Table 9:The Result of the Measurement Model -Opportunities of Green Finance

Opportunities for Green Finance	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
Renewable Energy (OP1)	0.390	0.058	6.748	0.000	0.390	0.436
Sustainable Agriculture (OP2)	0.379	0.056	6.751	0.000	0.379	0.436
Sustainable Transport (OP3)	0.224	0.050	4.432	0.000	0.224	0.290
Green Buildings (OP4)	0.289	0.056	5.175	0.000	0.289	0.337
Policy Frameworks (OP5)	0.270	0.058	4.647	0.000	0.270	0.304
Innovative Funding Methods (OP6)	0.217	0.057	3.794	0.000	0.217	0.249
Green Infrastructure (OP7)	0.286	0.046	6.253	0.000	0.286	0.405

Source: R programming Software version 4.2.2 output

According to the findings, there is a strong correlation between the construction of green finance opportunities and every question that was utilized in this study to reflect its opportunities. This result was confirmed by the Std.lv values, which indicate the strength of the relationship between the latent construct and each indicator. All the standardized factor loadings (Std.lv) are positive, suggesting a positive association between the latent constructs and their respective indicators. Based on the provided output, all the indicators (OP1 to OP7) have positive and statistically significant standardized factor loadings on their respective latent constructs. These results suggest that the indicators are effective in measuring the underlying constructs related to opportunities for Green Finance.

More specifically, each indicator used in this study to measure the opportunities of green finance from different aspects, such as Renewable Energy, Sustainable Agriculture, Sustainable Transport, Green Buildings, Policy Frameworks, Innovative Funding Methods, and Green Infrastructure, demonstrates a statistically significant contribution to the latent variable. The p-values for all indicators are remarkably low (all being 0.000), underscoring the high significance of these relationships. The findings suggest that investments and initiatives in Renewable Energy, Sustainable Agriculture, Sustainable Transport, Green Buildings, Policy Frameworks, Innovative Funding Methods, and Green Infrastructure are integral components contributing significantly to the overall construct of "Opportunities of Green Finance." This robust statistical support enhances confidence in the validity of these relationships within the structural equation model.

Table 10:The Result of the Measurement Model - Challenges of Green Finance

Challenges of Green Finance	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
Institutional Framework (C1)	0.255	0.056	4.574	0.000	0.255	0.293
Project Financiers (C2)	0.344	0.060	5.765	0.000	0.344	0.367
Market Conditions (C3)	0.282	0.052	5.392	0.000	0.282	0.344
Product Awareness (C4)	0.214	0.052	4.120	0.000	0.214	0.264
Access to Finance (C5)	0.276	0.060	4.592	0.000	0.276	0.294
Political Instability (C6)	0.223	0.049	4.581	0.000	0.223	0.293
Limited Technical Expertise (C7)	0.282	0.051	5.542	0.000	0.282	0.353
Project preparation (C8)	0.269	0.047	5.710	0.000	0.269	0.364

Source: R programming Software version 4.2.2 output

The latent variable challenges of green finance and the outside loading of this variable are measured using the same methodology, as was previously indicated. Notably, the Institutional Framework exhibits a positive and statistically significant correlation with the challenges of green finance, as indicated by an estimated coefficient of 0.255 and a standardized loading of 0.293. Furthermore, the other variable identified as the challenge of green finance is Project Financiers. This variable has a substantial standardized loading of 0.367, suggesting a pronounced impact on the challenges. Market Conditions also contribute significantly, as evidenced by an estimate of 0.282 and a standardized loading of 0.344. Limited Product Awareness, though slightly lower in estimate at 0.214, is nonetheless a meaningful contributor, as indicated by a standardized loading

of 0.264. Additional challenges arise from Access to Finance (estimate of 0.276 and a standardized loading of 0.294), Political Instability (estimate of 0.223 and a standardized loading of 0.293), Limited Technical Expertise (estimate of 0.282 and a standardized loading of 0.353), and Project Preparation (estimate of 0.269 and a standardized loading of 0.364). Collectively, these results shed light on the multifaceted nature of challenges associated with green finance, providing valuable insights for policymakers, investors, and other stakeholders seeking to address and overcome these impediments in sustainable financial endeavors.

Table 11:The Result of the Measurement Model - Current Status of Green Finance

Current Status of Green Finance	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
Concept of GF (CS1)	0.306	0.052	5.892	0.000	0.306	0.384
Green Finance Initiatives (CS2)	0.225	0.046	4.869	0.000	0.225	0.320
Green Finance Options (CS3)	0.343	0.066	5.218	0.000	0.343	0.342
Green Finance Supportive (CS4)	0.316	0.050	6.300	0.000	0.316	0.409
Green Finance Extent (CS5)	0.240	0.048	4.974	0.000	0.240	0.326
Availability of Green Finance (CS6)	0.321	0.058	5.523	0.000	0.321	0.361
Green Finance Awareness (CS7)	0.298	0.051	5.798	0.000	0.298	0.378
Green Finance Importance (CS8)	0.265	0.048	5.505	0.000	0.265	0.360

Source: R programming Software version 4.2.2 output

The current status of green finance sheds light on the multifaceted factors influencing the landscape of green finance practices in Ethiopia. Firstly, the clear Concept of Green Finance (CS1), denoted by an estimate of 0.306 and a standardized loading of 0.384, showcases a substantial and highly significant association with the overall status of green finance. This underscores the importance of a well-defined conceptual foundation. Green Finance Initiatives (CS2) contribute significantly, as indicated by an estimate of 0.225 and a standardized loading of 0.320, signifying a positive and meaningful impact on the current state. Diverse Green Finance Options (CS3), reflected by an estimate of 0.343 and a standardized loading of 0.342, play a pivotal role, suggesting that the availability of a range of options positively influences the status of green finance. Moreover, a Supportive Environment for Green Finance (CS4) exhibits a robust association, with an estimate of 0.316 and a standardized loading of 0.409, highlighting the critical role of a supportive ecosystem in shaping the current landscape.

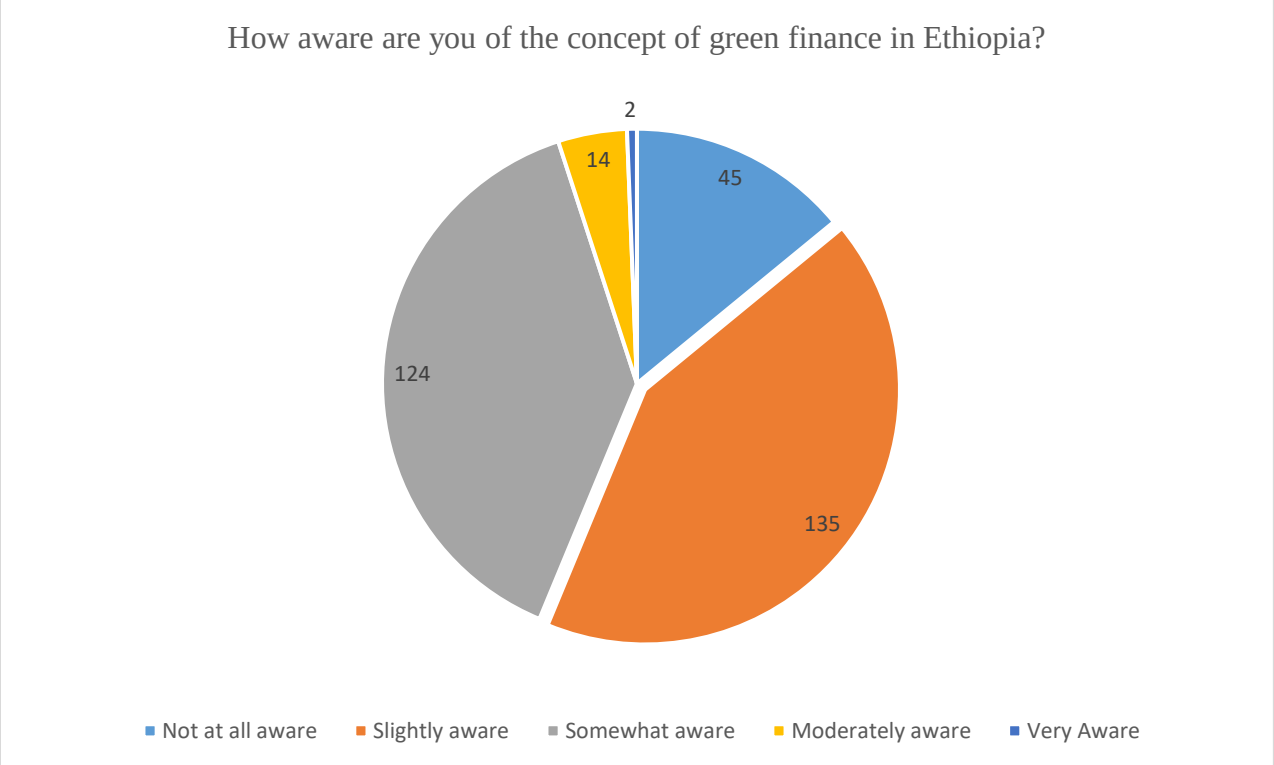
The Extent of Green Finance Activities (CS5) also contributes significantly, with an estimate of 0.240 and a standardized loading of 0.326, emphasizing the impact of the scale of initiatives on the overall status. Furthermore, the Availability of Green Finance (CS6), Awareness about Green Finance (CS7), and the Perceived Importance of Green Finance (CS8) all show positive and significant relationships, with estimates ranging from 0.298 to 0.321 and standardized loadings ranging from 0.361 to 0.378. These findings collectively paint a comprehensive picture of the nuanced factors contributing to the status of green finance, providing valuable insights for stakeholders aiming to foster and advance sustainable financial practices.

4.6. Results and Discussion

This section presents the study's key findings for each question and provides a detailed analysis of their implications for the research objectives. The results are systematically organized to address the questions related to the current status of green finance, opportunities, and challenges.

4.6.1. Results on Current Status of Green Finance

Figure 6:Respondents' Response on Green Finance Awareness



Source: Compiled by Author.

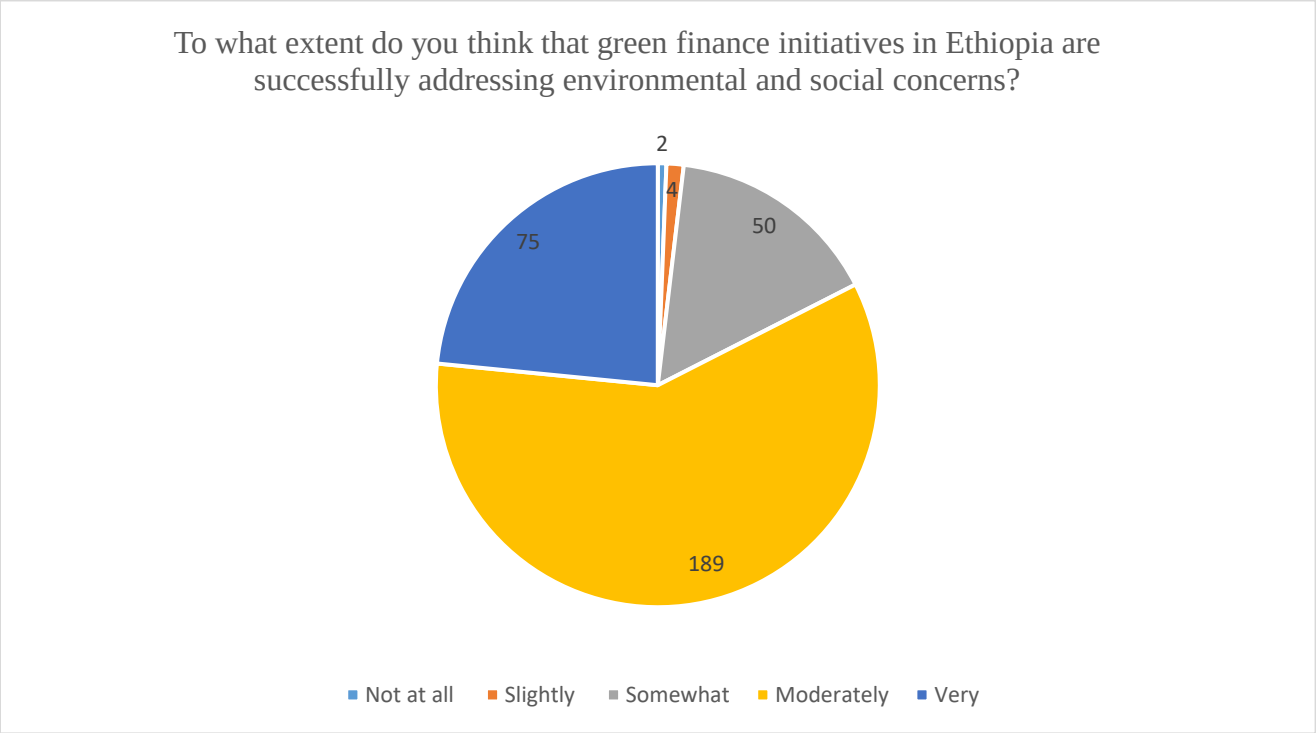
Note: CS1 represents the first question used to measure the current status of green finance in Ethiopia.

The results presented in Figure 6 reveal that a relatively small percentage of participants, precisely 16 respondents (5%), exhibit moderate to very high levels of awareness regarding green finance in Ethiopia. On the other hand, 95% of respondents demonstrate limited or no awareness of green finance, underscoring the need for comprehensive efforts to enhance understanding of this critical concept. The results suggest that while there is some foundation of awareness, a vast majority of participants lack sufficient familiarity with green finance and its applications.

The descriptive statistics provide further insight, with a mean value of 3.65 and a standard deviation of 0.798, indicating that a significant gap persists while the overall awareness is within a favorable range. The measurement model further validates this finding, with a P-value of 0.000 underscoring the reliability of this variable (CS1) in accurately representing the latent construct of green finance awareness.

The interview findings corroborate these results, identifying several key factors contributing to the limited awareness of green finance in Ethiopia. Respondents highlighted insufficient educational outreach programs, such as workshops, campaigns, and initiatives to disseminate information on green finance, as a limitation of green finance. The lack of independent institutions specifically focused on green finance further worsens this gap. Additionally, the absence of clear definitions and integration of green finance concepts with sustainable development goals and climate change standards creates ambiguity among stakeholders. Moreover, inadequate communication channels, limited access to media, and poor internet connectivity were cited as significant barriers to effectively transmitting knowledge of green finance in Ethiopia. Government priorities that do not emphasize green finance and the absence of a robust financial infrastructure supporting green banking services and incentives were also identified as critical obstacles.

Figure 7:Respondents' Response on Green Finance Initiatives



Source: Compiled by Author.

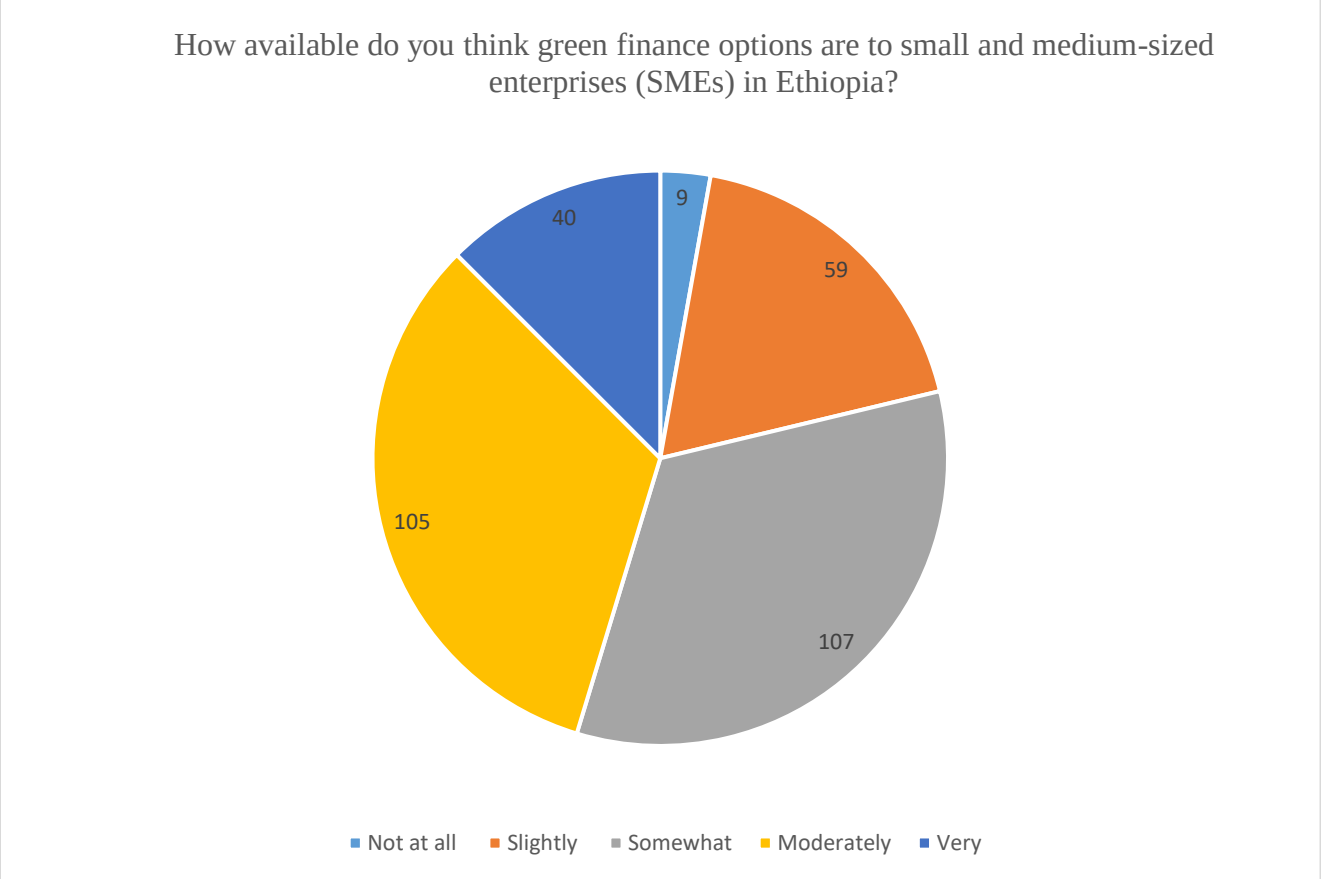
Note: CS2 represents the second question used to measure the current status of green finance in Ethiopia.

The data presented in Figure 7 demonstrates that a substantial majority of respondents, 264 individuals (82.5%), hold a moderate to very high level of belief in the effectiveness of green finance initiatives in Ethiopia in addressing environmental and social concerns. Another 50 respondents perceive these initiatives as somewhat successful, while only a minimal segment, comprising six individuals, rates their success as low, ranging from "not at all" to "slightly" successful.

The descriptive statistics complement these findings, with a mean score of 4.03 and a standard deviation of 0.705. The mean value, positioned within a favorable range, reflects an overall positive perception of the success of green finance initiatives in addressing environmental and social concerns. The relatively low standard deviation signifies an agreement among participants, indicating that the majority align in their assessment of these initiatives. Furthermore, the statistical significance indicated by a P-value of 0.000 confirms the robustness of the variable (CS2) in accurately capturing the respondents' perceptions regarding the success of green finance initiatives.

These results imply that green finance initiatives in Ethiopia are largely perceived as effective in addressing environmental and social concerns. This positive assessment highlights the growing awareness and recognition of green finance's potential to drive sustainable development. However, the responses from the small percentage of participants expressing low confidence in these initiatives suggest areas for further enhancement, such as improving communication, implementing strategies, or expanding stakeholder engagement. By addressing these gaps, policymakers and stakeholders can strengthen the impact and reach of green finance initiatives, ensuring they more effectively contribute to Ethiopia's sustainability goals.

Figure 8:Respondents' Response on Green Finance Options



Source: Compiled by Author.

Note: CS3 represents the third question used to measure the current status of green finance in Ethiopia.

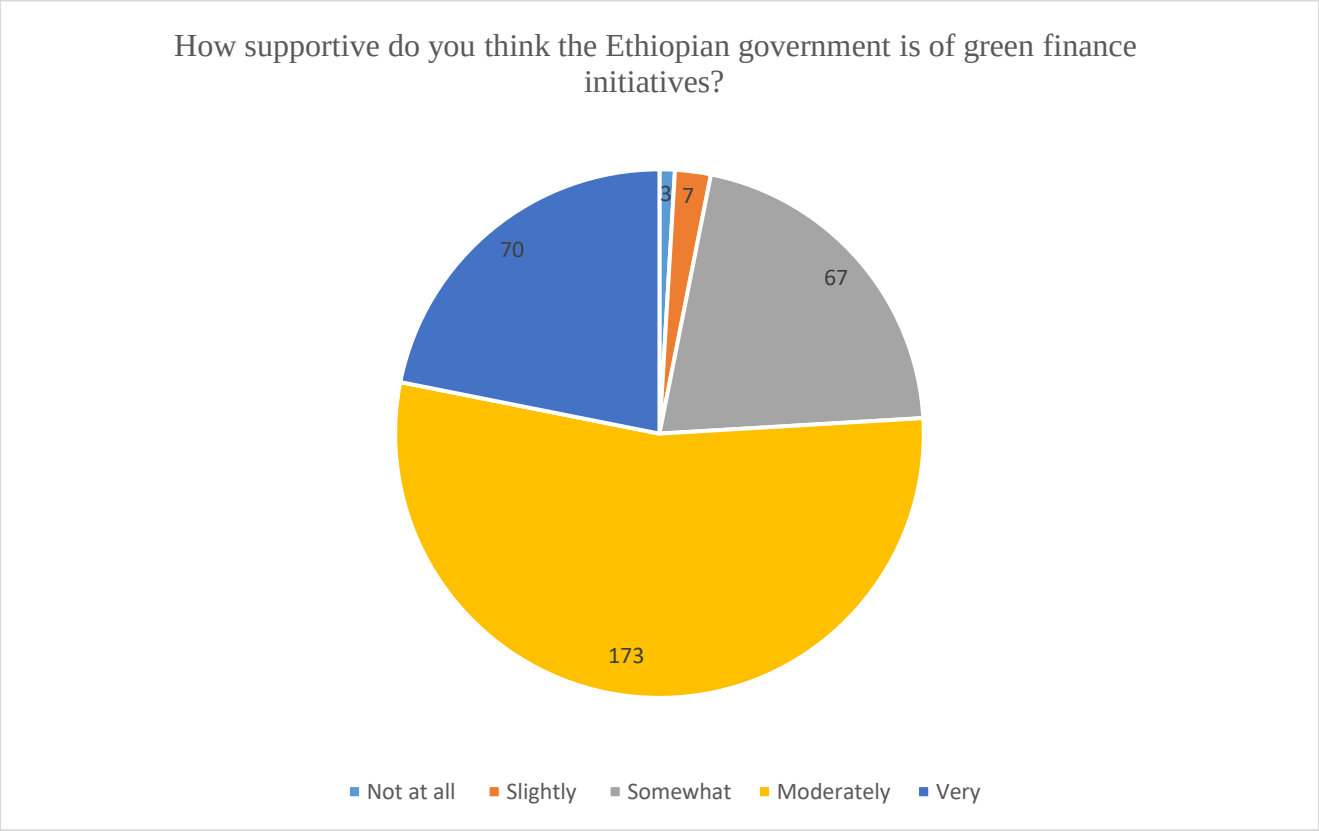
The responses from Figure 8 indicate varying degrees of belief among the participants regarding the accessibility of green finance for SMEs. The majority of respondents, totaling 145 (45.3

percent), express a moderate to very high perception of the availability of green finance options. While 107 (33.4 percent) respondents perceive them as somewhat available. However, a notable portion, consisting of 68 individuals (21.25 percent), indicates a lower level of confidence, ranging from "not at all" to "slightly" available.

The descriptive statistics provide additional context, with a mean score of 3.34 and a standard deviation of 1.007. The mean value, falling within a moderately positive range, suggests a general perception that green finance options for SMEs are available. The standard deviation, indicating a relatively wide distribution of responses, highlights some diversity in opinions among participants regarding the accessibility of green finance for SMEs. The statistical significance (P-value of 0.000) in the measurement model reinforces the reliability of the variable (CS3) in capturing and representing the latent construct related to the availability of green finance options for SMEs. Overall, the findings suggest a varied but generally positive perception among respondents regarding the accessibility of green finance options for small and medium-sized enterprises in Ethiopia. From this, the accessibility of green finance to small and medium-sized enterprises is not supported by the respondents.

Considering the response rate of the participants, the study endeavors to examine secondary data about the accessibility of green finance options for small and medium enterprises (SMEs) in Ethiopia. While the explicit terminology of "green finance" may not be directly utilized, there exists an alternative avenue known as sustainable finance, specifically designed to bolster the endeavors of small and medium-sized enterprises. According to data from the Ministry of Finance and Economic Development, the government administers a distinct fund called the Sustainable Development Fund. This fund is allocated to support small and medium-sized enterprises engaged in agricultural activities and other enterprises in the agro-industry sector. Further insights from interviews with personnel from the Ministry of Economic and Finance affirm that a separate fund is established to support small and medium enterprises in Ethiopia. However, it is important to note that this fund is not explicitly dedicated to activities aligned with sustainable development goals or those falling within the purview of green finance. Despite the lack of direct association with these specific domains, the government's commitment to facilitating financial support for SMEs engaged in various sectors remains evident through establishing and allocating dedicated funds to foster economic development within the country.

Figure 9:Respondents' Response on Green Finance Support



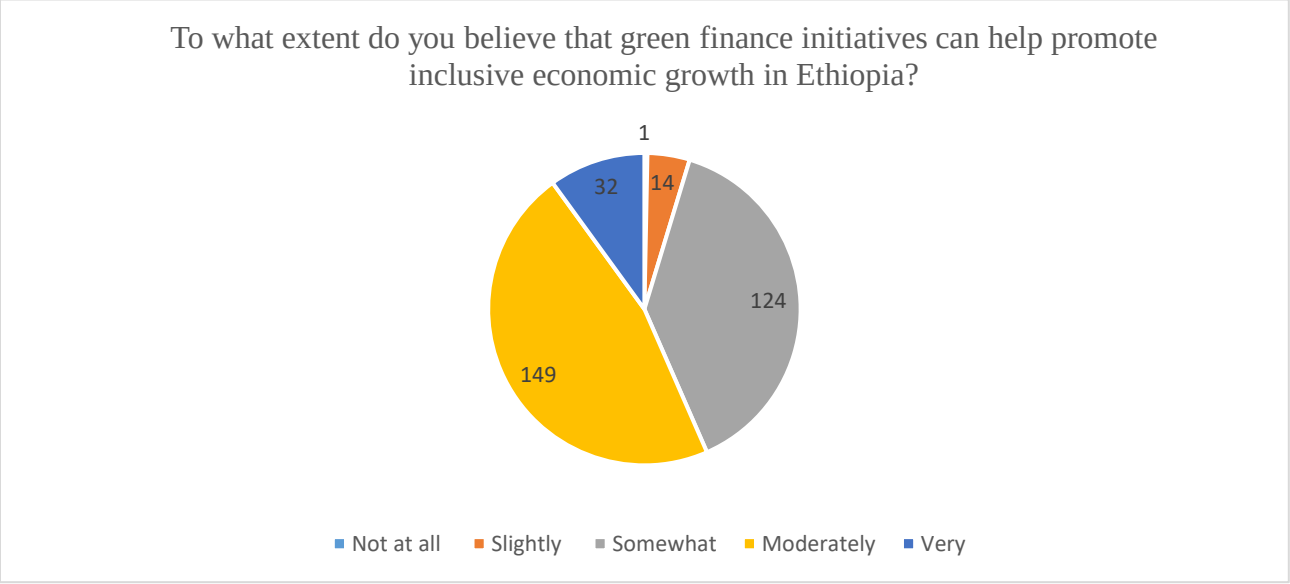
Source: Compiled by Author.

Note: CS4 represents the fourth question used to measure the current status of green finance in Ethiopia.

The above figure 9 reveals respondents' degrees of belief regarding the government's support for green finance initiatives in Ethiopia. Most participants, including 243 individuals (76 percent), express a moderate to remarkably high perception of the Ethiopian government's support for green finance. Meanwhile, 67 respondents perceived it as supportive. However, a smaller yet notable segment of 10 individuals indicates a lower level of confidence, ranging from "not at all" to "slightly" supportive. The descriptive statistics offer additional context, with a mean score of 3.94 and a standard deviation of 0.773. The mean value, falling within a positive range, indicates an overall favorable perception of the Ethiopian government's support for green finance initiatives. The standard deviation, representing a relatively narrow distribution of responses, suggests a consensus among participants regarding the perceived level of governmental support. The statistical significance (P-value of 0.000) in the measurement model underscores the robustness of

the variable (CS4) in capturing and representing the latent construct related to the government's support for green finance initiatives. Overall, the findings suggest a generally positive perception among respondents regarding the level of support from the Ethiopian government for green finance initiatives, indicating a favorable trend in the perceived commitment to sustainable financial practices at the governmental level. Additionally, the outcomes derived from interviews underscore a substantial commitment on the part of the Ethiopian government toward endorsing green finance and fostering an overarching green economy within the nation. The interviews reveal that this commitment is not merely rhetorical but is substantiated by concrete strategies that have been meticulously planned and executed. The response of the participants further emphasizes this dedication, particularly citing the establishment of a green legacy by the Prime Minister as a noteworthy illustration of the government's support for green finance and the broader green economy. This commitment, demonstrated through strategic planning and tangible initiatives, signifies a proactive approach by the Ethiopian government to champion environmentally sustainable financial practices and contribute to the development of a greener and more sustainable economy in the country.

Figure 10:Respondents' Response on the Role of Green Finance in Promoting Inclusive Economic Growth



Source: Compiled by Author.

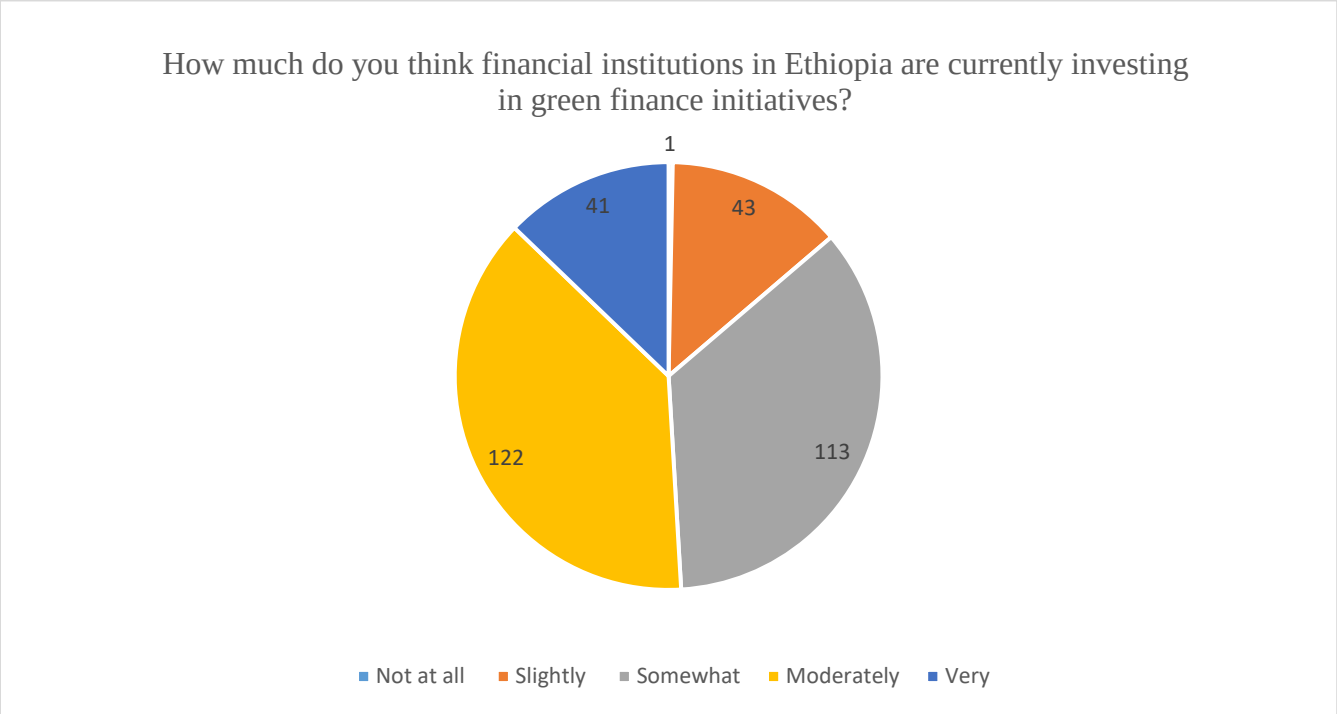
Note: CS5 represents the fifth question used to measure the current status of green finance in Ethiopia.

Respondents' perspectives on the potential of green finance initiatives to drive inclusive economic growth in Ethiopia show a range of beliefs, reflecting varied degrees of confidence in the efficiency of these initiatives. The above figure 10 illustrates that a substantial segment, comprising 181 individuals (56.5 percent), holds a moderate to very high level of belief regarding the capacity of green finance initiatives to contribute to economic inclusivity. In contrast, a smaller yet noteworthy group of 15 individuals expresses a lower level of confidence, ranging from "not at all" to "slightly" impactful. Nevertheless, a substantial proportion of respondents, amounting to 124, 38.75 percent, have acknowledged to some extent the significance of green finance in fostering inclusive economic growth in Ethiopia.

Delving into the descriptive statistics offers further insight, with a mean score of 3.62 and a standard deviation of 0.738. The positive mean value indicates an overall favorable perception of the potential impact of green finance initiatives on inclusive economic growth. The relatively low standard deviation suggests a convergence of opinions among participants, emphasizing consensus in their views.

The statistical significance, as denoted by a P-value of 0.000, underscores the robustness of the variable (CS5) in effectively capturing and representing the underlying construct related to the potential of green finance initiatives in promoting inclusive economic growth. In summary, the findings unveil a prevailing optimistic outlook among respondents, signifying a collective belief in the transformative role of green finance initiatives in advancing inclusive economic growth in Ethiopia. This revelation aligns with the outcomes derived from interviews with key stakeholders. The interviewees, who hold valuable insights into various sectors, have corroborated the importance of green finance initiatives in advancing inclusive economic growth. This affirmation is particularly significant given Ethiopia's rich endowment of renewable energy resources, sustainable agriculture, and a commitment to a green legacy. The convergence of responses from both survey participants and key personnel underscores a widespread recognition of the pivotal role that green finance plays in promoting economic inclusivity, leveraging the nation's abundant resources for sustainable and environmentally friendly development.

Figure 11:Respondents' Response on the Role of Financial Institutions



Source: Compiled by Author.

Note: CS6 represents the sixth question used to measure the current status of green finance in Ethiopia.

The study gathered data to examine the current investment practices of financial institutions in Ethiopia in the realm of green financial initiatives. This information is presented through a detailed analysis encompassing frequency distribution, descriptive statistics, and the measurement model utilized in the research. The study's findings, as indicated in the provided figure 11, shed light on the varied perceptions of respondents regarding the level of investment undertaken by financial institutions in Ethiopia towards green finance initiatives.

According to the study's outcomes, respondents hold diverse viewpoints on the current dedication of financial institutions to invest in green finance. A significant portion of the participants, totaling 163 (51 percent) individuals, articulate a moderate to very high level of belief in the commitment of financial institutions toward green finance initiatives. On the other hand, a smaller but noteworthy segment, comprising 44 (13.75 percent) individuals, expresses a lower level of confidence, ranging from "not at all" to "slightly" committed. These results underscore the

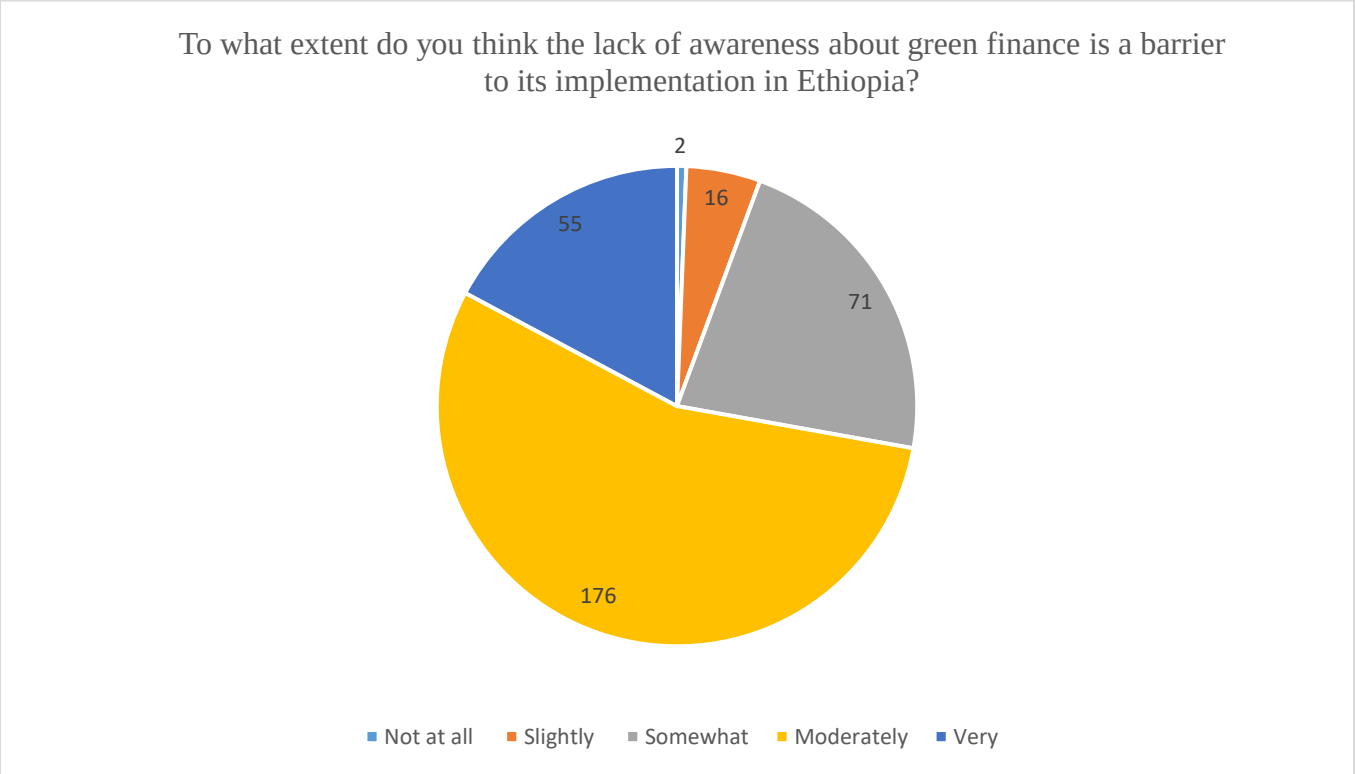
variability in the beliefs held by respondents regarding the commitment of financial institutions in Ethiopia to invest in green finance.

The descriptive statistics provide additional context, with a mean score of 3.50 and a standard deviation of 0.892. The mean value, falling within a positive range, indicates an overall favorable perception of the current investment by financial institutions in green finance initiatives. The standard deviation, representing a relatively wide distribution of responses, suggests some diversity in opinions among participants regarding the perceived commitment of financial institutions to green finance. The statistical significance (P-value of 0.000) in the measurement model underscores the reliability of the variable (CS6) in capturing and representing the latent construct related to the perceived investment by financial institutions in green finance initiatives.

About this matter, the study also engaged in interviews with various stakeholders from diverse financial institutions, including the National Bank of Ethiopia. The responses obtained from the interviews also indicated a spectrum of beliefs among respondents concerning the issue at hand. According to the interview findings, only two private banks, Awash Bank and Dashen Bank, are actively attempting to integrate environmental considerations into their project finances. However, it is noteworthy that the details of these funds lack clarity, as there is no written documentation or strategic plan outlining their application.

The interviews further affirm that there is no legal obligation imposed on commercial banks to allocate a specific amount of money or funds towards environmentally friendly projects. Neither the National Bank of Ethiopia nor government officials exerts any force on banks in this regard. This practice distinctly illustrates that any bank operating in Ethiopia has the autonomy to decide whether or not to contribute to environmental causes or provide financing for environmentally friendly investments, solely based on the will of the bank itself. Overall, the findings suggest a generally optimistic outlook among respondents regarding the commitment of financial institutions in Ethiopia to invest in green finance, though opinions may vary to some extent.

Figure 12:Respondents' Response on the Level of Awareness of Green Finance



Source: Compiled by Author

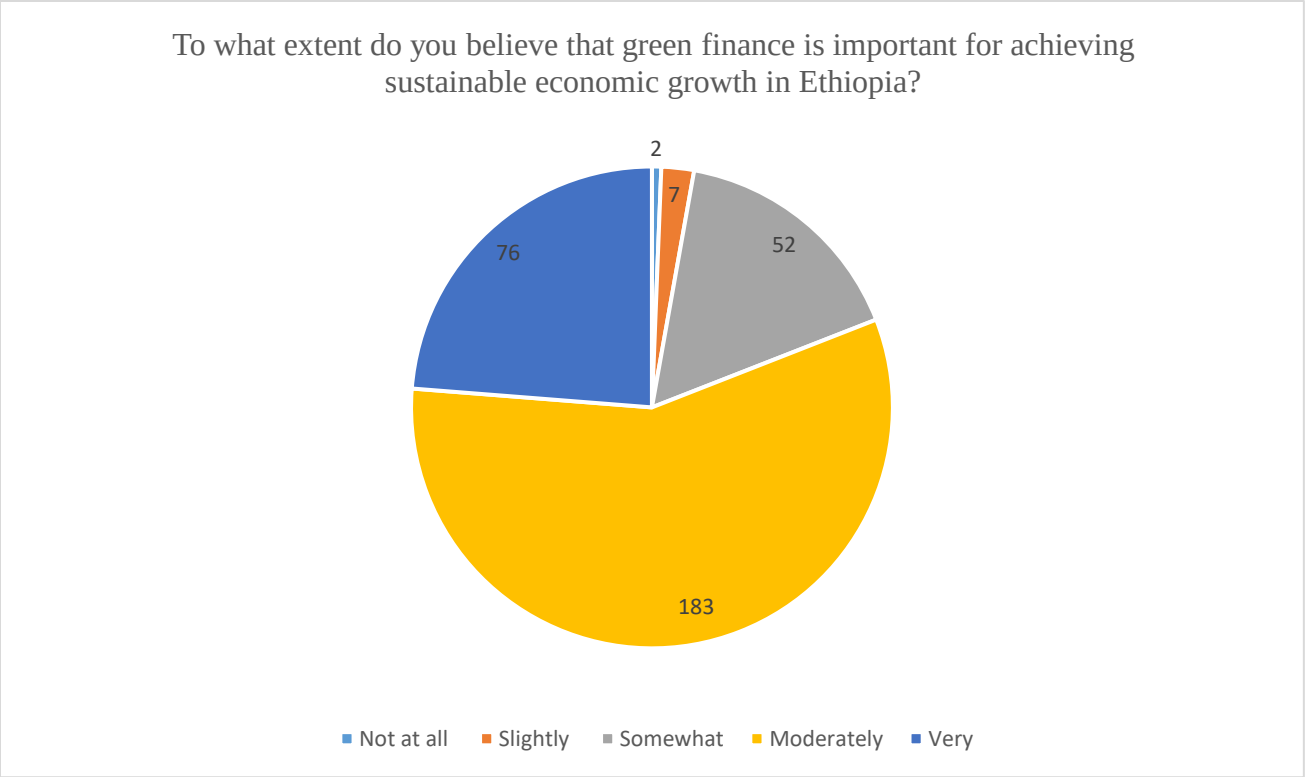
Note: CS7 represents the seventh question used to measure the status of green finance in Ethiopia.

The data elucidated in the frequency distribution, descriptive statistics, and measurement model deliver valuable insights into the perceived role of awareness, or its absence, as a barrier to the successful implementation of green finance initiatives in Ethiopia. As depicted in Figure 12, respondents articulate various opinions regarding the degree to which a lack of awareness hampers the effective execution of green finance initiatives in Ethiopia. A significant majority of participants in the study, comprising 231 individuals (72.18 percent), conveyed that the lack of awareness poses a moderate to very high barrier to implementing green finance in Ethiopia.

Conversely, a smaller yet noteworthy segment, comprising 18 individuals, expressed a lower level of concern, ranging from “not at all” to “slightly” significant, regarding this issue. Furthermore, the results from descriptive statistics provide additional contextual information, with a mean score of 3.83 and a standard deviation of 0.790. The mean value, falling within a positive range, indicates an overall perception that the lack of awareness is a significant barrier to the implementation of green finance in Ethiopia. The standard deviation, indicative of a relatively narrow distribution of

responses, implies a consensus among participants concerning the perceived impact of awareness (or lack thereof) on the successful implementation of green finance initiatives. The statistical significance (P-value of 0.000) in the measurement model underscores the reliability of the variable (CS7) in capturing and representing the latent construct related to the perceived barrier of lack of awareness in the implementation of green finance initiatives. Overall, the findings suggest a shared concern among respondents regarding the pivotal role of awareness in the successful implementation of green finance in Ethiopia.

Figure 13:Respondents' Response on the Importance of Green Finance in Achieving Sustainable Growth



Source: Compiled by Author

Note: CS8 represents the eighth question used to measure the status of green finance in Ethiopia.

Finally, the last question used to measure the current state of green finance in Ethiopia was related to the importance of green finance for achieving sustainable economic growth, which was reflected in variable CS8. The data collected through frequency distribution illustrates a noteworthy consensus among respondents, with a substantial majority, 311(97 percent) individuals expressing opinions ranging from “Somewhat” to “Very” important.

This finding in Figure 13 highly implies that green finance is important for achieving sustainable economic growth in Ethiopia. The mean value of 4.01 suggests a relatively high average level of belief in the significance of green finance, indicating a collective acknowledgment of its role in fostering sustainable economic development. The standard deviation of 0.738 indicates that these opinions are moderately clustered around the mean, portraying a degree of coherence among respondents. Furthermore, the p-value of 0.000 attests to the statistical significance of the observed data, reinforcing the notion that the belief in the importance of green finance is significantly different from a scenario where there is no belief at all. This data implies a strong recognition among respondents regarding the pivotal role that green finance plays in driving sustainable economic growth in Ethiopia. This finding aligns particularly well with the insights gathered through interviews. All interview participants affirmed the significance of green finance in fostering sustainable economic growth in Ethiopia. Respondents underscored that to achieve the objectives outlined in the specific Climate-Resilient Green Economy strategy, placing a heightened emphasis on green finance is imperative.

More explicitly, they emphasized that despite a lack of awareness among many individuals and institutions regarding green finance, the economy is undergoing a noticeable transformation due to the impacts of climate change.

The respondents highlighted the necessity of prioritizing green finance as a key component in addressing the challenges posed by climate change. They stressed that even though there may be limited awareness about green finance, the observable changes in the economy underscore the urgency of incorporating environmentally sustainable practices. This underscores the crucial role that green finance can play in mitigating the effects of climate change and promoting a more sustainable economic trajectory for Ethiopia.

4.6.2. Results of Respondents' Response on Challenges of Green Finance

To examine the challenges of green finance in Ethiopia, key issues were identified and incorporated into a structured questionnaire using proxy questions. Each proxy question was further assessed through specific sub-questions. A Likert scale was utilized to gauge respondents' opinions, with reverse coding applied to transform its alignment. In this system, 1 indicated "Strongly Agree," while 5 represented "Strongly Disagree," reversing the conventional order.

Although the questions were designed for simplicity and ease of comprehension, the reversed coding aimed to capture more nuanced perspectives ranging from strong agreement to strong disagreement.

This systematic approach enabled a thorough evaluation of the challenges in green finance, providing a detailed understanding of respondents' views within the Ethiopian context. Furthermore, frequency distribution analysis, supported by descriptive statistics and measurement models, ensured consistent reporting. The study found a general tendency toward agreement on the variables, as evidenced by the mean values, standard deviations, and the significant p-value (0.000) for all variables in the measurement model. For each variable, the data was transformed, and the average was computed to establish a unified variable. The following section of the study discusses the details of each variable based on frequency distribution, measurement model, and descriptive analysis results.

Table 12:Respondents' Response on Institutional Framework

1	Institutional Framework							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
IF1	37	196	58	21	8			
IF2	34	157	76	47	6			
IF3	61	139	106	13	1			
C1(IF)	44	164	80	27	5	3.67	.872	0.000

Source: SPSS 29 output

Note: C1 represents the first question used to measure the challenges of green finance in Ethiopia. IF1: The existing institutional framework in Ethiopia adequately supports the implementation of green finance. IF2: A clear and well-defined regulatory framework is in place for green finance initiatives in Ethiopia. IF3: The coordination and collaboration between different government agencies and stakeholders regarding green finance is effective.

The survey aimed to assess the challenges of green finance in Ethiopia, specifically focusing on the institutional framework, regulatory clarity, and coordination among stakeholders. The results

of the survey reflected in table 12, as reflected in the responses to questions IF1, IF2, and IF3, highlight significant concerns about the current system's ability to support green finance initiatives in the country.

Existing Institutional Framework (IF1)

Regarding the adequacy of the existing institutional framework in supporting the implementation of green finance, a significant majority of respondents (72.8%, 233 respondents) disagreed, suggesting a prevalent belief that the current institutions are not equipped to adequately support green finance. Only a small minority (12%, 29 respondents) agreed, with 8.3% (27 respondents) remaining neutral. This indicates a widespread sentiment that institutional frameworks are insufficient or ineffective in facilitating green finance initiatives. Interviews with respondents echoed this view, pointing out challenges such as the absence of a clear strategy for green finance and implementation difficulties, including limited institutional capacity.

Regulatory Framework (IF2)

When examining the clarity of the regulatory framework for green finance, 58.9% (191 respondents) disagreed or strongly disagreed that a clear and well-defined framework exists. In contrast, only 15.5% (49 respondents) agreed, while 25.6% (80 respondents) were neutral. This finding reveals a strong perception that the regulatory environment for green finance is underdeveloped or unclear, which could hinder the success of green finance initiatives. Further interviews with experts indicated that the lack of a comprehensive and robust regulatory framework is a major obstacle to the advancement of green finance in Ethiopia.

Coordination Among Stakeholders (IF3)

The issue of coordination and collaboration between government agencies and other stakeholders was also examined. The results indicated that 63.3% (200 respondents) disagreed with the assertion that there is effective coordination in place. Only 6% (14 respondents) agreed, and a significant portion (32.5%, 105 respondents) remained neutral. This shows a clear concern about the lack of effective coordination between relevant parties, which is critical for the successful execution of green finance projects. The interview results also confirmed that this fragmentation among stakeholders significantly impedes the effectiveness of green finance policies and initiatives in Ethiopia.

Overall Perception of Challenges (C1)

The cumulative data on the challenges of green finance in Ethiopia, represented by C1 (Institutional Framework), reveals a mean response score of 3.67, with a standard deviation of 0.872. The P-value of 0.000 indicates that the results are statistically significant, suggesting a strong agreement among respondents that the existing institutional framework, regulatory framework, and coordination mechanisms are inadequate for supporting the implementation of green finance in Ethiopia. This reinforces the finding that these challenges are deeply ingrained and need urgent attention. As highlighted by one of the interviewees, "The lack of a cohesive strategy and fragmented coordination significantly hampers green finance efforts."

The survey results highlight a widespread perception that Ethiopia's institutional framework, regulatory environment, and stakeholder coordination are insufficient to support the effective implementation of green finance. The significant number of disagreements across the three areas (IF1: 72.8%, IF2: 58.9%, IF3: 63.3%) indicates the need for substantial improvements in these critical aspects to enable the successful promotion and implementation of green finance in the country. These findings reinforce the notion that the existing challenges must be addressed to unlock the potential of green finance in Ethiopia. This finding is consistent with other studies conducted in different economies (Lupu, Criste & Victor, 2022)

Table 13:Respondents' Response on Project Financiers

2	Project Financiers							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
PF1	28	79	165	42	6			
PF2	32	86	128	66	8			
PF3	33	87	150	75	7			
C2(PF)	31	84	137	61	7	3.22	.939	0.000

Source: SPSS 29 output

The second proxy question used to measure the challenges of green finance in Ethiopia addresses the role of project financiers, represented by the variable C2. This variable includes three sub-questions: PF1, PF2, and PF3, which examine the support provided by financial institutions for

green projects, the difficulties in securing long-term financing, and the adequacy of knowledge and expertise within financial institutions to evaluate and finance green projects.

Active Support and Funding for Green Projects (PF1)

PF1 explored whether financial institutions in Ethiopia actively support and provide sufficient funding for green projects. The responses showed in Table 13 above that 33.4% (107 respondents) disagreed, indicating that financial institutions are not providing sufficient support. 15% (49 respondents) agreed, and 51.6% (162 respondents) remained neutral. This highlights a clear concern regarding the level of active support and funding for green projects, pointing to a gap in financial institutions' involvement in green finance. Interviews with stakeholders reinforced these findings, revealing that financial institutions are largely disconnected from green finance due to a lack of regulatory pressure or strategic focus. Many banks and financial entities are not prioritizing green initiatives and may require further incentives or mandates to become more involved.

Difficulties in Securing Long-Term Financing (PF2)

PF2 examined whether green projects face difficulties in securing long-term financing from traditional financial institutions. 36.9% (118 respondents) disagreed that long-term financing is a challenge, while 23.1% (74 respondents) agreed, and 39.7% (128 respondents) remained neutral. The disagreement expressed by a large portion of respondents (36.9%) points to some positive developments, where green projects are not necessarily struggling to secure long-term funding. However, the neutral and agreeing responses suggest that many still perceive long-term financing as a challenge, which indicates that traditional banks are not providing sufficient support for green projects. Interviews also highlighted that the lack of legal obligations for financial institutions to provide long-term financing for green projects remains a key barrier. Many banks remain focused on traditional lending practices, limiting their involvement in green projects.

Knowledge and Expertise in Financial Institutions (PF3)

PF3 focused on whether financial institutions in Ethiopia possess adequate knowledge and expertise to evaluate and finance green projects. The responses revealed that 37.5% (120 respondents) disagreed, suggesting that financial institutions lack the necessary expertise. On the other hand, 25.6% (82 respondents) agreed, and 46.8% (150 respondents) were neutral. The relatively high percentage of neutral responses indicates varying levels of expertise across different

financial institutions. Interviews with financial experts confirmed that there is a notable shortage of green finance specialists within institutions, which hinders their ability to effectively evaluate and finance green projects. The absence of a dedicated green finance initiative or a specialized unit within these institutions further complicates their ability to fully support green projects.

Overall Perception of Challenges (C2)

Aggregating the responses from PF1, PF2, and PF3, the data shows that there are significant challenges faced by financial institutions in supporting green finance initiatives. The mean score of 3.22, with a standard deviation of 0.939, reflects a moderate level of agreement regarding the challenges associated with project financiers in the realm of green finance. The p-value of 0.000 indicates that these results are statistically significant. The variability in responses emphasizes the diverse opinions regarding the support, knowledge, and expertise of financial institutions in financing green projects.

The concerns raised by respondents, coupled with interview insights, underscore the need for a stronger regulatory environment and greater engagement from financial institutions in green finance initiatives. Specifically, there is a need for improved expertise, clearer strategic focus, and a supportive regulatory framework to promote green projects. In conclusion, the findings suggest that project financiers in Ethiopia face substantial challenges in supporting green finance. A large number of respondents expressed concerns over the active support and funding from financial institutions (PF1: 33.4% disagreement), difficulties in securing long-term financing (PF2: 36.9% disagreement), and the lack of expertise within financial institutions (PF3: 37.5% disagreement). Addressing these challenges requires greater institutional commitment, enhanced expertise, and a more supportive policy and regulatory environment to enable green finance initiatives to thrive in Ethiopia.

Table 14:Respondents Response on Market Conditions

3	Market Conditions							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
MC1	38	165	98	19	0			
MC2	23	160	109	27	1			
MC3	59	113	117	26	5			
C3(MC)	40	146	108	24	2	3.62	.822	0.000

Source: SPSS 29 output

The variable C3, representing market conditions as a challenge for green finance, summarizes three key aspects: demand for green financial products and services (MC1), availability of such products and services (MC2), and access to appropriate market mechanisms and incentives (MC3). Analyzing the responses provides a comprehensive view of market-related barriers to green finance in Ethiopia. The details of the frequency distribution are provided in Table 14 above.

Demand for Green Financial Products and Services (MC1)

MC1 explored the perceived demand for green financial products and services in Ethiopia. A significant portion of respondents (203 or 63.4%) disagreed with the assertion that demand is high, indicating uncertainty about the prevalence of demand for green financial offerings. Only 19 respondents (6%) agreed, while 98 respondents (30.6%) adopted a neutral position. These findings highlight a prevailing perception that the demand for green finance products in Ethiopia is not substantial, potentially signaling limited market interest or awareness of these offerings

Availability of Green Financial Products and Services (MC2)

MC2 examined the availability of green financial products and services in the Ethiopian market. A majority of respondents (183 or 57.18%) disagreed that these offerings are sufficiently available, further emphasizing the inadequacy of green financial services in the market. Conversely, 28 respondents (8.75%) agreed with the statement, and 109 respondents (34.06%) remained neutral. This distribution suggests that market supply lags, with insufficient offerings to meet even the existing modest demand for green finance products.

Access to Market Mechanisms and Incentives (MC3)

MC3 assessed whether green projects face challenges in accessing appropriate market mechanisms and incentives. Surprisingly, 172 respondents (53.75%) disagreed that such mechanisms pose a significant barrier, suggesting that access to market mechanisms and incentives may not be a primary issue. In contrast, 31 respondents (9.7%) agreed with the statement, while 117 (36.56%) maintained a neutral stance. This unexpected result indicates that challenges in green finance may not stem predominantly from a lack of market mechanisms but rather from other structural and systemic issues.

Overall Perception of Challenges (C3)

Aggregating the responses to the three sub-questions, the data suggests that market conditions in Ethiopia do present challenges to green finance, though these challenges are nuanced. The responses to MC1 and MC2 indicate an agreement on the lack of demand and insufficient supply of green financial products and services, while MC3 suggests that market mechanisms and incentives may not be as significant a hurdle as expected.

The mean response score of 3.62 reflects a moderate level of agreement on average regarding the challenges posed by market conditions. A standard deviation of 0.822 highlights relatively consistent levels of opinion among respondents. The measurement model further validates these findings, with a statistically significant p-value of 0.000 confirming the robustness of the results.

The challenges related to market conditions in promoting green finance in Ethiopia primarily stem from low demand for green financial products and services and insufficient supply from financial institutions. While market mechanisms and incentives are not perceived as major barriers, aligning the forces of demand and supply remains crucial for fostering a thriving green finance market. These findings underscore the need for strategic interventions to boost awareness, enhance product availability, and stimulate market demand for green finance initiatives in Ethiopia.

Table 15:Respondents' Response on Product Awareness

4	Product Awareness							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
PA1	62	173	81	3	1			
PA2	36	131	119	28	6			
PA3	43	146	115	14	2			
C4(PA)	47	150	105	15	3	3.70	.811	0.000

Source: SPSS 29 output

Variable C4, representing product awareness as a challenge for green finance, consists of three key dimensions: awareness among potential investors and consumers (PA1), the effectiveness of promotional and marketing efforts (PA2), and the adequacy of education and information dissemination (PA3). A detailed analysis of the responses reveals significant barriers related to awareness in promoting green finance in Ethiopia. The above Table 15 implies the details of the frequency distribution.

Awareness Among Potential Investors and Consumers (PA1)

PA1 examined whether there is sufficient awareness of green financial products and services among potential investors and consumers in Ethiopia. A vast majority of respondents (235 or 73.4%) disagreed that there is awareness, pointing to a major gap in public knowledge regarding green financial offerings. Only 4 respondents (1.25%) agreed with the statement, and 81 respondents (25.3%) were neutral.

These results highlight a critical deficiency in awareness among potential consumers and investors, which limits the growth of green finance in the country. Interviews with key stakeholders, including financial experts and green project developers, revealed a similar sentiment. They mentioned that many investors and the general public are still unfamiliar with green finance, often viewing it as a niche market. This lack of awareness prevents the wider adoption of green financial products and services in Ethiopia, hindering the development of sustainable projects.

Effectiveness of Promotional and Marketing Efforts (PA2)

PA2 focused on evaluating the effectiveness of promotional and marketing efforts for green financial products and services. A significant portion of respondents (167 or 52.18%) disagreed with the statement that marketing efforts are effective, indicating that current promotional strategies are insufficient in reaching and educating the target audience. 34 respondents (10.6%) agreed, while 119 respondents (37.22%) remained neutral.

These findings suggest that existing marketing efforts are failing to create sufficient awareness or interest in green finance. Interviews with marketing professionals and financial institutions pointed out that many marketing strategies are either poorly targeted or not sufficiently widespread. There is also a lack of clear communication regarding the benefits of green finance and how it differs from conventional financing options. This gap in effective promotion exacerbates the low awareness observed in PA1, further inhibiting market growth.

Adequacy of Education and Information Dissemination (PA3)

PA3 explored whether the public is receiving adequate education and information on green finance. The responses revealed that 189 respondents (59%) disagreed that the level of education and information dissemination is satisfactory, signaling significant gaps in public knowledge about green finance. Only 16 respondents (5%) agreed, and 115 respondents (36%) were neutral.

The lack of adequate education and information dissemination emerges as another critical barrier to green finance in Ethiopia. Stakeholder interviews revealed that there is a shortage of training and public awareness programs on green finance. While some financial institutions and government agencies have started to raise awareness, many respondents expressed that the educational materials available are not detailed or accessible enough to engage the public. This deficit prevents individuals and businesses from fully understanding how to access and benefit from green financial products.

Overall Perception of Challenges (C4)

When combining the responses from PA1, PA2, and PA3, product awareness is a significant challenge in promoting green finance in Ethiopia. PA1 and PA2 highlight a substantial lack of awareness and ineffective marketing strategies, while PA3 emphasizes the need for better public

education and information dissemination. These combined issues underscore the necessity of concerted efforts to raise awareness, improve promotional activities, and enhance educational outreach about green finance. The measurement model further supports these conclusions, with a mean score of 3.72, indicating moderate agreement among respondents on the challenges posed by product awareness. A standard deviation of 0.784 reflects consistent responses across the sample, and the p-value of 0.000 confirms the statistical significance of the results.

In conclusion, addressing the challenges related to product awareness is critical for the successful promotion of green finance in Ethiopia. Targeted interventions to improve public knowledge, enhance marketing strategies, and boost educational efforts will be essential for building a well-informed market that is receptive to green financial products and services. These actions are vital for fostering the growth and success of green finance initiatives in Ethiopia.

Table 16:Respondents' Response on Access to Finance

5	Access to Finance							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
AF1	51	118	115	33	3			
AF2	39	123	99	52	7			
AF3	30	119	113	53	5			
C5	40	120	109	46	5	3.45	.939	0.000

Source: SPSS 29 output

The variable C5, representing access to finance as a challenge for green finance, covers three main aspects: the affordability of financing options (AF1), the appeal of financing criteria (AF2), and the presence of specialized financial institutions or funds (AF3). Analyzing the responses provides a comprehensive understanding of the financial obstacles hindering the advancement of green finance in Ethiopia. Additionally, the results from interviews conducted with key stakeholders provide further insights into these challenges, complementing and supporting the survey findings. Table 16 shows the details of the frequency distribution result.

Affordability of Financing Options (AF1)

AF1 explored the extent to which financing for green projects is affordable in Ethiopia. A large portion of respondents (169 or 52.8%) disagreed with the statement suggesting the availability of affordable financing options, indicating that financing remains a significant challenge for green initiatives. In a smaller group, 36 respondents (11.25%) agreed that such options are accessible, while 115 respondents (35.94%) were neutral.

These findings reflect a major barrier to the growth of green projects in Ethiopia, where high financing costs limit access and hinder the implementation of environmentally sustainable initiatives. Interviews with stakeholders, including representatives from financial institutions and green project developers, revealed a similar concern. Many expressed that the interest rates on loans for green projects are significantly higher than for traditional projects, making them unaffordable for many potential green initiatives. Moreover, the lack of favorable terms and conditions for such projects further compounds this issue, as financial institutions are reluctant to take risks on projects without proven financial stability.

Attractiveness of Financing Criteria (AF2)

AF2 examined whether financial institutions in Ethiopia offer attractive criteria for providing financing to green projects. The majority of respondents (162 or 50.6%) disagreed that the criteria were favorable, suggesting that financial institutions' conditions for granting loans are not particularly appealing or tailored to green projects. In contrast, 59 respondents (18.43%) agreed that the criteria were attractive, while 99 respondents (30.97%) held a neutral stance.

The widespread disagreement indicates a perception that the current criteria set by financial institutions are a hindrance to green project development. Interviews with financial institution representatives highlighted that although there is growing interest in green finance, the stringent criteria for loan approval often do not align with the specific needs of green projects, which typically require flexible repayment schedules and lower interest rates. Many institutions have cited concerns about the perceived risk of green projects and the lack of collateral or financial history to back such ventures, making them less attractive for financing.

Availability of Specialized Financial Institutions or Funds (AF3)

AF3 explored whether Ethiopia has specialized financial institutions or funds dedicated to supporting green projects. A substantial proportion of respondents (149 or 46.56%) disagreed with the presence of such dedicated financial resources. On the other hand, 58 respondents (18.125%) affirmed the existence of these specialized entities, while 113 respondents (35.31%) remained neutral.

These findings point to a notable gap in the availability of financial institutions or funds focused specifically on supporting green projects, indicating a need for more targeted financial mechanisms that can support the growth of sustainable projects in Ethiopia. Interviews with green finance experts and environmental project managers revealed that the lack of specialized green finance institutions or funds in Ethiopia is a critical barrier. While some international development funds exist, there are few domestic sources of financing dedicated to green initiatives. This lack of specialized funding mechanisms increases the reliance on conventional financial products, which often fail to meet the unique needs of green projects.

Overall Perception of Challenges (C5)

When aggregating the responses from AF1, AF2, and AF3, it becomes evident that access to finance poses a significant challenge to the promotion of green finance in Ethiopia. AF1 and AF2 suggest that financing is not affordable or attractive enough, while AF3 reveals the lack of specialized financial institutions or funds dedicated to green projects. Collectively, these issues highlight the financial barriers hindering the development of green finance in Ethiopia and point to the need for systemic interventions to make financing more accessible and supportive of green initiatives.

The measurement model further corroborates these findings, with a mean score of 3.68 indicating moderate agreement among respondents regarding the financial challenges to green finance. The standard deviation of 0.856 reflects consistent opinions across respondents, while the statistically significant p-value of 0.000 affirms the reliability of these results.

In conclusion, the challenges related to access to finance in Ethiopia’s green finance sector are substantial. The findings highlight the importance of addressing the barriers to affordable financing, revising financial institutions' criteria, and establishing specialized financial entities

dedicated to green projects. Interviews further validate these findings, revealing a consensus among stakeholders that addressing these financial challenges is critical to the success of green finance in Ethiopia. These efforts are essential to creating an enabling environment for the growth and success of green finance initiatives in Ethiopia.

Table 17:Respondents' Response on Political Instability

6	Political Instability							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
PI1	42	168	95	13	2			
PI2	31	175	99	9	6			
PI3	53	155	97	14	1			
C6 (PI)	42	166	97	12	3	3.73	.762	0.000

Source: SPSS 29 output

The challenges related to political instability were assessed using three specific sub-questions that addressed the impact of political instability on the growth and implementation of green finance in Ethiopia. These sub-questions examined whether political instability hinders green finance (PI1), whether policies and regulations are subject to frequent changes (PI2), and whether the government's commitment to promoting green finance is influenced by political factors (PI3). The responses suggest that political instability is not seen as a significant barrier to green finance in Ethiopia. Table 17 above shows the details of the frequency distribution result.

Political Instability and the Growth of Green Finance (PI1)

PI1 asked whether political instability hinders the implementation and growth of green finance initiatives. The results revealed that a significant majority, 65.6% (210 respondents), disagreed with this statement, suggesting that political instability is not perceived as an obstacle to the expansion of green finance. Only 4.6% (15 respondents) agreed with the concern, indicating that a small portion of participants believe political instability may impact green finance efforts. These results indicate that, according to the majority of respondents, political instability does not pose a major challenge to green finance initiatives in Ethiopia.

Frequent Changes in Green Finance Policies (PI2)

PI2 examined whether green finance policies and regulations in Ethiopia are subject to frequent changes and uncertainties due to political factors. Again, the responses were consistent with the findings from PI1, with 64.4% (206 respondents) disagreeing that political factors lead to frequent changes and uncertainties in green finance regulations. Only 4.6% (15 respondents) agreed with this perspective, suggesting that most respondents do not view political dynamics as a significant source of instability in green finance policies. This finding suggests that green finance policies in Ethiopia are perceived as relatively stable and not overly influenced by political factors, contrary to concerns raised by a minority of respondents.

Government's Commitment to Green Finance and Political Instability (PI3)

PI3 focused on whether political instability affects the government's commitment to promoting green finance. The responses were similar to those of PI1 and PI2, with 65.6% (208 respondents) disagreeing that the government's commitment to green finance is impacted by political instability. This indicates that the majority of participants do not see political instability as a major factor influencing the government's dedication to green finance initiatives. However, 4.6% (15 respondents) agreed with the statement, suggesting that a small portion of the population believes political instability can affect the government's support for green finance.

Overall Perception of Political Instability as a Challenge (C6)

Aggregating the responses to PI1, PI2, and PI3, the data reveals a consistent perspective that political instability is not perceived as a significant challenge to the implementation and growth of green finance in Ethiopia. 65.6% of participants disagreed with the notion that political instability hinders green finance initiatives, and the responses from the other two questions (PI2 and PI3) reinforced this view. The results highlight that political instability does not appear to be a primary barrier to the successful implementation of green finance in the Ethiopian context.

This finding is supported by insights gathered from interviews with stakeholders. Interviews revealed that the Ethiopian government's commitment to green finance remains strong, as demonstrated by initiatives like the Climate Resilient Green Economy (CRGE), which have continued regardless of changes in the political landscape. The government's support for renewable energy projects and foreign investment in the sector is seen as stable and unaffected by political

shifts. Furthermore, the private sector, which plays a leading role in green finance in Ethiopia, is viewed as less vulnerable to the impacts of political instability.

Overall, the findings suggest that political factors are not perceived as a major challenge to the adoption and implementation of green finance in Ethiopia. While a small minority of respondents expressed concerns about the influence of political instability on green finance, the majority of participants, as well as interviewees, emphasized that political instability does not significantly hinder green finance initiatives. The Ethiopian government's long-standing commitment to green finance, coupled with a stable regulatory environment, contributes to the favorable outlook on green finance. Therefore, political instability does not appear to be the primary obstacle to the success of green finance in Ethiopia.

Table 18:Respondents' Response on Limited Technical Expertise

7	Limited Technical Expertise							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
LTE1	57	187	66	9	1			
LTE2	69	151	81	12	7			
LTE3	66	163	78	12	1			
C7	64	167	75	11	3	3.87	.801	0.000

Source: SPSS 29 output

The challenge of limited technical expertise was used to assess the difficulties facing green finance in Ethiopia. This variable was evaluated through three sub-questions, each aimed at measuring the impact of insufficient technical know-how on the adoption and implementation of green finance practices. The responses to these sub-questions highlight the significant role that technical expertise plays in the successful development of green finance initiatives in the country. Table 18 above shows the details of the frequency distribution result.

Availability of Skilled Professionals in Green Finance (LTE1)

LTE1 examined whether there are skilled professionals with expertise in green finance in Ethiopia. The results revealed a significant concern, with 76.25% (244 respondents) agreeing that the lack of technical expertise in green finance is a critical challenge. This suggests that the majority of

respondents recognize the importance of skilled professionals in driving green finance initiatives, and the shortage of expertise is seen as a notable barrier. However, a small minority of 3% (10 respondents) disagreed with this view, indicating that a few individuals believe the lack of technical expertise is not a major issue. These findings underscore the need for more professionals with specialized knowledge in green finance to support the growth and success of green initiatives in Ethiopia.

Adequacy of Capacity-Building Programs (LTE2)

LTE2 sought to assess whether the capacity-building programs and training initiatives for green finance professionals in Ethiopia are adequate. The responses reveal a clear dissatisfaction with the current state of such programs, as 68.75% (220 respondents) disagreed with the idea that these programs are sufficient. In contrast, only 6% (19 respondents) agreed that the capacity-building efforts are adequate. This disparity highlights a perceived gap in the quality and quantity of training and professional development opportunities for those working in green finance. The data suggests that improvements are needed in training programs to ensure that professionals are equipped with the skills and knowledge necessary for effective participation in green finance initiatives.

Expertise in Financial Institutions in Green Finance (LTE3)

LTE3 evaluated whether financial institutions in Ethiopia have technical experts capable of navigating the unique regulatory and market dynamics of green finance. The majority of respondents, 71.5% (229 respondents), disagreed with the notion that financial institutions have the necessary technical expertise to handle the complexities of green finance. Only 4% (13 respondents) agreed that financial institutions are adequately equipped with technical experts. This indicates a significant gap in the expertise available within financial institutions, which may hinder their ability to effectively support green finance initiatives. The lack of specialized knowledge within these institutions can result in inefficiencies and missed opportunities in green finance projects.

Overall Perception of Limited Technical Expertise (C7)

When aggregating the responses to LTE1, LTE2, and LTE3, it becomes evident that the challenge of limited technical expertise is widely perceived as a major barrier to the implementation and growth of green finance in Ethiopia. A total of 72.2% (231 respondents) agreed that the scarcity

of technical expertise is a primary challenge, further confirming the importance of addressing this issue to foster a more robust green finance ecosystem in the country. This view is supported by insights gathered from interviews conducted alongside the survey. The interviews highlighted the shortage of technical expertise, particularly in areas related to environmental activities and green finance, and the need for specialized professionals in the sector.

The absence of sufficient technical expertise results in increased project costs, as organizations must outsource professionals with the necessary skills. Additionally, the lack of technical knowledge impacts the effectiveness of monitoring and evaluation systems within green finance projects, further hindering their success. In conclusion, the findings strongly suggest that the limited availability of technical expertise is a significant challenge for green finance in Ethiopia. The majority of survey respondents expressed concerns about the shortage of skilled professionals, the inadequacy of capacity-building programs, and the lack of technical experts within financial institutions. These challenges point to a pressing need for more investment in training, professional development, and the recruitment of experts to support green finance initiatives in Ethiopia. Addressing these gaps in technical expertise will be crucial for the successful implementation and scaling of green finance projects in the country.

Table 19:Respondents' Response on Project Preparation

8	Project Preparation							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
PP1	55	189	64	11	1			
PP2	67	176	69	4	4			
PP3	61	175	77	6	1			
C8	61	180	70	7	2	3.91	.739	0.000

Source: SPSS 29 output

The challenge of project preparation was used to assess the difficulties facing green finance in Ethiopia. This variable was evaluated through three sub-questions, each aimed at measuring the availability of resources and capabilities, the role of government and financial institutions in creating preparation procedures, and the engagement of green finance experts in the project preparation process. The responses to these sub-questions highlight the critical role that effective

project preparation plays in the successful implementation of green finance initiatives in the country. Table 19 above shows the details of the frequency distribution result.

Availability of Resources and Capabilities for Project Preparation (PP1)

PP1 examined whether there are sufficient resources and capabilities to effectively prepare and execute green finance projects in Ethiopia. The results revealed a significant concern, with 76.25% (244 respondents) disagreeing with the statement that there are adequate resources and capabilities available. Only 3.75% (12 respondents) agreed. This suggests that the majority of respondents perceive a significant gap in the resources and capabilities required to prepare and execute green finance projects. The lack of resources can undermine the successful implementation of such projects, as it limits organizations' ability to design comprehensive, well-funded, and sustainable green initiatives.

Interviewees echoed this concern, stressing that the absence of adequate resources is a major barrier to the preparation of green finance projects. Many participants in the interviews highlighted that the lack of sufficient funding, technical expertise, and skilled personnel has hampered the ability to effectively prepare green projects. Without access to the right resources, projects often struggle to meet the high standards required to secure green finance, contributing to the high failure rate of green initiatives.

Project Preparation Procedures for Green Finance (PP2)

PP2 sought to assess whether project preparation procedures are specifically formulated by the government or financial institutions to access green finance. The majority, 76% (243 respondents), disagreed with the idea that such procedures are systematically prepared by relevant authorities. Only 2.5% (8 respondents) agreed. This response suggests a notable gap in the existing frameworks for project preparation related to green finance in Ethiopia. The absence of clear, standardized procedures for preparing green finance projects can create challenges for organizations attempting to navigate the complex landscape of green finance, making it difficult for them to align with green finance requirements and secure the necessary funding.

Interview insights supported this view, with interviewees highlighting the absence of a formalized process for preparing green finance projects. Many felt that a lack of structured guidelines from the government and financial institutions has led to confusion and inefficiencies in preparing

projects that could access green finance. The absence of a well-defined preparation procedure limits the ability of organizations to plan effectively, leading to missed opportunities for securing funding. This gap was seen as a significant hurdle that needs to be addressed to ensure more projects can access green finance.

Engagement with Green Finance Experts During Project Preparation (PP3)

PP3 assessed whether many organizations engage in consultation with green finance experts during the preparation of projects. 73.75% (236 respondents) disagreed with the statement that many organizations consult with green finance experts, while only 2% (7 respondents) agreed. These findings suggest a significant underutilization of expert knowledge during the project preparation phase. Green finance experts are crucial in providing technical guidance and ensuring that projects meet the necessary criteria for green finance eligibility. The lack of expert consultation may lead to poorly designed projects that are not aligned with green finance standards, thus reducing their chances of success.

Interview responses aligned with the survey data, with many participants noting that consulting with green finance experts is not common practice. The majority of organizations, according to interviewees, do not engage experts early in the project preparation process, which often results in poorly crafted proposals that do not meet the necessary environmental or financial criteria. Several interviewees stressed that the lack of expert involvement during the project planning phase could lead to designs that are not aligned with international best practices in green finance, further complicating the financing process.

Overall Perception of Project Preparation Challenges (C8)

When aggregating the responses to PP1, PP2, and PP3, it becomes clear that project preparation is a significant challenge in the field of green finance in Ethiopia. A total of 76% of respondents expressed dissatisfaction with the availability of resources and capabilities, the absence of tailored project preparation procedures, and the limited consultation with green finance experts. These findings highlight the systemic weaknesses in the way green finance projects are prepared and managed, further indicating that addressing these challenges is essential for improving the green finance landscape in Ethiopia.

The interviews confirmed these results, emphasizing the complexity and obstacles faced by organizations in preparing green finance projects. Interviewees explained that the lack of resources, unclear procedures, and insufficient expert consultation are deeply intertwined challenges that prevent the effective execution of green finance projects in Ethiopia. These challenges were seen as major impediments that slowed the uptake of green finance and reduced the success rate of green projects.

The findings strongly suggest that project preparation is a significant challenge for green finance in Ethiopia. The majority of survey respondents and interviewees expressed concerns about insufficient resources, the lack of tailored project preparation procedures, and the limited consultation with green finance experts. These challenges indicate the need for a more structured approach to project preparation, which includes the development of standardized procedures, the mobilization of adequate resources, and greater involvement of specialized expertise.

4.6.3. Results of Respondents' Response on Opportunities of Green Finance

Green finance presents a transformative opportunity for Ethiopia to advance its sustainable development goals while addressing critical environmental challenges. By leveraging seven key dimensions, Renewable Energy (OP1), Sustainable Agriculture (OP2), Sustainable Transport (OP3), Green Buildings (OP4), Policy Frameworks (OP5), Innovative Funding Methods (OP6), and Green Infrastructure (OP7) the country can strategically align its economic growth with environmental stewardship. These areas not only offer pathways for reducing carbon footprints and enhancing resilience to climate change but also create opportunities for innovation, job creation, and global collaboration. The following section of the study discusses the details of respondents' responses on green finance opportunities in Ethiopia.

Table 20:Respondents' Response on Renewable Energy

1	**Renewable Energy**							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
RE1	5	12	89	142	72			
RE2	2	17	93	141	67			
RE3	2	19	82	152	65			
OP1	3	16	88	145	68	3.81	.859	0.000

Source: SPSS 29 output

The variable of renewable energy plays a central role in assessing the opportunities for green finance in Ethiopia. The renewable energy sector offers significant potential to drive green finance initiatives, especially considering the country's vast natural resources. This variable was assessed through three questions aimed at measuring the effectiveness of government policies, the investment potential of renewable energy projects, and the role of financial institutions in supporting such initiatives. The data from the survey and interviews suggests an optimistic outlook regarding the opportunities for green finance in Ethiopia, particularly in the renewable energy sector. Table 20 above shows the details of the frequency distribution result.

Effectiveness of Government Policies and Incentives for Renewable Energy Projects (RE1)

RE1 focused on the effectiveness of government policies and incentives in supporting the growth of renewable energy projects, thus enhancing green finance in Ethiopia. The survey revealed that 66.875% (214 respondents) of participants agreed with the notion that government policies and incentives are effectively supporting renewable energy projects.

Only 5.3% (17 respondents) disagreed with this assessment, suggesting a strong overall perception that government support is helping to foster the growth of renewable energy and green finance initiatives in the country. Interview insights confirmed these positive findings, with many respondents noting that government policies, including incentives for renewable energy projects, have been instrumental in attracting green finance investments. Policies such as tax incentives, subsidies for renewable energy projects, and a commitment to sustainable energy goals were identified as key drivers. However, some interviewees pointed out that while the policies are in

place, their implementation and reach could be improved to ensure that more projects benefit from these incentives, especially in remote or underserved areas.

Potential for Green Finance Investments in Renewable Energy Projects (RE2)

RE2 aimed to assess whether renewable energy projects in Ethiopia present significant potential for green finance investments. The data collected showed that 65% (208 respondents) agreed with the statement, while 6% (19 respondents) disagreed. This finding suggests a strong belief among respondents in the investment potential of renewable energy projects as a key avenue for green finance in Ethiopia. The positive response indicates that there is confidence in the ability of renewable energy projects such as solar, wind, and geothermal energy to attract green finance investments and contribute to the overall sustainability goals of the country.

Interviews further reinforced this perception, with participants highlighting Ethiopia's abundant renewable energy resources, such as solar and wind power, as promising sectors for attracting green finance. Interviewees also emphasized that renewable energy offers not only environmental benefits but also economic opportunities, such as job creation and rural development. The interview results highlighted the importance of creating a conducive environment for investors, including clear regulations and streamlined procedures, to fully unlock the potential of these renewable energy projects.

Financial Institutions' Role in Financing Renewable Energy Projects (RE3)

RE3 examined the active involvement of financial institutions in Ethiopia in financing renewable energy projects. The survey results showed that 67.8% (217 respondents) agreed that financial institutions are actively financing renewable energy projects as part of their green finance initiatives, while 6.8% (22 respondents) disagreed. This suggests a positive trend toward financial institutions playing a supportive role in promoting renewable energy projects and green finance. The interviews corroborated these survey results, with many participants acknowledging that financial institutions are increasingly offering financing options for renewable energy projects.

The findings suggest that renewable energy represents a significant opportunity for the expansion of green finance in Ethiopia. The government's policies and incentives are seen as effective in supporting renewable energy projects, and there is strong confidence in the investment potential of such projects. Financial institutions are also perceived to be actively involved in financing these

projects, contributing to the overall growth of green finance in the country. The interview results reinforced these positive survey findings, emphasizing the potential of Ethiopia's renewable energy sector to contribute to sustainable development and attract green finance investments. The country's vast renewable energy resources, particularly in solar, wind, geothermal, and hydro energy, position it as a leader in the region for green finance opportunities. However, some challenges were identified, such as the need for improved implementation of policies and better financial products to mitigate risks and facilitate investment. Strengthening the collaboration between government, financial institutions, and the private sector, alongside targeted capacity-building efforts, could further unlock the potential of renewable energy for green finance in Ethiopia.

Table 21:Respondents' Response on Sustainable Agriculture

2	**Sustainable Agriculture**							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
SA1		3	41	162	114			
SA2		8	47	155	110			
SA3		4	50	190	76			
OP2		5	46	169	100	4.14	.708	0.000

Source: SPSS 29 output

Sustainable agriculture is a vital component in the pursuit of green finance opportunities in Ethiopia. The survey results in Table 21 sought to assess the demand for sustainable agriculture practices, the role of financial institutions, and the government's support in fostering green finance through these practices. The results from the survey and interviews offer valuable insights into the opportunities and challenges associated with sustainable agriculture and green finance in the country.

Demand for Sustainable Agriculture Practices (SA1)

SA1 sought to measure whether there is a strong demand for sustainable agriculture practices in Ethiopia, which could create opportunities for green finance investments. The survey results revealed that 54.4% (162 respondents) were neutral, 38.3% (114 respondents) agreed, and 7.3%

(44 respondents) disagreed. While a substantial portion of respondents acknowledged some level of demand, the majority (54.4%) were neutral, indicating uncertainty or lack of clear evidence regarding the demand for sustainable agriculture practices. The interview with an agricultural economist from the Ministry of Finance and Economy supported these results, noting that while many farmers are interested in sustainable practices, there is a gap in knowledge regarding the benefits and implementation of these practices. This suggests that while demand may exist, it is not yet fully recognized or realized by all stakeholders, especially at the grassroots level. There is a need for greater education and awareness campaigns to help farmers understand the advantages of sustainable agriculture and how green finance can support their initiatives.

Support from Financial Institutions for Sustainable Agriculture Projects (SA2)

SA2 examined the extent to which financial institutions in Ethiopia support financing sustainable agriculture projects. The survey results showed that 52.2% (155 respondents) were neutral, 37% (110 respondents) agreed, and 10.8% (55 respondents) disagreed or strongly disagreed. This suggests that while there is some support from financial institutions, many respondents were unsure about the level of engagement or the availability of financing options for sustainable agriculture projects. An interview with a bank manager revealed that financial institutions are open to financing green projects but highlighted the lack of awareness among potential clients about these opportunities. This aligns with the survey's neutral responses, which indicate that financial institutions may not be effectively communicating their support for sustainable agriculture. There is a clear opportunity for financial institutions to develop targeted financial products and outreach programs to increase visibility and engagement with farmers and agricultural stakeholders.

Government Policies and Support for Sustainable Agriculture (SA3)

SA3 aimed to assess whether the government provides sufficient policies and support for promoting sustainable agriculture practices. The survey results revealed that 63.9% (190 respondents) were neutral, 25.6% (76 respondents) agreed, and 10.5% (54 respondents) disagreed or strongly disagreed. This shows that while there is some recognition of government support, a majority of respondents were neutral, suggesting a lack of clarity or confidence in the government's role in fostering sustainable agriculture.

Interview insights, however, provided a more positive perspective on government policies. Several participants, including policymakers and industry experts, affirmed that the government has made strides in promoting sustainable agriculture through policies such as land use regulations, water management initiatives, and incentives for adopting environmentally friendly farming practices. Despite these efforts, the survey results suggest that these policies are not widely recognized or adequately communicated to stakeholders. This discrepancy highlights the need for clearer, more robust policy frameworks and better communication to enhance the effectiveness of government support.

Overall Perception of Green Finance Opportunities in Sustainable Agriculture (OP2)

The overall opportunity for green finance in Ethiopia, as measured by OP2, received a strong positive response, with a mean score of 4.14 out of 5 and a statistically significant p-value of 0.000. This indicates that the majority of respondents agree that there are significant opportunities for green finance in Ethiopia. This aligns with the general findings from the sub-questions regarding sustainable agriculture. Despite the neutral responses in the individual areas of demand, financial institution support, and government policies, the overarching view is that there is a growing potential for green finance to be a transformative tool for sustainable agriculture in Ethiopia. In conclusion, the findings validate the potential for green finance to play a crucial role in promoting sustainable agriculture in Ethiopia. However, several challenges must be addressed, including improving government communication and policies, enhancing support from financial institutions, and raising awareness among stakeholders. By addressing these gaps, Ethiopia can unlock the full potential of green finance, driving sustainable agricultural practices that contribute to both environmental sustainability and economic development.

Table 22:Respondents' Response on Sustainable Transport

3	Sustainable Transport							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
ST1	1	8	99	167	45			
ST2	1	15	104	156	44			
ST3	1	10	106	136	67			
OP3	1	11	103	153	52	3.76	.772	0.000

Source: SPSS 29 output

Sustainable transport infrastructure represents a significant opportunity for the expansion of green finance in Ethiopia. This analysis evaluates three aspects: the potential for investment, financial institution support, and government policies, as well as the overall perception of green finance opportunities in the transport sector. The above table 22 result shows the frequency distribution result.

Potential for Green Finance Investments in Sustainable Transport Infrastructure (ST1)

ST1 assessed whether sustainable transport infrastructure in Ethiopia offers potential for green finance investments. The survey results indicated that 33.5% (167 respondents) agreed, 9% (45 respondents) strongly agreed, and 33.3% (99 respondents) remained neutral. A minimal percentage, 2.1% (9 respondents), disagreed or strongly disagreed.

This highlights that a significant portion of respondents recognize the potential for green finance investments in sustainable transport infrastructure, although the neutral responses indicate that a considerable number are uncertain or unaware of the financial opportunities this sector offers. Supporting these findings, an interview with a transport sector expert noted, "There is a growing recognition of the importance of sustainable transport, but many stakeholders are still not fully aware of the financial opportunities it presents." This suggests that while there is optimism about the potential, there is a need for broader dissemination of knowledge about green finance opportunities in this sector to fully engage stakeholders.

Support from Financial Institutions for Sustainable Transport Projects (ST2)

ST2 examined the role of financial institutions in financing sustainable transport projects. The survey results revealed that 31.1% (156 respondents) agreed and 8.8% (44 respondents) strongly agreed, while 34.1% (104 respondents) were neutral. A small percentage, 4.1% (16 respondents), disagreed or strongly disagreed. This indicates that while some financial institutions are involved in supporting sustainable transport, the high percentage of neutral responses suggests that their efforts are either insufficiently visible or not widespread. Interview feedback from a financial sector representative reinforced this point: "While our institution is open to financing sustainable transport projects, there is limited awareness among project developers about these financing options." This underscores the need for financial institutions to better communicate and promote their green finance initiatives to stakeholders in the transport sector.

Government Policies and Support for Sustainable Transport Projects (ST3)

ST3 evaluated the effectiveness of government policies and initiatives in supporting sustainable transport. The survey results showed that 27.3% (136 respondents) agreed and 13.5% (67 respondents) strongly agreed, while 32.4% (106 respondents) were neutral. Only 2.7% (11 respondents) disagreed or strongly disagreed. The relatively high percentage of neutral responses points to a perceived ambiguity or inadequacy in current government policies and support mechanisms for sustainable transport projects. Interviews with policymakers provided additional context, revealing that while there are ongoing efforts to create policies supporting sustainable transport, the implementation and communication of these policies remain challenges. For example, government initiatives to promote electric vehicles and public transport systems are often hampered by funding and infrastructure limitations.

Overall Perception of Green Finance Opportunities in Sustainable Transport (OP3)

The general perception of green finance opportunities in Ethiopia, as measured by OP3, received a mean score of 3.76 out of 5, with a standard deviation of 0.772 and a statistically significant p-value of 0.000. This indicates that respondents generally agree that there are considerable opportunities for green finance in the transport sector. Interview findings echoed this sentiment, emphasizing the sector's potential for growth but noting the need for better alignment between policies, financial mechanisms, and stakeholder engagement to realize these opportunities. The

alignment of these elements is crucial for unlocking the full potential of sustainable transport as a driver for green finance. The findings validate that sustainable transport holds significant promise to advance green finance in Ethiopia. However, realizing this potential requires addressing key challenges, including improving the clarity and robustness of government policies, increasing financial institution involvement, and raising awareness among stakeholders. By tackling these issues, Ethiopia can unlock new green finance opportunities, contributing to environmental sustainability and economic development through innovative transport solutions.

Table 23:Respondents' Response on Green Buildings

4	Green Buildings							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
GB1	6	26	90	147	51			
GB2	4	21	93	151	51			
GB3	8	22	102	137	51			
OP4	6	23	95	145	51	3.66	.895	0.000

Source: SPSS 29 output

Green buildings represent a promising avenue for advancing green finance in Ethiopia. This analysis evaluates three aspects: the potential for investment in green buildings, financial institution support, government policies, and the overall perception of green finance opportunities in the construction sector. It incorporates both survey and interview results for a comprehensive perspective. Table 23 above shows the details of the frequency distribution result.

Potential for Green Finance Investments in Green Buildings (GB1)

The survey assessed whether the construction of green buildings in Ethiopia presents opportunities for green finance investments (GB1). The results showed that 33.5% (147 respondents) agreed, 11.6% (51 respondents) strongly agreed, and 20.5% (90 respondents) were neutral. A small percentage, 6.1% (32 respondents), disagreed or strongly disagreed. This indicates a substantial recognition of the investment potential of green buildings, though the neutral responses suggest room for further awareness-building about the opportunities this sector offers. An interview with an urban development expert highlighted similar sentiments, noting, "Green buildings are a new

concept for many in Ethiopia, but the potential is immense given the increasing urbanization and the need for sustainable infrastructure."

Support from Financial Institutions for Green Building Projects (GB2)

GB2 examined the role of financial institutions in funding green building projects. Survey results revealed that 34.4% (151 respondents) agreed and 11.6% (51 respondents) strongly agreed, while 21.2% (93 respondents) were neutral. A minority, 5.8% (25 respondents), disagreed or strongly disagreed. While the results demonstrate some level of support from financial institutions, the significant proportion of neutral responses suggests a gap in the visibility or availability of dedicated financial products for green building projects. An interview with a financial institution executive revealed that "While banks are increasingly interested in green financing, the lack of technical knowledge and low demand from developers limit the expansion of products specifically for green buildings".

Government Policies and Regulations Supporting Green Buildings (GB3)

The evaluation of government policies and regulations supporting green buildings (GB3) revealed that 31.9% (137 respondents) agreed, 11.9% (51 respondents) strongly agreed, and 23.7% (102 respondents) were neutral. Only 6.3% (30 respondents) disagreed or strongly disagreed. Interviews with policymakers from the Ministry of Urban Development underscored this issue. One official stated, "While there are policies promoting energy efficiency and sustainability in construction, the enforcement mechanisms are weak, and developers often lack clarity on the benefits and processes involved."

Overall Perception of Green Finance Opportunities in Green Buildings (OP4)

The general perception of green finance opportunities in Ethiopia, as measured by OP4, yielded a mean response of 3.66 out of 5, with a standard deviation of 0.895 and a statistically significant p-value of 0.000. This demonstrates strong agreement among respondents that there are considerable opportunities for green finance in Ethiopia, particularly through green buildings. Interviewees unanimously supported this view, emphasizing that the sector has untapped potential but requires cohesive efforts from all stakeholders.

The findings affirm the substantial opportunities green buildings present for advancing green finance in Ethiopia, supported by promising survey results and complementary insights from interviews. However, realizing these opportunities requires a more structured and collaborative approach. The government must play a pivotal role by establishing clear and robust policies that incentivize sustainable building practices. Simultaneously, financial institutions need to design targeted products and increase their outreach to developers, fostering a stronger connection between financial resources and the construction sector. Moreover, stakeholders, including policymakers, real estate developers, and financial institutions, should invest in raising awareness and providing education about the benefits of green buildings and green finance. Building this knowledge foundation can shift perceptions and promote action, ultimately driving the adoption of sustainable practices. A unified effort across these domains will help unlock the sector's full potential, positioning green buildings as a cornerstone of Ethiopia's green finance future.

Table 24:Respondents' Response on Policy Frameworks

5	Policy Frameworks							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
PF1	7	28	111	136	38			
PF2	9	35	117	129	30			
PF3	2	39	114	131	34			
OP5	6	34	114	132	34	3.48	.889	0.000

Source: SPSS 29 output

The survey examining the opportunities for green finance in Ethiopia focused on policy frameworks, evaluating their comprehensiveness, clarity, and adaptability through three sub-questions: PF1, PF2, and PF3. These sub-questions were designed to measure the effectiveness of policy frameworks, while the overarching question (OP5) assessed the overall opportunities for green finance. The responses provide valuable insights into the current state of green finance policy frameworks and their alignment with international standards. The above table 24 of the study shows the details of the frequency distribution result.

Comprehensiveness of Policy Frameworks (PF1)

Respondents were asked whether the government has established comprehensive policy frameworks to promote green finance initiatives. Of the 320 respondents, 136 (31.6%) agreed and 38 (8.8%) strongly agreed, while 111 (25.8%) were neutral. A smaller percentage, 35 (7.7%), disagreed or strongly disagreed. This distribution indicates that 40.4% of respondents acknowledged the presence of such frameworks, but the substantial neutral response rate (25.8%) suggests uncertainty or a lack of awareness about their comprehensiveness. The minimal disagreement rate (7.7%) implies limited opposition, though concerns persist regarding the absence of detailed and actionable elements in the policies.

Clarity and Incentives in Policy Frameworks (PF2)

When evaluating whether the policy frameworks provide clear guidelines and incentives for green finance investments, 129 respondents (30%) agreed and 30 (7%) strongly agreed, while 117 (27.1%) were neutral. A total of 44 respondents (9.4%) disagreed or strongly disagreed. These findings reveal that while 37% of respondents acknowledged the frameworks' intentions, the high neutral response rate (27.1%) reflects uncertainty about the clarity and effectiveness of the policies. The disagreement rate (9.4%) further indicates dissatisfaction among some stakeholders. Interviews with financial experts revealed that, although policies exist, they lack specific incentives, such as tax breaks or subsidies, to make green finance investments more attractive. This highlights the need for the government to refine policies and introduce targeted measures to enhance their effectiveness.

Monitoring and Adaptation to Best Practices (PF3)

Respondents were also asked whether the government actively monitors and updates policy frameworks to align with the best international practices. Of the respondents, 131 (30.4%) agreed and 34 (7.9%) strongly agreed, while 114 (26.4%) were neutral. A smaller proportion, 41 respondents (8.6%), disagreed or strongly disagreed. Although 38.3% of respondents recognized the government's efforts, the significant neutral response rate (26.4%) suggests ambiguity about the effectiveness of monitoring and alignment processes.

Overall Perception of Green Finance Opportunities (OP5)

The general perception of green finance opportunities in Ethiopia was assessed through a question labeled OP5. The mean response score was 3.48 out of 5, with a standard deviation of 0.889 and a statistically significant p-value of 0.000. This reflects a moderate agreement among respondents regarding the existence of green finance opportunities. However, the variability in responses indicates room for improvement. The survey results validate the assumption that policy frameworks play a crucial role in facilitating green finance in Ethiopia. However, to fully realize these opportunities, there is a need for enhanced and more detailed government policies, greater support from financial institutions, and increased awareness and education about the benefits and specifics of green finance policies. Addressing these areas can help unlock the full potential of green finance, driving sustainable development in Ethiopia.

Table 25:Respondents' Response on Innovative Funding Methods

6	Innovative Funding Methods							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
IFM1	11	25	101	147	36			
IFM2	6	21	96	152	45			
IFM3	4	35	97	163	21			
OP6	7	27	98	154	34	3.57	.872	0.000

Source: SPSS 29 output

The survey assessing opportunities for green finance in Ethiopia focused on the role of innovative funding methods through three sub-questions: IFM1, IFM2, and IFM3. These questions explored the availability of innovative funding methods, the diversity and flexibility of financing options, and government support for such mechanisms. Additionally, the overarching question OP6 evaluated the general perception of opportunities for green finance. A total of 320 respondents participated in the survey, providing valuable insights into Ethiopia’s green finance landscape and the potential for innovative funding to drive sustainable development. The above Table 25 shows the details of the frequency distribution result.

Availability of Innovative Funding Methods (IFM1)

Respondents were asked whether innovative funding methods are available in Ethiopia to facilitate green finance investments. Of the 320 respondents, 147 (34.1%) agreed and 36 (8.3%) strongly agreed, accounting for 42.4% of total responses. Additionally, 101 respondents (23.5%) were neutral, and 36 respondents (8.3%) disagreed or strongly disagreed. These findings suggest that a notable portion of respondents recognize the availability of innovative funding methods such as green bonds and crowdfunding. However, the number of respondents who disagreed or strongly disagreed, combined with a significant neutral response rate, indicates some uncertainty or limited awareness regarding these mechanisms. This underscores the need for further education and exposure to innovative funding methods to help bridge the knowledge gap.

Diversity and Flexibility of Financing Options (IFM2)

When asked about the diversity and flexibility of financing options offered by financial institutions for green projects, 152 respondents (35.2%) agreed and 45 (10.4%) strongly agreed, accounting for 45.6% of total responses. Furthermore, 96 respondents (22.2%) were neutral, and 27 respondents (5.9%) disagreed or strongly disagreed. These results highlight that nearly half of the respondents acknowledge the availability of flexible financing options for green projects. However, the relatively small percentage of respondents who disagreed or strongly disagreed suggests that there may still be gaps in understanding or accessibility of these financing products, requiring further efforts to increase their appeal and accessibility.

Government Support for Innovative Funding Mechanisms (IFM3)

The survey also explored whether the government supports and promotes the use of innovative funding mechanisms for green finance projects. A total of 163 respondents (39.3%) agreed and 21 respondents (5.1%) strongly agreed, making up 44.4% of total responses. Additionally, 97 respondents (23.4%) were neutral, and 36 respondents (8.4%) disagreed or strongly disagreed. These findings suggest that a significant portion of respondents recognize government efforts to promote innovative funding mechanisms. However, the neutral responses imply that government initiatives may not be widely recognized or understood, and the small proportion of respondents who disagreed suggests that the support may not be perceived as robust or impactful.

Overall Perception of Green Finance Opportunities (OP6)

The general perception of green finance opportunities in Ethiopia was assessed through OP6, which yielded a mean response score of 3.57 out of 5, with a standard deviation of 0.872 and a statistically significant p-value of 0.000. This suggests a moderate level of agreement among respondents regarding the existence of green finance opportunities in the country. However, the variability in responses indicates that there are areas for improvement, particularly in raising awareness and addressing access barriers. The survey results validate the assumption that innovative funding methods present significant opportunities for green finance in Ethiopia. However, to fully realize these opportunities, there is a need for increased awareness and education about these methods, enhanced support from financial institutions, and more proactive government promotion and support. Addressing these areas can help unlock the full potential of innovative funding methods, driving sustainable development in Ethiopia.

Table 26:Respondents' Response on Green Infrastructure

7	Green Infrastructure							
Variable	Frequency distribution					Des. Stas.		Meas.M
	Strongly D	Disagree	Neutral	Agree	Strongly A	Mean	Std. Deviation	P(>|z|)
GI1	7	20	99	151	43			
GI2	5	18	104	141	52			
GI3	3	19	97	140	61			
OP7	5	19	100	144	52	3.68	.869	0.000

Source: SPSS 29 output

Green Infrastructure Opportunities (GI1)

The question about the potential for green infrastructure projects in Ethiopia to facilitate green finance investments (GI1) revealed that 35.3% (151 respondents) agreed, and 10.1% (43 respondents) strongly agreed. While this shows a positive outlook, the 23.2% (99 respondents) who were neutral and 6.3% (27 respondents) who disagreed or strongly disagreed suggest a level of uncertainty regarding the feasibility or awareness of these projects. This highlights the need for more education and information to build greater confidence in green infrastructure's role in green finance. Table 26 above shows the details of the frequency distribution result.

Financial Institutions and Green Infrastructure (GI2)

When assessing the active involvement of financial institutions in financing green infrastructure projects (GI2), 33% (141 respondents) agreed, and 12.2% (52 respondents) strongly agreed. However, the neutral responses (24.4%, or 104 respondents) suggest that while there is some recognition of financial institutions' role, more clarity is needed regarding the extent of their engagement. Additionally, 5.3% (23 respondents) disagreed or strongly disagreed, indicating that some respondents may not fully perceive the active involvement of financial institutions. A financial analyst remarked, "Financial institutions are beginning to see the value in financing green infrastructure, but there needs to be more visible and accessible financing options tailored to these projects."

Government Support for Green Infrastructure (GI3)

In terms of government support and policies for green infrastructure projects (GI3), 32.7% (140 respondents) agreed, and 14.3% (61 respondents) strongly agreed. Although this suggests a positive acknowledgment of government efforts, 22.6% (97 respondents) remained neutral, and 4.9% (22 respondents) disagreed. The high percentage of neutral responses points to perceived ambiguity or inconsistency in the government's policies and support mechanisms. A government official added, "While there are policies in place to support green infrastructure, their implementation and the level of support can be inconsistent and sometimes lack the needed incentives."

Overall Perception of Green Finance Opportunities (OP7)

The general perception of green finance opportunities in Ethiopia, as measured by OP7, yielded a mean response of 3.68 out of 5, with a standard deviation of 0.869 and a statistically significant p-value of 0.000. This indicates a strong consensus among respondents that there are substantial opportunities for green finance in Ethiopia. However, the variability in responses suggests that there are areas for improvement, particularly in raising awareness and addressing barriers to access. An investment strategist noted, "Green infrastructure presents significant opportunities for green finance, but to fully harness these opportunities, there must be an integrated approach involving robust policy support and active financial institution participation.

Table 27:Summary of Hypothesis Result

Hypotheses	Proof/Validation with statistics, literature	Proof/Validation with survey
H1: Existing green growth strategies in Ethiopia face limitations in effectiveness, and targeted enhancements can improve their impact and scalability.	fully verified	fully verified
H2: Ethiopia's green finance initiatives exhibit significant gaps, creating opportunities for further development.	fully verified	fully verified
H3: Key challenges, such as regulatory barriers, limited financial resources, and low awareness, substantially hinder the effective implementation of green finance programs in Ethiopia.	fully verified	fully verified
H4: Green finance plays a crucial role in fostering inclusive and sustainable economic growth in Ethiopia.	fully verified	fully verified

Source: Compiled by Author

The first hypothesis (H1) suggests that while Ethiopia has introduced green growth strategies, their effectiveness remains constrained by implementation gaps, indicating that focused improvements could enhance their scalability and impact. This hypothesis serves to evaluate both policy formulation and execution realities. Hypothesis two (H2) centers on identifying structural and operational gaps within Ethiopia's green finance landscape, highlighting opportunities for policy innovation, institutional strengthening, and investment mobilization. The third hypothesis (H3) draws attention to persistent barriers such as inadequate regulatory frameworks, limited financing mechanisms, and insufficient public awareness that inhibit progress in green finance initiatives. These challenges have been frequently cited in prior literature (e.g., UNDP, 2021; World Bank, 2020), and are further supported by respondent feedback indicating perceived implementation obstacles. Lastly, hypothesis four (H4) explores the broader developmental relevance of green finance, positing that it holds potential not only for environmental sustainability but also for driving inclusive economic transformation.

The verification status of each hypothesis, using both statistical evidence and survey-based validation, helps illustrate the extent to which theory aligns with practice and reveals gaps where future policy and research efforts should be directed.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusion

This study investigated the opportunities and challenges of green finance in promoting inclusive sustainable growth in Ethiopia, a nation with significant potential for renewable energy and sustainable development, yet faced with critical economic and environmental challenges. The study adopted a mixed-methods triangulation design, combining both quantitative and qualitative approaches to ensure a comprehensive understanding of the issues. Primary data was collected through structured questionnaires and unstructured interviews, while secondary data was sourced from existing literature, policy documents, and reports. The mixed-method approach enabled the validation of findings from diverse perspectives, ensuring the reliability and depth of the study.

The study was grounded in key theoretical frameworks, including Sustainable Finance Theory, Environmental Economics Theory, Ecological Modernization Theory, and Resource Efficiency Theory. These theories provided a robust foundation for analyzing how financial systems can be leveraged to address environmental challenges, promote sustainability, and achieve long-term economic stability. Sustainable Finance Theory emphasizes integrating environmental, social, and governance (ESG) factors into financial decision-making, while Environmental Economics Theory stresses the need to internalize the costs of environmental degradation.

Ecological Modernization Theory highlights the role of technology and market-based solutions in achieving sustainable development. Resource Efficiency Theory underscores optimizing resource use to reduce environmental impacts. These frameworks were instrumental in contextualizing the challenges and opportunities within Ethiopia's unique socio-economic environment. Findings revealed that despite Ethiopia's commitment to sustainability through strategies like the Climate Resilient Green Economy (CRGE), several barriers impede the advancement of green finance. More specifically, the findings highlight a significant gap in awareness, with only 5% of respondents reporting moderate to high familiarity with green finance concepts. This lack of awareness is primarily attributed to insufficient educational initiatives and the absence of dedicated institutions to promote green financial literacy. Respondents noted that the availability of accessible resources and clear information on green finance mechanisms is critical for improving awareness among different stakeholders.

Despite the limited awareness, there is an optimistic perception regarding the success of green finance initiatives in Ethiopia. About 73% of respondents viewed these initiatives as moderately successful in addressing social and environmental issues, such as reducing carbon emissions and supporting renewable energy projects. Respondents also pointed out that the measurable benefits of green finance, such as creating employment opportunities through green jobs and fostering innovation in renewable energy technologies, have yet to be fully realized due to various systemic challenges.

The study identifies sustainable agriculture and renewable energy projects as key opportunities for driving inclusive, sustainable growth. These areas are seen as crucial investment targets due to Ethiopia's abundant renewable energy resources, such as hydropower, wind, and solar energy. However, the study also brings to light several persistent challenges that hamper the effective implementation of green finance, including limited financial resources, weak regulatory frameworks, and inadequate project preparation and design. Respondents cited an inconsistent policy environment, where government support for green finance initiatives lacks continuity and coherence, as a significant barrier. Furthermore, stakeholder engagement was found to be inadequate, with limited involvement from financial institutions and a lack of robust public-private partnerships. These issues have created a fragmented approach to green finance, reducing its effectiveness in meeting sustainability objectives.

The analysis, supported by descriptive statistics and the use of measurement models, reinforces the need for a more structured and strategic approach to green finance in Ethiopia. Respondents emphasized the importance of establishing clear and enforceable regulations, increasing awareness campaigns, and fostering collaboration between the government, private sector, and civil society. Addressing these challenges would require scaling up financial resources, improving the capacity of institutions to manage green projects, and encouraging the private sector to actively participate in green finance.

5.2. Recommendation

To address the awareness gap, it is crucial to implement comprehensive green finance awareness campaigns targeting policymakers, financial institutions, and the general public. These campaigns could leverage multimedia platforms, workshops, and educational initiatives to increase understanding of green finance opportunities and benefits.

In tackling the regulatory framework limitations, Ethiopia shall establish a robust, transparent, and well-defined policy framework specifically for green finance. This could include mandating ESG (Environmental, Social, and Governance) criteria for investment decisions, incentivizing private-sector participation through tax benefits, and creating regulatory bodies to monitor compliance with green finance standards.

Establish standardized project preparation methodologies and provide technical assistance grants to ensure green projects are well-structured and bankable. Collaborate with international agencies and academic institutions to offer capacity-building programs and certification schemes that equip professionals with the necessary skills for green finance initiatives.

Introduce a broader range of green finance options, including green bonds, sustainability-linked loans, and crowdfunding platforms, tailored to various sectors such as agriculture, energy, and infrastructure. Develop secondary markets to increase the attractiveness and accessibility of these financial instruments.

For capacity building, targeted training programs should be introduced for stakeholders, including government officials, financial institutions, and project developers. These programs should focus on green finance structuring, risk management, and project evaluation techniques to improve efficiency and effectiveness in managing green investments.

On the matter of stakeholder engagement, a national green finance consortium could be established, comprising public institutions, private investors, NGOs, and international organizations. This consortium would facilitate coordination, resource mobilization, and the sharing of best practices.

Implement microfinance schemes and subsidized loan programs to make green finance accessible, particularly for SMEs. Encourage blended financing models that combine public and private investments to share risks and attract more capital into green initiatives.

Finally, Ethiopia should consider leveraging technology and innovation by promoting digital solutions like blockchain for transparent project financing and monitoring, and by investing in emerging green technologies, such as energy storage and smart grid systems, to reduce costs and improve project efficiency. By implementing these recommendations, Ethiopia can address the challenges and capitalize on the opportunities identified in this study. This will not only accelerate the adoption of green finance but also contribute significantly to the country’s broader goals of sustainable and inclusive growth. Future research should explore the practical implementation of these recommendations and evaluate their long-term impacts on Ethiopia's development route.

5.3. Future Research Direction

Future research in green finance within Ethiopia should focus on several critical areas to enhance its impact and address existing challenges. One priority is the development of localized financial instruments, such as green bonds, sustainability-linked loans, and innovative pay-for-performance mechanisms, tailored to Ethiopia's socio-economic and environmental context. Additionally, studies should investigate how Ethiopia's political and economic stability, including regional conflicts and global economic shocks, influence the mobilization and effectiveness of green finance initiatives. Expanding renewable energy investments is another key area, requiring strategic research into overcoming technological and financial barriers to fully leverage Ethiopia’s potential in hydropower, wind, and solar energy.

Building awareness and capacity among stakeholders is equally important, and future studies could evaluate the effectiveness of educational campaigns, workshops, and training programs for financial institutions, policymakers, and communities. Research should also address equity issues by examining disparities in access to green finance between urban and rural areas and identifying strategies to ensure resources are distributed inclusively. Furthermore, robust monitoring and evaluation frameworks are needed to assess the long-term social, economic, and environmental impacts of green finance projects, with a focus on transparency and accountability.

Exploring the role of green entrepreneurship and innovation is another area of interest, particularly in understanding barriers to entry, funding challenges, and opportunities for job creation through green startups. Additionally, studies could assess Ethiopia's engagement with international green finance initiatives, such as the Green Climate Fund, to identify strategies for attracting global investment and aligning local policies with international standards. By addressing these research priorities, Ethiopia can develop a stronger green finance ecosystem that drives sustainable and inclusive growth.

6. NEW SCIENTIFIC RESULTS

This study presents groundbreaking insights into the transformative role of green finance in fostering inclusive and sustainable economic development in Ethiopia, a country characterized by its low-income status but abundant natural resources. By integrating robust theoretical frameworks with empirical evidence, the research offers a nuanced understanding of the mechanisms through which green finance can drive environmental sustainability, economic resilience, and social inclusion. The findings contribute significantly to the growing body of knowledge on green finance, particularly within the context of developing economies, where financial, structural, and institutional challenges often impede progress. The following points are considered the new scientific findings of the study.

1. The study identifies unique barriers to green finance in Ethiopia, including limited institutional capacities, insufficient stakeholder awareness, and a lack of localized financial instruments. Unlike developed economies, where green finance faces challenges such as market mispricing or regulatory alignment, Ethiopia's issues are deeply rooted in structural economic constraints and reliance on international grants and concessional funding.

2. The research found the significant influence of external factors such as regional conflicts, the COVID-19 pandemic, and global economic shocks on Ethiopia's ability to mobilize green finance. These factors exacerbate existing vulnerabilities, particularly in maintaining a stable policy and investment environment. This finding underscores the interconnectedness of political and economic stability with the successful implementation of green finance initiatives.

3. The study found Ethiopia's vast renewable energy potential, particularly in hydropower, solar, and wind energy, as a primary driver for green finance opportunities. It demonstrates how strategic investments in these sectors could serve as a foundation for sustainable economic growth while reducing dependency on fossil fuels and mitigating climate change impacts.

4. The study identifies international collaboration as a critical enabler for green finance in Ethiopia. Engagement with global initiatives like the Green Climate Fund and alignment with international standards can help mobilize resources and expertise, fostering the scalability of green finance initiatives.

5. The findings underscore the necessity of integrating green finance with broader sustainable development strategies. By aligning green finance initiatives with Ethiopia's Climate Resilient Green Economy (CRGE) strategy and the Sustainable Development Goals (SDGs), the country can achieve greater coherence and impact in its development agenda.

These scientific findings contribute to the academic discourse on green finance, offering valuable insights for policymakers, financial institutions, and development practitioners working in developing countries. They highlight the multifaceted nature of green finance and its potential to drive transformative change when tailored to the specific context of a nation like Ethiopia.

SUMMARY

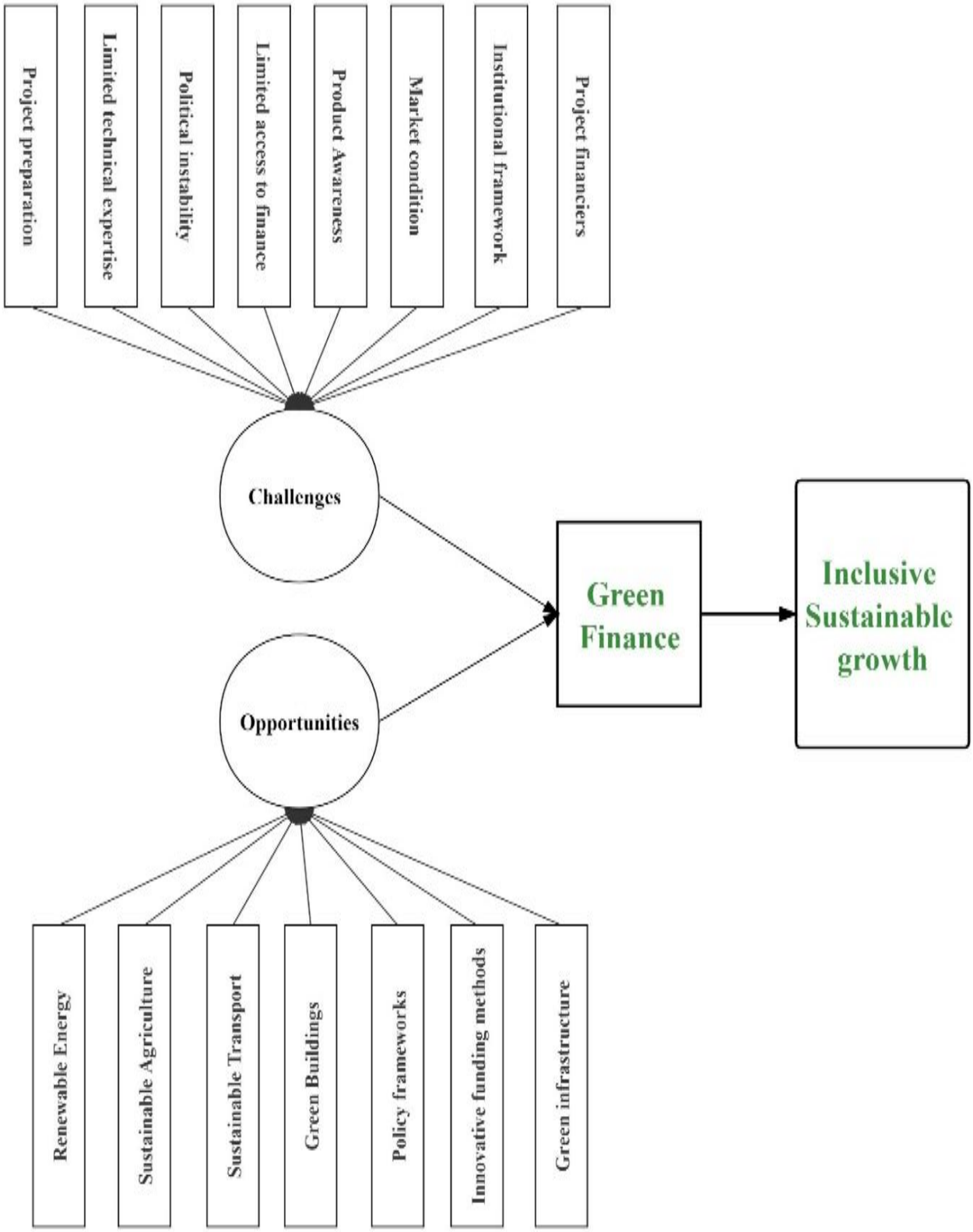
The theoretical and empirical foundations of green finance and its role in promoting inclusive, sustainable growth in Ethiopia were mainly discussed in this study. Green finance is defined as a financial mechanism aimed at funding environmentally sustainable and socially responsible projects. Although it shares similarities with terms like carbon finance and sustainable finance, it focuses specifically on environmental goals, such as renewable energy, energy efficiency, and sustainable infrastructure. The theoretical review highlights four major frameworks: Sustainable Finance Theory, emphasizing the integration of environmental, social, and governance (ESG) considerations into investment and lending decisions to achieve long-term success; Environmental Economics Theory, which focuses on pricing externalities like carbon emissions through mechanisms such as carbon pricing to encourage sustainable investment; Ecological Modernization Theory, advocating for technological innovation and market-based solutions to address environmental challenges; and Resource Efficiency Theory, which promotes waste reduction and optimal resource use to foster economic growth with minimal environmental impact.

The study also examines two main approaches to green finance. Neoliberal approaches emphasize market-driven mechanisms, such as green bonds and carbon markets, but are criticized for their failure to address systemic environmental challenges. Reformist approaches, on the other hand, advocate for stronger government interventions, including tax reforms, stricter regulations, and progressive initiatives to align financial systems with sustainability objectives. The study also presents an empirical review of global challenges and opportunities associated with green finance. Major challenges include market distortions, limited financial instruments, insufficient regulatory frameworks, and misaligned risk-return profiles that make green investments less attractive compared to traditional investments. Studies such as Yousuf et al. (2014) identify market competitiveness as a barrier, with private investors often prioritizing traditional investments due to higher returns. Similarly, Quatrini (2021) highlights short-term focus as an obstacle to scaling sustainable investments, while Thomä & Chenet (2017) underline the issue of mispricing climate risks and inadequate policy support.

Despite these challenges, empirical evidence highlights significant opportunities in green finance. Studies such as Wüstenhagen et al. (2007) emphasize the potential of renewable energy to attract

institutional investors due to its long-term predictability and lower operating costs compared to fossil fuels. Additionally, research by Horrigan et al. (2002) demonstrates how sustainable agriculture can mitigate climate change impacts and provide investment opportunities. The demand for sustainable transportation, green buildings, and green infrastructure also presents growth areas for green finance, as highlighted by studies like Romm (2006) and Darko et al. (2017). Furthermore, innovative financing mechanisms, such as green bonds, climate funds, and performance-based payment systems, are reshaping the green finance landscape, as discussed by Owen et al. (2018). From this literature review, the study concludes by identifying a significant knowledge gap in the context of Ethiopia, where limited research exists on the specific challenges and opportunities of green finance. Ethiopia's unique reliance on agriculture, coupled with its significant potential in renewable energy and the government's commitment to sustainable development through policies like the Climate Resilient Green Economy (CRGE) Strategy, underscores the need for a comprehensive understanding of green finance in the Ethiopian context. The study presents a conceptual framework summarizing the interplay of challenges, opportunities, and strategies for leveraging green finance to achieve inclusive and sustainable growth. This review provides a foundation for further research and policy recommendations tailored to Ethiopia's economic and environmental needs. The following figure 3 of the study summarizes the potential opportunities and challenges of green finance in Ethiopia.

Figure 3: Conceptual Framework of the study



Source: Compiled by the author

The research adopts a triangulation research design, which combines both quantitative and qualitative data collection methods to provide a comprehensive and nuanced understanding of the research problem. This design allows the study to draw on the strengths of both approaches, enhancing the robustness of the findings. The concurrent triangulation model is used, where both types of data are collected simultaneously and analyzed separately before being compared and integrated during the interpretation phase. This approach is particularly beneficial when examining complex phenomena like green finance, as it enables the study to capture both the measurable data (quantitative) and the underlying patterns, opinions, and experiences (qualitative) that influence the development of green finance strategies in Ethiopia.

The research approach used in this study is explanatory and descriptive. It seeks to explore the opportunities and challenges of implementing green finance in Ethiopia, aiming to provide both theoretical insights and practical recommendations. The study's objectives are clearly stated: to assess the current state of green finance initiatives in Ethiopia, identify areas of opportunity, evaluate the challenges hindering green finance, and explore its potential impact on inclusive sustainable growth.

Data collection for the study was carried out through a mixed-methods approach. The quantitative data is gathered through surveys, which are designed to capture numerical data on the knowledge, perceptions, and practices related to green finance among various stakeholders. The survey targets financial institutions, policymakers, businesses, and other key players in the green finance landscape. The qualitative data is collected through semi-structured interviews with experts, government officials, representatives of financial institutions, and other stakeholders involved in the implementation of green finance in Ethiopia. These interviews are designed to gain deeper insights into the challenges and opportunities of green finance from the perspective of those directly involved in its development and implementation.

The target population for the study includes a wide range of stakeholders, including government agencies, financial institutions, and other professionals working on sustainable projects. Sampling techniques are carefully chosen to ensure a representative sample, with the study using purposive sampling for interviews and convenience sampling for surveys to capture diverse perspectives

across different sectors. The sample size was determined based on the principles of statistical power and the need for sufficient representation from key groups.

For this particular study, the authors followed the recommendation by Corbetta (2003) to determine the sample size with a 95% confidence interval and a 5% sampling error when calculating the sample size. This approach helps ensure that the sample size is adequate for drawing meaningful conclusions from the data collected. Thus, the sample size for this study was determined with the use of the Topman formula as presented below

$$n = Z^2pq/e^2$$

n = required sample size
z = degree of confidence (i.e., 1.96)
p = probability of positive response (0.5)
q = probability of negative response (0.5)
e = tolerable error (0.05)

[n = (1.96) ^2 * 0.5 * 0.5 / (0.05) ^2] = 384

In terms of data analysis, the study employs both statistical methods for analyzing the quantitative survey data and thematic analysis for the qualitative interview data. The quantitative data is analyzed using software such as SPSS and R programming, where descriptive statistics, such as frequencies and percentages, are used to summarize the data. It begins by detailing the response rate of 384 distributed questionnaires, with 320 valid responses included in the final analysis. A reliability result of the data showed a Cronbach's alpha of 0.74, confirming the reliability of the survey items used for data collection. The descriptive statistics reveal several important trends. Firstly, the study identified a significant lack of awareness about green finance among the respondents. Only 5% of participants reported being moderately or highly aware of green finance, while the remaining 95% had limited or no awareness. This underscores the urgent need for educational initiatives to enhance knowledge about green finance in Ethiopia. Similarly, the study found that green finance initiatives were perceived as only moderately successful in addressing environmental and social concerns. 73% of respondents considered these initiatives somewhat

successful in promoting renewable energy and reducing carbon emissions but highlighted that the measurable benefits, such as job creation, were still underdeveloped due to systemic barriers like fragmented policies and financial limitations.

Another key finding pertains to the challenges of accessing green finance. A large portion of respondents indicated that the financing options available for green projects are unaffordable due to high interest rates and unfavorable loan terms. In terms of specific barriers, product awareness was highlighted as a significant challenge. Respondents cited the lack of awareness among potential investors and consumers, ineffective marketing strategies, and inadequate educational efforts as major obstacles to the growth of green finance. Over 73% disagreed that there was sufficient public awareness of green finance products, which suggests a pressing need for better promotional efforts and educational outreach. The affordability of financing options was also a notable barrier, with more than 50% of respondents indicating that green projects are not financially accessible.

Finally, the study emphasized that while Ethiopia has substantial opportunities in renewable energy and sustainable agriculture, these opportunities are underutilized due to insufficient regulatory frameworks, weak financial infrastructure, and low public awareness. These findings indicate that strategic interventions are required to raise awareness, improve access to finance, and strengthen the regulatory environment to unlock the full potential of green finance in Ethiopia. These insights suggest that addressing the awareness gaps, enhancing financial support for green projects, and fostering stronger government and institutional backing are essential for advancing green finance and supporting Ethiopia’s transition to a more sustainable and resilient economy.

The contributions of this study are substantial in understanding the opportunities and challenges associated with green finance in Ethiopia, a country with significant renewable energy potential but facing critical environmental and economic challenges. One of the primary contributions is addressing the knowledge gap regarding green finance in Ethiopia. This study is one of the first to comprehensively investigate green finance within the Ethiopian context, providing a detailed analysis of its potential to promote inclusive sustainable growth. Through its mixed-method approach, combining quantitative data from questionnaires and qualitative insights from interviews, the study offers a well-rounded perspective on the current state of green finance.

Key findings highlight that, despite Ethiopia's rich endowment of renewable energy resources such as hydropower, wind, and solar power, green finance initiatives are hindered by several systemic barriers, including a lack of public awareness, inadequate financial infrastructure, and insufficient technical expertise. The study reveals that only a small percentage of the population is aware of green finance, emphasizing the need for education and outreach efforts to raise awareness and understanding of these financial mechanisms.

Additionally, the study identifies several critical areas where green finance can contribute to inclusive growth. These include renewable energy and sustainable agriculture, which have been highlighted as key sectors for investment. However, challenges such as inconsistent government policies, and fragmented regulatory frameworks. The study also underscores the necessity for improved project preparation and technical expertise to ensure the successful implementation of green finance initiatives.

Moreover, the research contributes to the development of a conceptual framework that links green finance to Ethiopia's sustainable development strategies, particularly the Climate Resilient Green Economy (CRGE) strategy. This framework provides a foundation for future studies and policy development aimed at promoting green finance in Ethiopia and other developing countries with similar environmental and economic conditions. In conclusion, the study offers actionable recommendations for policymakers, financial institutions, and other stakeholders to enhance the effectiveness of green finance in Ethiopia. These include the need for better regulatory frameworks, targeted educational programs, and greater financial support for green projects, which would facilitate a transition toward sustainable economic growth. This research not only fills an academic gap but also provides practical solutions for fostering a more inclusive and sustainable green finance ecosystem in Ethiopia

Appendix 1 (A1)

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147. Yu, C.H., Wu, X., Zhang, D., Chen, S. and Zhao, J., 2021. Demand for green finance: Resolving financing constraints on green innovation in China. *Energy policy*, *153*, p.112255.

148. Zhao, L., Chau, K.Y., Tran, T.K., Sadiq, M., Xuyen, N.T.M. and Phan, T.T.H., 2022. Enhancing green economic recovery through green bonds financing and energy efficiency investments. *Economic Analysis and Policy*, *76*, pp.488-501.

Appendix 2 (A2)

Research questionnaire

Current Status of Green Finance in Ethiopia
How aware are you of the concept of green finance in Ethiopia?
To what extent do you think that green finance initiatives in Ethiopia are successfully addressing environmental and social concerns?
How available do you think green finance options are to small and medium-sized enterprises (SMEs) in Ethiopia?
How supportive do you think the Ethiopian government is of green finance initiatives?
To what extent do you believe that green finance initiatives can help promote inclusive economic growth in Ethiopia?
How much do you think financial institutions in Ethiopia are currently investing in green finance initiatives?
To what extent do you think the lack of awareness about green finance is a barrier to its implementation in Ethiopia?
To what extent do you believe that green finance is important for achieving sustainable economic growth in Ethiopia?
Challenges of Green Finance in Ethiopia
(Institutional Framework) The existing institutional framework in Ethiopia adequately supports the implementation of green finance.
(Institutional Framework) A clear and well-defined regulatory framework is in place for green finance initiatives in Ethiopia.
(Institutional Framework) The coordination and collaboration between different government agencies and stakeholders regarding green finance is effective.
(Project Financiers) Financial institutions in Ethiopia actively support and provide sufficient funding for green projects.
(Project Financiers) Green projects face difficulties in securing long-term financing from traditional financial institutions.

(Project Financiers) Financial institutions in Ethiopia have adequate knowledge and expertise to evaluate and finance green projects.
(Market Conditions) The demand for green financial products and services in Ethiopia is high.
(Market Conditions) The availability of green financial products and services in the Ethiopian market is sufficient.
(Market Conditions) Green projects face challenges in accessing appropriate market mechanisms and incentives.
(Product Awareness) There is awareness among potential investors and consumers about green financial products and services in Ethiopia.
(Product Awareness) The promotion and marketing efforts for green financial products and services in Ethiopia are effective.
(Product Awareness) The level of education and information dissemination about green finance among the general public is satisfactory.
(Limited Access to Finance) Green projects have affordable financing options in Ethiopia
(Limited Access to Finance) Financial institutions in Ethiopia have attractive criteria for providing financing to green projects.
(Limited Access to Finance) There are specialized financial institutions or funds dedicated to supporting green projects in Ethiopia.
(Political Instability) Political instability in Ethiopia hinders the implementation and growth of green finance initiatives.
(Political Instability) Green finance policies and regulations are subject to frequent changes and uncertainties due to political factors.
(Political Instability) The government's commitment to promoting green finance is affected by political instability.

(Limited Technical Expertise) There are skilled professionals with expertise in green finance in Ethiopia
(Limited Technical Expertise) Capacity-building programs and training initiatives for green finance professionals in Ethiopia are adequate.
(Limited Technical Expertise) Financial institutions have technical experts who navigate the unique regulatory and dynamics of green finance in Ethiopia
(Project Preparation) There are sufficient resources and capabilities to effectively prepare and execute green finance projects in Ethiopia
(Project Preparation) Project preparation procedures are prepared specifically by government or financial institutions to access green finance
(Project Preparation) Many organizations engage in consultation with green finance expert during the preparation of projects
Opportunities of Green Finance in Ethiopia
(Renewable Energy) The government policies and incentives in Ethiopia effectively support the growth of renewable energy projects that promote the enhancement of green finance
(Renewable Energy) The development of renewable energy projects in Ethiopia has significant potential for green finance investments
(Renewable Energy) Financial institutions in Ethiopia are actively financing renewable energy projects for the promotion of green finance
(Sustainable Agriculture) There is a strong demand for sustainable agriculture practices in Ethiopia, creating opportunities for green finance investments.

(Sustainable Agriculture) Financial institutions in Ethiopia are supportive of financing sustainable agriculture projects that promote green finance
(Sustainable Agriculture) The government provides sufficient policies and support for promoting sustainable agriculture practices in a bid to increase green finance
(Sustainable Transport) Developing sustainable transport infrastructure in Ethiopia offers potential for green finance investments.
(Sustainable Transport) Financial institutions in Ethiopia are actively financing sustainable transport projects in a bid to increase green finance
(Sustainable Transport) The government policies and initiatives in Ethiopia effectively support the growth of sustainable transport projects
(Green Buildings) The construction of green buildings in Ethiopia presents opportunities for green finance investments.
(Green Buildings) Financial institutions in Ethiopia provide adequate funding for green building projects in a bid to increase green finance fund
(Green Buildings) The government has implemented supportive policies and regulations for promoting green buildings.
(Policy Frameworks) The government of Ethiopia has established comprehensive policy frameworks that encourage green finance initiatives.
(Policy Frameworks) The policy frameworks in Ethiopia provide clear guidelines and incentives for green finance investments.
(Policy Frameworks) The government actively monitors and updates the policy frameworks to align with international best practices.

(Innovative Funding Methods) There are innovative funding methods available in Ethiopia that facilitate green finance investments.
(Innovative Funding Methods) Financial institutions in Ethiopia offer diverse and flexible financing options for green projects.
(Innovative Funding Methods) The government supports and promotes the use of innovative funding mechanisms for green finance projects
(Green Infrastructure) The development of green infrastructure projects in Ethiopia offers potential for green finance investments
(Green Infrastructure) Financial institutions in Ethiopia actively finance green infrastructure projects
(Green Infrastructure) The government provides sufficient policies and support

Appendix 3 (A3)

List of Publications

1. **Desalegn, G.,** Tangl, A. & Boros, A., 2024. The mediating role of customer attitudes in the linkage between e-commerce and the digital economy. NATIONAL ACCOUNTING REVIEW, 6(2), pp.245–265.
2. **Desalegn, G.,** Tangl, A., Fekete-Farkas, M., et al., 2024. Linking policies and regulations to sustainable finance for the promotion of urban agriculture: Evidence from micro and small businesses. HELIYON, 10(11).
3. **Desalegn, G.,** Tangl, A. & Fekete-Farkas, M., 2022a. From Short-Term Risk to Long-Term Strategic Challenges: Reviewing the Consequences of Geopolitics and COVID-19 on Economic Performance. SUSTAINABILITY, 14(21).
4. **Desalegn, G.,** Tangl, A. & Fekete-Farkas, M., 2022b. Greening through taxation: assessing the potential opportunities and challenges of plastic products in Ethiopia. AIMS Environmental Science, 9(4), pp.432–443.
5. **Desalegn, G.** & Tangl, A., 2022. Developing Countries in the Lead: A Bibliometric Approach to Green Finance. ENERGIES, 15(12).
6. **Desalegn, G.** & Tangl, A., 2022. Forecasting green financial innovation and its implications for financial performance in Ethiopian Financial Institutions: Evidence from ARIMA and ARDL model. NATIONAL ACCOUNTING REVIEW, 4(2), pp.95–111.
7. **Desalegn, G.,** Tangl, A. & Maria, F.-F., 2022. Greening Bank Financial Innovation for Better Financial Performance. Evidence from Ethiopia. ECONOMICS & WORKING CAPITAL, 2022(1–2), pp.55–64.
8. **Desalegn, G.** & Tangl, A., 2022. Enhancing Green Finance for Inclusive Green Growth: A Systematic Approach. SUSTAINABILITY, 14(12).
9. **Desalegn, G.** & Tangl, A., 2022. Banning Vs Taxing, Reviewing the Potential Opportunities and Challenges of Plastic Products. SUSTAINABILITY, 14(12).
10. **Desalegn, G.,** Maria, F.-F. & Tangl, A., 2022. The Effect of Monetary Policy and Private Investment on Green Finance: Evidence from Hungary. JOURNAL OF RISK AND FINANCIAL MANAGEMENT, 15(3).

11. **Desalegn**. **G,** 2023. Breaking the Black Market: The Case for Legalizing Foreign Exchange Trading in Ethiopia. JOURNAL OF ECONOMICS AND SUSTAINABLE DEVELOPMENT, 14(7), pp.9–12.
12. **Desalegn, G.** & Tangl A., 2021. Economic change and financial performance: A lesson from Ethiopian financial institutions. In Conference Proceedings of the 2nd Online International Scientific Conference on Economics, Politics and Management in times of change. pp. 20–29.
13. **Desalegn, G.,** 2020. Effects of Tax Audit on Revenue Collection Performance in Ethiopia: Evidence from ERCA Large Taxpayers' Branch Office. RESEARCH JOURNAL OF FINANCE AND ACCOUNTING, 11(7), pp.1–10.
14. **Desalegn. G,** 2020. Does IFRS Adoption Improve Financial Reporting Quality? Evidence from Commercial Banks of Ethiopia. RESEARCH JOURNAL OF FINANCE AND ACCOUNTING, 11(7), pp.18–24.
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